The New South Wales

UNIVERSITY *of* TECHNOLOGY

CALENDAR, 1956

THE N.S.W. UNIVERSITY OF TECHNOLOGY, CALENDAR, 1956

CALENDAR

OF

THE NEW SOUTH WALES
UNIVERSITY OF TECHNOLOGY

1956

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TABLE OF CONTENTS

(Information in this Calendar has been brought up to date as at 31st December, 1955)

TABLE OF CONTENTS—*continued.*

THE NEW SOUTH WALES UNIVERSITY OF TECHNOLOGY.

Calendar—1956

January—

Monday 30.........	Australia Day—Public Holiday.

February—

Monday 13.........	Enrolments begin all courses except 2nd year of courses I, IV, V, VI, VII, VIII and IX.
Tuesday 14	Professorial Board meets.
Monday 20.........	First term begins.

March—

Monday 12.........	Council meets.
Tuesday 13	Professorial Board meets.
Wednesday 21 ...	Faculty of Architecture meets.
Monday 26.........	Enrolments and lectures commence—2nd year courses I, IV, V, VI, VII, VIII and IX.
Wednesday 28 ...	Faculty of Engineering meets.
Friday 30 to Monday, April 2.	Easter Holidays.

April—

Wednesday 4......	Faculty of Science meets.
Tuesday 10	Professorial Board meets.
Wednesday 25 ...	Anzac Day—Public Holiday.

May—

Wednesday 2......	Faculty of Humanities and Social Sciences meets.
Saturday 12	First term ends.
Monday 14 to Saturday 26.	Vacation (2 weeks).
Monday 14.........	Council meets.
Tuesday 15	Professorial Board meets.
Monday 28.........	Second term begins.

CALENDAR—1956—*continued.*

June—

Monday 4	Queen's Birthday—Public Holiday.
Wednesday 6......	Faculty of Engineering meets.
Tuesday 12	Professorial Board meets.
Wednesday 13 ...	Faculty of Science meets.
Wednesday 20 ...	Faculty of Architecture meets.

July—

Wednesday 4......	Faculty of Humanities and Social Sciences meets.
Monday 9	Council meets.
Tuesday 10	Professorial Board meets.
Wednesday 18 ...	Faculty of Engineering meets.

August—

Monday 6	Bank Holiday—classes meet as usual.
Tuesday 14	Professorial Board meets.
Wednesday 15 ...	Faculty of Science meets.
Saturday 18	Second term ends.
Monday 20 to Saturday, September 1.	Vacation (2 weeks).

September—

Monday 3	Third term begins.
	Examinations commence—two-term courses, except 2nd year of courses I, V, VI, VII, VIII, and IX.
Monday 10.........	Council meets.
Tuesday 11	Professorial Board meets.
Wednesday 12 ...	Faculty of Engineering meets.
Saturday 15	Examinations cease—two-term courses.
Monday 17.........	Industrial training begins—two-term courses not engaged in Survey Camp.
Monday 17 to Friday 21.	Survey Camp—1st year courses VII and VIII, 2nd year courses VIIA and VIIB, 3rd year courses V, VI, VII, VIIA and VIII, 4th year courses VII and VIII, 6th year course VIIB.
Wednesday 19 ...	Faculty of Science meets.
Monday 24.........	Industrial training begins—two-term courses attending Survey Camp, except 3rd year of courses VII, VIIA and VIII.
Monday 24 to Friday 28.	Geology excursion—3rd year of courses VII, VIIA and VIII.
Wednesday 26 ...	Faculty of Architecture meets.

CALENDAR—1956—*continued.*

October—

Monday 1	Six Hour Day—Public Holiday.
Tuesday 2	Industrial training begins—3rd year of courses VII, VIIA and VIII.
Wednesday 3......	Faculty of Humanities and Social Sciences meets.
Saturday 6.........	Lectures cease—2nd year courses I, V, VI, VII, VIII and IX.
Tuesday 9	Professorial Board meets.
Monday 15.........	Examinations commence—2nd year courses I, V, VI, VII, VIII and IX.
Saturday 27	Examinations cease—2nd year courses I, V, VI, VII, VIII and IX.
Monday 29.........	Industrial training commences—2nd year courses, I, V, VI, VII, VIII and IX.

November—

Saturday 10	Lectures cease—diploma and three-term degree courses.
Monday 12.........	Council meets.
Tuesday 13	Professorial Board meets.
Monday 19.........	Examinations begin—diploma and three-term degree courses.
Saturday 24	Third term ends.

December—

Saturday 8	Examinations end—diploma and three-term degree courses.
Tuesday 11	Professorial Board meets.

February— 1957.

Monday 11.........	Enrolments begin.
Tuesday 12	Professorial Board meets.
Monday 18.........	First term begins.

LOCATION OF SCHOOLS AND STAFF.

The location of the various Schools of the University and their staff is as follows:—

The Faculties of Architecture and Humanities and Social Sciences and the Schools of Applied Physics, Mining Engineering and Applied Geology, and Textile Technology are in the main building at Barker Street, Kensington, and the Department of Production Engineering will also be housed there early in 1956.

The Schools of Chemical Engineering and Metallurgy are located in a separate block on the northern end of the Kensington site, at High Street.

The Schools of Applied Chemistry, Civil Engineering, Electrical Engineering, and Mechanical Engineering are in the grounds of Sydney Technical College, Broadway.

The Schools of Applied Psychology and Mathematics are also at the Sydney Technical College grounds, Broadway, but will be transferred early in 1956 to a new building at the corner of Anzac Parade and Day Avenue, Kensington, which will also house the Faculty of Commerce.

The School of Wool Technology is at East Sydney Technical College, Forbes Street, Darlinghurst.

The Vice-Chancellor and the Divisions of the Registrar and the Bursar are in the main building at Barker Street, Kensington: the remainder of the University's administrative staff, including the Accounts Branch, is at the Sydney Technical College, Broadway.

The postal address at Kensington is Box 1, P.O., Kensington.

PREFACE.

Incorporated by Act of the New South Wales Parliament on 1st July, 1949, the N.S.W. University of Technology was established to assist in meeting the urgent demand in Australia for increasing numbers of technologists and applied scientists, and to provide them with the means of advanced training and research.

In the words of the Act, the objects of the University are—

(*a*) the provision of facilities for higher specialised instruction and advanced training in the various branches of technology and science in their application to industry and commerce; and

(*b*) the aiding by research and other suitable means of the advancement and development of science in its application to industry and commerce.

The Incorporating Act was amended in 1955, and by the Act, as amended, provision is made for the government of the University by a Council representative of Parliament, industry and commerce, agriculture, the trade unions, technical education, professional bodies, the University of Sydney, and of the University's own professorial and teaching staff and its undergraduates and graduates. The present membership of the Council is listed on pages 46 and 47 of the Calendar.

The Council under the authority given to it by the Act—

(*a*) may provide courses in applied science, engineering, technology, commerce, industrial organisation and such other related courses as it deems fit, and may, after examination, confer the several degrees of Bachelor, Master and Doctor, and such other degrees and such certificates in the nature of degrees or otherwise as it thinks fit;

(*b*) may from time to time appoint deans, professors, lecturers and other officers and employees of the University;

(*c*) shall have the entire control and management of the affairs, concerns and property of the University; and

(*d*) may act in all matters concerning the University in such manner as appears to it best calculated to promote the objects and interests of the University.

The first courses, leading to the degree of Bachelor of Engineering, were instituted in 1948 in Civil, Electrical, Mechanical, and Mining Engineering. These courses were planned to give students full-time lecture and laboratory instruction at the University for approximately half the year, with planned industrial experience for the remainder of the year. This initial step was made possible by the work of the

Developmental Council appointed in August, 1947, by the Minister for Education, the Hon. R. J. Heffron, M.L.A. Courses leading to the degree of Bachelor of Science were introduced in Applied Chemistry and Chemical Engineering for the 1949 academic year, and in Applied Physics and Wool Technology for the 1951 academic year. A first degree course in Architecture (B.Arch.) was established in 1950, and in 1954 a further full-time Bachelor of Science course, in Metallurgy, and a four-year degree course in Applied Geology leading to the degree of Bachelor of Engineering (Geology), were offered. A four-year full-time course in Food Technology (B.Sc.) was also instituted in 1954.

Part-time degree courses were introduced in 1954 in Applied Biology, Applied Chemistry, Applied Geology, Chemical Engineering, Civil Engineering, Electrical Engineering, Food Technology, General Science, Industrial Chemistry, Leather Chemistry, Mechanical Engineering and Metallurgy. These courses are of the same standard as the full-time degree courses, and are arranged to enable the student to remain continuously in employment related to his studies throughout the whole course. A part-time course was instituted in Applied Psychology in 1955, leading to the degree of Bachelor of Science in Psychology.

During 1955 the Council decided to establish a Faculty of Commerce, provision being made for foundation Chairs in Accountancy and Economics. An appointment was made in 1955 to the Chair of Accountancy, and a foundation Chair in Textile Technology was filled. Approval was also given to the establishment of Chairs in Highway Engineering and Traffic Engineering. The Department of Main Roads is making available £5,000 a year for five years for the establishment of the Chair in Highway Engineering, and a grant of £5,000 a year for five years is being made by the Australian Automobile Association for the Chair in Traffic Engineering.

Two features are emphasised in the planning of first degree courses of the University of Technology. The first is the inclusion of industrial experience as an essential part of the courses to supplement the laboratory and lecture-room work at the University. In the Faculty of Engineering this practical work occupies five months a year, and is supervised and organised to suit the stage and syllabus of each course of study. A different pattern obtains in the Faculty of Applied Science, where, for example, in the case of Applied Chemistry (Course II) the first and fourth years are full-time at the University while the second and third years are part-time at the University concurrently with appropriate industrial employment.

Secondly, in all faculties, the study of general subjects such as language and literature, history, economics and psychology, is compulsory. These courses are designed to broaden the experience and interests of the student and thus to assist him to take the place in contemporary affairs for which he is otherwise qualified. In view of the development which the Humanities subjects have undergone, the Council approved the establishment of a Faculty of Humanities and Social Sciences in 1954.

The University offers the customary club and social features of university life—sport and societies dealing with literature, religion, art, music and public questions. During 1952 the constitution of the University of Technology Students' Union was approved by Council. Membership of the Union is compulsory for all registered students. Membership of the N.S.W. University of Technology Sports Association is also compulsory for all registered students.

In order to secure a closer integration between the relevant activities of the Department of Technical Education and the University, arrangements were completed during 1951 for the University to administer twenty of the Department's professional diploma courses and to further this integration in 1954 the syllabuses of the diploma courses were revised in the Faculties of Applied Science and Engineering to align them as closely as possible with the part-time degree courses. Where a part-time degree course is conducted in the particular field of study, a student may generally qualify for the diploma of Associateship of Sydney Technical College by completing the first five years (in the case of Chemical Engineering, Food Technology and Metallurgy, six years) of the part-time degree course. Should the student then desire to take out a degree, he can do so by completing the remainder of the part-time degree course. The diploma courses now administered by the University of Technology are—

Faculty of Applied Science: *Applied Biology, *Applied Chemistry, *Chemical Engineering, *Food Technology, *Leather Chemistry, *Metallurgy, *Optometry, *Physics, Science, *Secondary Metallurgy.

Faculty of Architecture: *Architecture, Building, Quantity Surveying.

Faculty of Engineering: Aeronautical Engineering, *Civil Engineering, *Electrical Engineering, *Mechanical Engineering, Metalliferous Mining, Naval Architecture, Production Engineering, *Radio Engineering.

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*Students completing these courses may proceed to the appropriate degree with full credit for their diploma studies.

Where the diploma was obtained prior to this alignment of courses, a first degree of the New South Wales University of Technology may be gained by further study in a conversion course conducted by the University.

Special investigations may be carried out on problems of technology or applied science on request, and in respect of any such investigation the Council of the University may charge such fees therefor and agree to such conditions in relation thereto as it thinks fit.

A number of industrial undertakings and Government departments are co-operating with the University by their recognition of its courses as a means of training their industrial cadets in the theory and practice of their profession. To this end, they have selected employees as students to attend degree courses, paying their fees and the ordinary cadet rates payable during their periods in industry. In many cases the attendance of such students is also counted as part of their service for seniority grading and salary purposes.

A number of scholarships with liberal living allowances have been granted, particularly from the coal-mining and metal industries.

Students may also prepare for the degrees of Master of Science, Master of Science in Psychology, Master of Architecture, Master of Engineering or Doctor of Philosophy in Science or Engineering.

The first main building on the University site at Kensington was opened on 16th April, 1955, by the Governor of New South Wales, His Excellency Lieutenant-General Sir John Northcott, K.C.M.G., K.C.V.O., C.B., and the Schools of Applied Physics, Architecture and Building, Humanities and Social Sciences, Mining Engineering and Applied Geology, and Textile Technology, the Department of Production Engineering, and the Registrar's and Bursar's Divisions of the University Administration are now located in this building. The Schools of Applied Psychology and Mathematics and the newly created Faculty of Commerce will also operate at Kensington early in 1956.

The School of Chemical Engineering, including the Department of Food Technology, is housed in seven light-framed permanent buildings at the northern end of the University site, and the School of Metallurgy occupies four similar buildings in the same area.

The remaining Schools of the University are operating in the Sydney Technical College grounds at Ultimo, with the exception of the School of Wool Technology, which is at East Sydney Technical College.

Power to decentralise the University's activities, both in its co-operation with industry and in its teaching services, is given to the Council, which is authorised to establish and maintain branches, departments or colleges at Newcastle, Wollongong, Broken Hill, or such other places in the State of New South Wales as it may approve. Action has been taken under this authority to establish the Newcastle University College of the University within the Newcastle Technical College and this College was opened on 3rd December, 1951.

Instruction in certain courses is also provided at Wollongong and Broken Hill, and from 1956 the first and second years of the Mechanical Engineering diploma and part-time degree courses will be offered at Orange.

Late in 1953 the Minister for Education announced that the New England University College would become the University of New England in 1954 with authority to confer degrees. In conjunction with this development arrangements were made for students to enrol in classes at the Newcastle College of the New South Wales University of Technology with a view to meeting the requirements for the degree of Bachelor of Arts of the University of New England, and in accordance with this arrangement Arts courses were commenced at Newcastle in 1954.

Details of the courses at Newcastle may be found in the Handbook of Newcastle University College.

TECHNICAL EDUCATION AND NEW SOUTH WALES UNIVERSITY OF TECHNOLOGY ACT, 1949-1955.

PART III.

THE NEW SOUTH WALES UNIVERSITY OF TECHNOLOGY.

DIVISION 1.—Preliminary.

Commencement.

Proclamation issued G.G. 24/6/49 sections 35 and 36 excepted.

14. This Part of this Act shall, except where otherwise expressly provided, commence upon a day to be appointed by the Governor and notified by proclamation published in the Gazette.

Definitions.

15. In this Part of this Act, unless the context or subject matter otherwise indicates or requires—

"By-laws" means by-laws made under this Part of this Act.

"Council" means the Council of the University.

"Prescribed" means prescribed by this Part of this Act or by the regulations.

"Regulations" means regulations made under this Part of this Act.

"University" means the New South Wales University of Technology.

DIVISION 2.—Incorporation of the University and Establishment of a Council thereof.

New South Wales University of Technology.

16. (1) There shall be a New South Wales University of Technology consisting of the Council, the professors and such other classes of persons giving instruction within the University as may be prescribed and the graduate and under-graduate members thereof.

(2) The University shall be a body corporate under the name of "The New South Wales University of Technology" with perpetual succession and a common seal, and shall be capable by that name of suing and being sued, and of doing and suffering all such other acts and things as bodies corporate may by law do and suffer.

(3) The University shall, subject to this Part of this Act and the regulations, have power to take, purchase, hold, grant, alienate, demise or otherwise dispose of real and personal property:

Provided that the University shall not, except with the approval of the Governor, alienate, mortgage, charge or demise any real property.

Common Seal.

17. (1) The common seal of the University shall be kept in such custody as the Council directs, and shall not be used except upon resolution of the Council.

(2) All courts, judges and persons acting judicially shall take judicial notice of the common seal of the University affixed to any document, and shall presume that it was duly affixed.

Objects of the University.

18. The objects of the University shall include the following:—

(*a*) to provide facilities for higher specialised instruction and advanced training in the various branches of technology and science in their application to industry and commerce; and

(*b*) to aid by research and other suitable means the advancement, development, and practical application of science to industry and commerce.

The Council.

19. (1) There shall be a Council of the University which shall have and may exercise and discharge the powers, authorities, duties and functions conferred and imposed upon the Council by or under this Part of this Act.

(2) The Council shall consist of not more than thirty-nine members who shall be appointed by the Governor.

Of the members so appointed—

(*a*) five shall be appointed on the nomination of the Minister, being persons who, in the opinion of the Minister, by their knowledge and experience can advance the full development of the University;

(*b*) one shall be a member of the Legislative Council elected by that Council;

(*c*) one shall be a member of the Legislative Assembly elected by that Assembly;

(*d*) four shall be appointed on the nomination of the Minister to represent persons engaged in the professions;

(*e*) two shall be officers within the meaning of the Public Service Act, 1902, as amended by subsequent Acts, directly concerned with and engaged in the administration of technical education and shall be appointed on the nomination of the Minister:

(*f*) five shall be appointed on the nomination of the Minister to represent industrial and commercial interests;

(*f1*) two shall be appointed on the nomination of the Minister to represent agricultural, pastoral and rural interests;

(*g*) three shall be appointed on the nomination of the Minister to represent trade unions and employee organisations;

(*h*) one shall be appointed upon the nomination of the Senate of the University of Sydney.

(*h1*) one shall be the person for the time being holding the office of Chairman of the Professorial Board of the University;

(*i*) one shall be a person having the qualifications as prescribed by the by-laws, elected in the manner prescribed by the by-laws, by undergraduates within the University;

(*j*) not more than seven, the number to be determined in accordance with the provisions of subsection (2A) of this section, shall be persons having the qualifications as prescribed by the by-laws elected, in the manner prescribed by the by-laws, by the graduates of the University;

(*k*) one shall be a person elected, in the manner prescribed by the by-laws, by the professors and such other classes of persons giving instruction within the University as may be so prescribed;

(*l*) one shall be the person for the time being holding the office of Vice-Chancellor of the University;

(*m*) not more than four shall be persons elected in the manner prescribed by the by-laws to represent such principal faculties as may be so prescribed.

(2A) The number of persons to be elected pursuant to paragraph (*j*) of subsection two of this section shall be—

(*a*) where the number of the graduates of the University does not exceed five hundred, two;

(*b*) where the number of the graduates of the University exceeds five hundred but does not exceed one thousand, three;

(*c*) where the number of the graduates of the University exceeds one thousand, four and one for each additional one thousand graduates in excess of one thousand and one until the maximum number of seven is attained.

For the purposes of this section "graduate" means person whose name appears on the list of electors comprised of graduates prepared in accordance with the by-laws.

(3) The person or persons to be nominated by the Minister for appointment pursuant to paragraph (*d*), (*f*), (*f1*), or (*g*) of subsection two of this section shall, in respect of each such paragraph,

be selected by him from a panel of such number of names as may be prescribed submitted to him for the purpose by such person or class or classes of persons or body or bodies of persons as may be prescribed in relation to that paragraph.

The regulations may prescribe—

(*a*) the time within which any such panel of names shall be submitted to the Minister;

(*b*) where any such panel of names is to be submitted by more than one prescribed class or body of persons, the number of names which each such class or body is entitled to include in such panel.

(4) If for any reason a panel of names is not submitted to the Minister in accordance with this section or the regulations or is not submitted within the time prescribed with respect thereto, the Minister may nominate such person or persons as he thinks fit and such person or persons shall be deemed to have been validly nominated in accordance with subsection three of this section and the regulations.

(5) (*a*) Members of the Council, other than the Vice-Chancellor of the University, and the Chairman of the Professorial Board of the University, shall, subject to this Part of this Act, hold office for such period not exceeding four years as may be prescribed. Different periods may be prescribed in respect of the different classes of members.

The Vice-Chancellor of the University shall hold office while he remains Vice-Chancellor.

The Chairman of the Professorial Board of the University shall hold office while he remains Chairman of that Board.

(*b*) The regulations may provide for the retirement in rotation of members of any particular class and for that purpose may provide that, on the first appointment of members of any such class after the introduction of rotational retirement, such number as may be prescribed of the members of that class shall be appointed for a less period than that prescribed pursuant to paragraph (*a*) of this subsection with respect to members of that class.

(*c*) All retiring members shall, unless otherwise disqualified, be eligible for reappointment.

(6) Where a casual vacancy occurs in the office of a member of the Council the Governor may appoint a person to the vacant office. The person so appointed shall have the like prescribed qualification (if any) as that of the member whose office has become vacant and shall, subject to this Part of this Act, hold office for the residue of his predecessor's term of office.

(7) The provisions of the Public Service Act, 1902, as amended by subsequent Acts, shall not apply to or in respect of the appointment by the Governor of any member of the Council, and any member so appointed shall not, in his capacity as such member, be subject to the provisions of such Act during his term of office.

Vacation of Office.

20. A member of the Council shall be deemed to have vacated his office if he—

(*a*) dies;

(*b*) resigns his office by writing under his hand addressed to the Governor;

(*c*) becomes bankrupt, compounds with his creditors or makes any assignment of his salary or estate for their benefit;

(*d*) becomes an insane person or patient or an incapable person within the meaning of the Lunacy Act, 1898-1947;

(*e*) absents himself from four consecutive meetings of the Council without leave of the Council; or

(*f*) in the case of a member elected by either House of Parliament—ceases to be a member of that House.

Chancellor and Deputy Chancellor.

21. (1) The first Chancellor and the first Deputy Chancellor of the University shall be the persons who, immediately before the day upon which Her Majesty's assent to the Technical Education and New South Wales University of Technology (Amendment) Act, 1955, is signified, held office as President and Vice-President of the University respectively. Such persons shall hold office as Chancellor and Deputy Chancellor for the remainder of the period for which and upon the terms and conditions upon which they would have held office as President and Vice-President respectively had the said Act not been enacted.

(2) Wherever a vacancy in the office of Chancellor or Deputy Chancellor occurs the Council shall elect one of its number to be Chancellor or Deputy Chancellor of the University.

(3) The Chancellor and Deputy Chancellor shall, subject to subsection one of this section, hold office for such period and on such terms and conditions as may be prescribed by the by-laws.

Chairman.

22. At every meeting of the Council the Chancellor or, in his absence, the Deputy Chancellor, shall preside as Chairman, but if the Chancellor and Deputy Chancellor are both absent, the members present shall elect a person from among their number to preside as chairman.

Questions How Decided.

23. (1) All questions which come before the Council shall be decided at any meeting duly convened, at which a quorum is present, by a majority of the votes of the members present.

(2) The chairman at any such meeting shall have a vote; and in case of an equality of votes a second or casting vote.

(3) At any such meeting ten members shall form a quorum.

Validity of Acts and Proceedings.

24. (1) No act or proceeding of the Council or any committee of the Council, or of the Vice-Chancellor or any person acting pursuant to any direction of the Council shall be invalidated or prejudiced by reason only of the fact that at the time when such act or proceeding was done, taken or commenced there was a vacancy or vacancies, not exceeding twelve in number, in the office or offices of any member or members of the Council.

(2) All acts and proceedings of the Council or any committee of the Council, or of the Vice-Chancellor or any person acting pursuant to any direction of the Council shall, notwithstanding the subsequent discovery of any defect in the appointment, nomination or election of any member of the Council, or that any such member was disqualified from acting as or incapable of being a member of the Council, be as valid as if such member had been duly appointed, nominated or elected and was qualified to act as or capable of being a member and had acted as a member of the Council and as if the Council had been properly and fully constituted.

DIVISION 3.—Administration.

Powers of the Council.

25. Subject to this Part of this Act and to the regulations and by-laws, the Council—

(*a*) may provide courses in applied science, engineering, technology, commerce, industrial organisation and such other related courses as it deems fit and may, after examination, confer the several degrees of Bachelor, Master and Doctor, and such other degrees and such certificates in the nature of degrees or otherwise as it thinks fit;

(*b*) may from time to time appoint deans, professors, lecturers and other officers and employees of the University;

(*c*) shall have the entire control and management of the affairs, concerns and property of the University; and (*d*) may act in all matters concerning the University in such manner as appears to it best calculated to promote the objects and interests of the University:

Provided that no appointment of a dean, professor, lecturer or other officer or employee shall be made pursuant to this section before the day appointed and notified pursuant to subsection three of section thirty-three of this Act.

Vice-Chancellor.

26. (1) There shall be a Vice-Chancellor of the University who shall be the chief executive officer of the Council.

(2) The Vice-Chancellor shall have and may exercise and discharge such powers, authorities, duties and functions as may be prescribed in the regulations and by-laws.

(3) The Vice-Chancellor shall be appointed in the manner prescribed and shall hold office for such period and upon such terms and conditions as may be prescribed.

Delegation to Committees, etc.

27. (1) The Council may constitute and appoint such committees as it thinks fit and may delegate all or any of its powers, authorities and functions (except this power of delegation and the power to make by-laws) to any such committee or to any member of the Council, or to any officer or officers of the University.

(2) Every delegation under this section shall be revocable by resolution of the Council and no delegation shall prevent the exercise or discharge by the Council of any of its powers, authorities, duties or functions.

Ad Eundem and Honorary Degrees.

28. (1) Where any person has obtained in any university or other educational establishment recognised by the by-laws of the university in force for the time being any degree or diploma corresponding or equivalent, in the opinion of the Council, to any degree which the Council is now or may hereafter be empowered to confer after examination, the Council may confer such latter degree upon such person without examination.

(2) The persons upon whom degrees are conferred, under the provisions of subsection one of this section, shall be entitled to the same rights and privileges as appertain to those who have taken the same degrees in the ordinary course in the University.

(3) By-laws may be made for or with respect to the conferring of honorary degrees or other distinctions on approved persons.

Power to Establish and Maintain Branches, Departments, or Colleges.

29. (1) The Council may establish and maintain branches, departments or colleges of the University at Newcastle, Wollongong, Broken Hill or such other place in the State as the Council deems fit.

Council May Authorise Educational Establishments to Issue Certificates.

(2) (*a*) The Council may authorise any college or educational establishment, whether incorporated or not, engaged in the promotion of applied science and technology, to issue to candidates for any degree or diploma, certificates to the effect that the candidate for any such degree or diploma has completed such course of instruction therefor as the Council by by-law prescribes.

(*b*) Any person who presents to the Council any such certificate may be admitted as a candidate for the degree or diploma to which it has reference.

Evidence of Degrees Conferred.

30. All degrees conferred by the University shall be evidenced by a certificate under the common seal of the University and be signed by the Chancellor and the Vice-Chancellor.

Fees.

31. The Council may by by-law make provision for the payment by students of the University of reasonable fees for entrance to the University, attendance at lectures, conferring of degrees and other University charges, except in the case of any student who is granted any fellowship, scholarship, exhibition, bursary or similar benefit to the extent to which he is thereby exempted from payment of fees.

Technological and Scientific Investigation.

32. (1) The Council may carry out special investigations in any technological or scientific matter at the request of any authority, institution, association, firm or person, and in respect of any such investigation may charge such fees therefor and agree to such conditions in relation thereto as it thinks fit.

(2) The Council may publish information relating to any matter investigated by it pursuant to the provisions of subsection one of this section or otherwise:

Provided that no such publication shall be made in contravention of any condition agreed to pursuant to the said subsection.

Transitional Provisions—Appointments.

33. (1) (*a*) During the period commencing on the date of commencement of this Part of this Act and ending on the appointed day the provisions of this subsection shall have effect.

(*b*) All deans, professors, lecturers and other officers and employees necessary to enable the Council to exercise and discharge the powers, authorities, duties and functions conferred and imposed upon it by this Part of this Act shall be appointed under and subject to the provisions of the Public Service Act, 1902, as amended by subsequent Acts; and every such dean, professor, lecturer or other officer or employee shall be subject to the said Act, as so amended, during his tenure of office or employment; and the permanent head of the Department of Technical Education shall in relation to such deans, professors, lecturers and other officers and employees be the permanent head within the meaning of the said Act, as so amended.

(2) Any person appointed under subsection one of this section and in office immediately before the appointed day who is not appointed by the Council to the staff of the University on that day shall be entitled, if he is under the age of sixty years, to be appointed on the recommendation of the Public Service Board to some office or position in the Public Service not lower in salary than that which he held under the said subsection immediately before the appointed day.

Proclamation issued G.G. 14/5/54.

(3) In this section, "appointed day" means a day to be appointed by the Governor and notified by proclamation published in the Gazette. The day so appointed and notified shall not be earlier than one month after the date of the publication of such proclamation in the Gazette.

Use of Services of Officers and Employees of the Public Service.

34. For the purpose of exercising and discharging the powers, authorities, duties and functions conferred and imposed on the Council by this Part of this Act the Council may, with the approval of the Minister of the Department concerned and of the Public Service Board, on such terms as may be arranged, make use of the services of any of the officers and employees of any Government Department.

Saving of Rights.

35. (1) Where a person who is appointed by the Council to the staff of the University was immediately before his appointment an officer within the meaning of the Public Service Act, 1902, or an employee within the meaning of the Superannuation Act, 1916, he shall—

(*a*) retain any rights accrued or accruing under either of those Acts;

(*b*) continue to contribute to any fund or account and shall be entitled to receive any deferred or extended leave and any payment, pension or gratuity as if he were an officer or employee within the meaning of the Public Service Act, 1902, or the Superannuation Act, 1916, as the case may be, and for such purpose his service with the University shall be deemed to be service for the purposes of such Acts;

(*c*) in the event of his ceasing to be employed by the University (otherwise than on account of misconduct or disgraceful or improper conduct) be entitled, if he is under the age of sixty years, to be appointed upon the recommendation of the Public Service Board to some office in the Public Service not lower in classification and salary than that which he held immediately before his appointment to the staff of the University.

(2) This section shall commence upon the day appointed and notified pursuant to subsection three of section thirty-three of this Act.

Amendment of Act No. 28, 1916, *Sch. III.*

36. (1) The Superannuation Act, 1916-1948, is amended by inserting at the end of Schedule Three thereto the following words:—

The New South Wales University of Technology.

(2) This section shall commence upon the day appointed and notified pursuant to subsection three of section thirty-three of this Act.

By-laws.

37. (1) The Council may make by-laws, not inconsistent with this Part of this Act or the regulations, with respect to all matters pertaining to the University.

(2) Without prejudice to the generality of subsection one of this section the Council may make by-laws with respect to—

(*a*) the management, good government, and discipline of the University;

(*b*) the method of election of members of the Council (other than the members referred to in paragraphs (*b*) and (*c*) of subsection two of section nineteen of this Act) who are to be elected;

(*c*) the manner and time of convening, holding and adjourning the meetings of the Council; the manner of voting at such meetings, including postal voting or voting by proxy; the powers and duties of the chairman thereof; the conduct and record of the business; the appointment of committees of the Council, and the quorum, powers and duties of such committees;

(*d*) the number, stipend, manner of appointment and dismissal of deans, professors, lecturers, examiners, and other officers and servants of the University;

(*e*) the entrance standards for students;

(*f*) the examinations for and the granting of degrees, diplomas, certificates and honours;

(*g*) the examinations for and the granting of fellowships, scholarships, exhibitions, bursaries, and prizes;

(*h*) the admission of students of other universities and technical colleges to any corresponding status or of graduates of other universities or technical colleges to any corresponding degree or diploma without examination;

(*i*) generally, all other matters authorised by this Part of this Act or necessary or convenient for giving effect to this Part of this Act.

(3) Every by-law made by the Council shall be sealed with the common seal of the University, shall be submitted for the consideration and approval of the Governor, and when so approved shall—

(*a*) be published in the Gazette;

(*b*) take effect from the date of publication or from a later date to be specified in the by-law.

(4) A copy of every such by-law shall be laid before each House of Parliament within fourteen sitting days after the publication thereof in the Gazette if Parliament is in session, and if not, then within fourteen sitting days after the commencement of the next session.

(5) Any such by-law may be proved in any court by the production of a verified copy under the seal of the University or by the production of a document purporting to be a copy of such by-law and to be printed by the Government Printer.

Division 4.—Finance.

New South Wales University of Technology Account.

38. (1) The University shall have an account which shall be called the "New South Wales University of Technology Account" (in this section referred to as the "Account").

(2) There shall be paid to the credit of the Account—

(*a*) all moneys received by the University by way of fees, charges, gifts, bequests or otherwise;

(*b*) all moneys made available to the University or the Council in accordance with the provisions of this Division.

(3) All expenditure incurred by the University (including the repayment of moneys borrowed by or advanced to the University in accordance with this Division) shall be paid from the Account.

Colonial Treasurer to Meet Certain Costs.

39. (1) Any expenditure incurred by the University with the approval of the Governor given on the recommendation of the Colonial Treasurer is in this section referred to as approved expenditure.

(2) The Colonial Treasurer shall, in each year, pay to the University the amount by which the approved expenditure exceeds the income from all sources of the University or so much of such income as is capable of being applied for the purpose of meeting approved expenditure.

(3) Any moneys payable by the Colonial Treasurer under this section shall be paid out of moneys provided by Parliament.

Advances by Colonial Treasurer.

40. The Colonial Treasurer may for the temporary accommodation of the University advance such moneys to the Council as the Governor may approve upon such terms and conditions as to repayment and interest as may be agreed upon.

Power of Council to Borrow.

41. The Council may borrow money for—

(*a*) the purpose of carrying out or performing any of its powers, authorities, duties and functions;

(*b*) the renewal of loans; or

(*c*) the discharge or partial discharge of any indebtedness to the Colonial Treasurer or to any bank,

within such limits, to such extent and upon such conditions as to security or otherwise as the Governor upon the recommendation of the Colonial Treasurer may approve.

Accounts To Be Rendered.

42. The Council shall cause to be kept proper books of account in relation to the funds of the University and shall, as soon as practicable after the thirtieth day of June in each year, prepare and transmit to the Minister for presentation to Parliament a statement of accounts in a form approved by the Auditor-General exhibiting a true and correct view of the financial position and transactions of the University.

Audit.

43. The accounts of the University shall be audited by the Auditor-General, who shall have, in respect thereof, all the powers conferred on the Auditor-General by any law now or hereafter in force relating to the audit of public accounts; and the Audit Act, 1902, and any Acts amending the same, shall apply to the members of the Council and to the officers and employees of the University in the same manner as it applies to accounting officers of public departments.

DIVISION 5.—General.

No Religious Test.

44. No religious test shall be administered to any person in order to entitle him to be admitted as a student of the University, or to hold office therein, or to graduate thereat, or to enjoy any benefit, advantage or privilege thereof.

Power to Accept Gifts, etc.

45. (1) The University shall have power to acquire by gift, bequest or devise any property for the purposes of this Part of this Act, and to agree to and carry out the conditions of any such gift, bequest or devise.

(2) The rule of law relating to perpetuities shall not apply to any condition of a gift, bequest or devise to which the University has agreed.

Council to Co-operate with Other Bodies.

46. In the exercise of its powers, authorities, duties and functions under this Part of this Act the Council shall, so far as is practicable, co-operate with the University of Sydney, the Commonwealth Scientific and Industrial Research Organisation, the Department of Technical Education, and other Commonwealth and State institutions devoted to science and research.

Report of Proceedings.

47. (1) As soon as practicable after the thirtieth day of June in each year, the Council shall prepare and furnish to the Minister a report upon the proceedings of the University during the period of twelve months immediately preceding that day. Such report shall include a summary of the work, researches and investigations carried out by the University during such period.

(2) A copy of such report shall be laid before both Houses of Parliament as soon as practicable after it has been received by the Minister.

Regulations.

48. (1) The Governor may make regulations not inconsistent with this Part of this Act prescribing all matters which by this Part of this Act are required or permitted to be prescribed or which are necessary or convenient to be prescribed in relation to any matter within the powers and functions of the University and the Council and generally for carrying out or giving effect to the objects of the University and to this Part of this Act.

(2) The Regulations shall—

(*a*) be published in the Gazette;

(*b*) take effect from the date of publication or from a later date to be specified therein;

(*c*) be laid before both Houses of Parliament within fourteen sitting days after the publication thereof if Parliament is in session, and if not, then within fourteen sitting days after the commencement of the next session.

If either House of Parliament passes a resolution of which notice has been given at any time within fifteen sitting days after such regulations have been laid before such House disallowing any regulation or part thereof, such regulation or part shall thereupon cease to have effect.

PART IV.

Acquisition of Land.

49. (1) For the purposes of this Act, the Governor may, under the Public Works Act, 1912, as amended by subsequent Acts, resume or appropriate any land and the Minister may, under the said Act as so amended, purchase any land.

(2) (*a*) Where any land has been appropriated or resumed pursuant to this section the Governor may, by notification published in the Gazette, notify that the land so resumed or appropriated and specified in such notification is vested in The New South Wales University of Technology.

(*b*) Thereupon the land so specified shall vest in the said University.

(3) For the purposes of the Public Works Act, 1912, as amended by subsequent Acts, any such resumption, appropriation or purchase shall be deemed to be for an authorised work, and the Minister shall be deemed to be the Constructing Authority:

Provided that sections thirty-four, thirty-five, thirty-six and thirty-seven of the Public Works Act, 1912, as amended by subsequent Acts, shall not apply to any such resumption, appropriation or purchase, but section thirty-eight of such Acts shall, mutatis mutandis, apply to and in respect of any contracts relating to any such resumption, appropriation or purchase.

Power to Rescind Resumptions. Cf. Act No. 7, 1912, *s.* 4c.

50. (1) The Governor may, by notification in the Gazette, rescind in whole or in part any notification of resumption made in pursuance of section forty-nine of this Act.

(2) Upon the publication of any notification of rescission the land described in such notification shall revest in the person who was entitled thereto immediately before the resumption for his estate, interest or right immediately before such resumption, but subject to any interest in or equity binding upon such land created by the Constructing Authority since such resumption; and the land shall be subject to all trusts, obligations, estates, interests, contracts, charges, rates, rights-of-way or other easements from which it was freed and discharged by such resumption as if the land had not been resumed and shall also be subject to any interests in or equities binding on the compensation moneys created since the resumption.

(3) On the lodgment with the Registrar-General of a copy of a notification in the Gazette rescinding a notification of resumption of land under the provisions of the Real Property Act, 1900, the Registrar-General shall cancel any entry or notification in the register book made by him pursuant to section 46A of the Real Property Act, 1900, in so far as it relates to the land the notification of the resumption of which has been rescinded, and for the purpose of any dealing with such land the entry or notification made pursuant to section 46A of the Real Property Act, 1900, shall be deemed never to have been made.

(4) The person in whom any land is revested under this section shall be entitled to be compensated by the Constructing Authority for any loss or damage actually suffered by him as a direct consequence of the resumption and its rescission other than compensation in respect of the value of the land.

(5) Any claim for compensation arising under this section shall be heard and determined in like manner and subject to the like conditions as a claim for compensation by reason of the acquisition of land under the Public Works Act, 1912, as amended by subsequent Acts, and the provisions of the Land and Valuation Court Act, 1921, as amended by subsequent Acts, shall, mutatis mutandis, apply to and in respect of the hearing and determination of any such claim.

REGULATIONS.

Interpretation.

1. In these Regulations, "Act" means the Technical Education and New South Wales University of Technology Act, 1949-1955.

Incorporation of the University.

2. For the purposes of subsection one of section sixteen of the Act, "lecturers and fellows of the University" are hereby prescribed as classes of persons giving instruction within the University.

Submission to Minister of Panels of Names Relating to the Appointment of Certain Members of the Council of the University.

3. (1) The persons to be nominated by the Minister for appointment—

(*a*) pursuant to paragraph (*d*) of subsection two of section nineteen of the Act shall be selected by him from a panel of twenty-four names submitted to him by the organisations specified in Part A of the Schedule hereto;

(*b*) pursuant to paragraph (*f*) of the same subsection shall be selected by him from a panel of eighteen names submitted to him by the organisations specified in Part B of the Schedule hereto;

(*b*1) pursuant to paragraph (*f*1) of the same subsection shall be selected by him from a panel of eight names submitted to him by the organisations specified in Part B1 of the Schedule hereto;

(*c*) pursuant to paragraph (*g*) of the same subsection shall be selected by him from a panel of four names submitted to him by the organisations specified in Part C of the Schedule hereto.

(2) The number of names which each such organisation is entitled to include in the appropriate panel shall be the number specified in the said Schedule opposite the name of such organisation.

(3) All names which any such organisation, other than an organisation specified in Part B1 of the Schedule hereto, is entitled to include in a panel shall, in respect of the first appointment of members to the Council of the University, be submitted to the Minister not later than the twenty-eighth day of June, one thousand nine hundred and forty-nine, and in respect of any subsequent appointment of members to that Council, be submitted to the Minister not later than the fourteenth day of June in the year in which any such appointment is to be made.

(4) All names which any organisation specified in Part B1 of the Schedule hereto is entitled to include in a panel shall, in respect of the first appointment of members to the Council of the University pursuant to paragraph (*f*1) of subsection two of section nineteen of the Act, be submitted to the Minister not later than the fourteenth day of June, one thousand nine hundred and fifty-five, and in respect of any subsequent appointment of members pursuant to that paragraph, be submitted to the Minister not later than the fourteenth day of June in the year in which any such appointment is to be made.

SCHEDULE.

Part A.

Representation of Persons Engaged in the Professions.

Organisation.	Number of Names.
The Institution of Engineers, Australia, Sydney Division	3
The Institution of Engineers, Australia, Newcastle Division	3
The Royal Australian Chemical Institute (N.S.W. Branch)	3
The Institute of Optometrists of New South Wales	3
The Royal Australian Institute of Architects, New South Wales Chapter	3
The Institution of Production Engineers (Sydney Section)	3
The Institute of Physics (Australian Branch, N.S.W. Division)	3
The Australasian Institute of Mining and Metallurgy Incorporated	3

Part B.

Representation of Industrial and Commercial Interests.

Organisation.	Number of Names.
Chamber of Manufactures of New South Wales	3
Sydney Chamber of Commerce	3
Metal Trades Employers' Association	3
The Employers' Federation of New South Wales	3
Building Industry Congress of New South Wales	3
The Institute of Management	3

Part B1.

Representation of Agricultural, Pastoral and Rural Interests.

Organisation.	Number of Names.
Primary Producers' Union	2
The Graziers' Association of New South Wales	2
Farmers and Settlers' Association of New South Wales ..	2
Wheat Growers' Union of New South Wales	2

Part C.

Representation of Trade Unions and Employee Organisations.

Organisation.	Number of Names.
Labor Council of New South Wales	1
Technical Teachers' Association of New South Wales	3

Period of Office.

4. (1) The members of the Council of the University, other than the Vice-Chancellor of the University, the Chairman of the Professorial Board of the University and the members referred to in clauses two, three and four of this Regulation, shall, subject to the Act, hold office for a period of four years.

(2) The member of the Council of the University elected by the Legislative Council shall, subject to the Act, hold office until his successor has been elected by the Legislative Council as hereinafter provided and has been appointed by the Governor to the Council of the University.

After the first election of a member by the Legislative Council in the year one thousand nine hundred and forty-nine each subsequent election shall be held as soon as practicable after the commencement of the term of service of the fifteen members of the Legislative Council elected at each triennial election of members of the Legislative Council held after such year.

(3) The member of the Council of the University elected by the Legislative Assembly shall, subject to the Act, hold office until his successor has been elected by the Legislative Assembly as hereinafter provided and has been appointed by the Governor to that Council.

After the first election of a member by the Legislative Assembly in the year one thousand nine hundred and forty-nine each subsequent election shall be held as soon as practicable after every general election of members of the Legislative Assembly held after such year.

(4) The members of the Council appointed pursuant to paragraphs (*i*), (*j*), (*k*) and (*m*) of subsection two of section nineteen of the Act shall hold office for a period of two years: Provided that the members first appointed pursuant to paragraphs (*i*), (*k*) and (*m*) of the said subsection shall hold office for a period of one year.

The Vice-Chancellor.

5. (1) The Vice-Chancellor shall be the chief executive officer of the Council and shall be specially charged with the duty of promoting the interests and furthering the development of the University.

(2) The Vice-Chancellor shall, under the Council, subject to the by-laws and to any resolution of the Council—

(*a*) manage and supervise the administrative, financial and other activities of the University;

(*b*) consult with and advise the Professorial Board, and all other University Boards, Faculties, Committees, Professors, and other Heads of Departments;

(*c*) exercise supervision over the discipline of the University, with power, in the case of students, to impose penalties in accordance with academic usage for breach of discipline or for misconduct of any kind;

(*d*) give effect to the by-laws and to any resolution or report passed or adopted by the Council;

(*e*) perform such other duties as may from time to time be assigned to him by the Council.

(3) Nothing in this Regulation shall affect the precedence or authority of the Chancellor or Deputy Chancellor.

BY-LAWS.

Chapter I.—The Chancellor and Deputy Chancellor.

1. (*a*) The Chancellor shall hold office for a period commencing from his election and terminating at the close of the ordinary meeting of Council next preceding the expiration of two years from the date of his election.

(*b*) The Deputy Chancellor shall hold office for a period commencing from his election and terminating at the close of the ordinary meeting of the Council next preceding the expiration of two years from the date of his election.

(*c*) Any retiring Chancellor or Deputy Chancellor shall be eligible for re-election.

2. (*a*) The Chancellor and Deputy Chancellor shall, by virtue of their office, be members of any Committee constituted by any By-law or by any resolution of the Council and of any Board or Faculty within the University.

(*b*) The Chancellor may preside at any meeting of any such Committee, Board or Faculty and shall have all the rights and powers of the Chairman of any such Committee, Board or Faculty.

(*c*) If the Chancellor is absent or does not desire or is unable to act, or if the office of Chancellor is vacant, the Deputy Chancellor may preside at any such meeting and shall have the like rights and powers.

(*d*) In the absence of the Chancellor, or if the office of Chancellor is vacant, any powers or duties conferred or imposed upon the Chancellor by these By-laws may be exercised and discharged by the Deputy Chancellor.

(*e*) This By-law shall have effect notwithstanding the provisions of any other By-law.

Chapter II.—The Council.

Meetings and Rules of Procedure.

1. The Council shall meet on the second Monday of March, May, July, September and November in each year, and on such other days as may be necessary for the despatch of business: Provided that if the Monday so specified for the regular meeting is a public holiday the Council shall meet on the following Monday. The Council shall have power to adjourn any meeting to a later date.

2. At any time in the interval between such meetings the Chancellor or, in his absence, the Deputy Chancellor or, in the absence of both, the Vice-Chancellor shall have power to call a special meeting for consideration of any urgent business which he may wish to submit to the Council.

3. Upon the written requisition of any five members, the Chancellor or Deputy Chancellor or Vice-Chancellor, or in their absence, the Registrar shall convene a special meeting of the Council to be held within fourteen days after the receipt of the requisition. The written requisition shall set forth the objects for which the meeting is required.

4. Except in the case of a special meeting as aforesaid or unless otherwise decided by the Council no motion initiating any subject for discussion shall be made except in pursuance of notice given to the Secretary to the Council at any time not less than ten clear days before the meeting of the Council at which the motion is to be moved, and the Secretary shall enter all such notices in the Notice of Motion Book in the order in which they are received by him.

5. The Secretary to the Council shall transmit by post or deliver to each member of the Council a written or printed notice of the date of the next ensuing meeting of the Council, whether such meeting is an ordinary or special meeting. Such notice shall, except in any case of emergency, be so posted or delivered at least seven days previous to the meeting. Except in any case of emergency all matters to be considered at the meeting shall be stated in the said notice or in a supplementary notice transmitted by post or delivered to each member of the Council not less than three days before the meeting. The said notice or supplementary notice shall be accompanied by supporting statements in sufficient detail to allow members to consider the matters prior to the meeting.

6. In the event of a quorum of the Council not being present at any meeting within half-an-hour after the time appointed for the meeting, whether such meeting is an ordinary or special meeting, the members then present may appoint any convenient future day, of which at least seven days' notice shall be given by the Secretary to the members of the Council in the usual way. Such day may be chosen as the day of the next ordinary meeting of the Council and all business which should have been transacted at the meeting lacking a quorum shall take precedence thereat.

7. The Minutes of any preceding meeting of the Council, whether ordinary or special not previously approved as being a true record, shall be circulated to members of the Council prior to the meeting at which they are to be considered. Upon being approved as correct such Minutes shall be signed by the Chairman as being a true record.

Members Representing Principal Faculties.

8. The members to be elected pursuant to paragraph (*m*) of subsection two of section nineteen of the Technical Education and New South Wales University of Technology Act, 1949-1955, shall be elected by the three principal Faculties to be chosen by the Council at its March meeting in 1955 and in every alternate year after 1955.

9. The election of a member by each of the Faculties so chosen shall be held at a meeting of the Faculty duly convened by the Registrar to be held in June in 1955 and in every alternate year after 1955.

10. The Registrar shall act as Chairman of the meeting.

11. The method of election shall be by ballot, at which the candidate polling the largest number of votes shall be declared elected. Where an equal number of votes is cast for more than one candidate and it is necessary to determine between them which of them shall be elected the Registrar shall determine the matter by lot.

In this By-law the expression "determine by lot" means determine in accordance with the following directions:—The names of the candidates concerned having been written on similar slips of paper and the slips having been folded so as to prevent identification and mixed and drawn at random, the candidate whose name is first drawn shall be the candidate elected.

Member Representing Teaching Staff.

12. The member to be elected pursuant to paragraph (*k*) of subsection two of section nineteen of the Technical Education and New South Wales University of Technology Act, 1949-1955, shall be elected by the professors, persons giving full-time instruction within the University and such other persons giving instruction within the

University as the Council may determine by resolution from time to time. The election shall be held on such day in the month of June in 1953 and in every alternate year after 1953, as the Council may appoint.

13. At least forty days' notice of the date of election shall be given by notice posted at the University and in such other place as the Council may determine.

14. The Registrar shall prepare a list of electors comprised of all persons eligible to vote as provided under By-law 12 of this chapter, completed to the last day for receiving nominations for any election, and a copy of such list shall be exhibited at the University during the period from that date to the time of election.

14A. (*a*) No person shall be eligible for election unless his name has been communicated to the Registrar in writing under the hands of two qualified voters not less than twenty-eight days before the day fixed for the election.

(*b*) Every nomination of the person for election shall contain the written consent of such person to his nomination.

14B. On the expiration of the time for receiving nominations, the Registrar shall cause the name of each person so nominated and the fact of his candidature to be forthwith posted at the University.

14C. In the case of there being only one nomination the Registrar shall declare the candidate duly elected. If there are two or more candidates, the election shall be by postal ballot.

14D. (*a*) At least fourteen days before the date fixed for the election the Registrar shall transmit a voting paper through the post to each person eligible to vote, addressed to the last known address of the person as noted in the records of the Registrar. Each voting paper shall be accompanied by an envelope marked "voting paper" and by a second envelope addressed to the Registrar on the inside of which shall be printed a form of declaration to be signed by the voter stating that he is a person qualified under the provisions of By-law 12 of this Chapter to vote at the election of a member of Council to represent the teaching staff.

The envelopes addressed to the Registrar shall be numbered in consecutive numerical order and the number appearing on such an envelope sent to each person eligible to vote shall be entered on the list of electors prepared by the Registrar opposite the name of the person to whom such envelope is sent.

(*b*) The provisions of paragraphs (*b*), (*c*), (*d*), (*e*) and (*g*) of By-law twenty-one of this Chapter shall apply to and in respect of any such election.

(*c*) The method of counting votes to ascertain the result of the election shall be as prescribed in By-law twenty-nine of this Chapter.

Members Elected by Graduates.

15. The members to be elected pursuant to paragraph (*j*) of subsection two of section nineteen of the Technical Education and New South Wales University of Technology Act, 1949-1955, shall be elected in May in 1953 and in every alternate year thereafter.

The election shall be held on such day in that month as the Council may appoint.

16. At least sixty days' notice of the day of election shall be given by advertisement in two or more of the daily newspapers published in Sydney, and by notice posted at the University.

17. The Registrar shall prepare a list of electors comprised of all graduates of the University, completed to the last day for receiving nominations for any election, and a copy of such list shall be exhibited at the University during the period from that date to the time of election.

18. (i) No person shall be eligible for election—

(*a*) unless he is a graduate of the University and of the full age of twenty-one years; and

(*b*) unless his name has been communicated to the Registrar in writing under the hands of two qualified voters not less than twenty-eight days before the day fixed for the election.

(*c*) if he is engaged in duties connected with the University either on the teaching staff or otherwise.

(ii) Every nomination of the person for election shall contain the written consent of such person to his nomination.

19. On the expiration of the time for receiving nominations the Registrar shall cause the name of each person so nominated and the fact of his candidature to be forthwith advertised in two or more of the daily newspapers published in Sydney, and to be posted at the University.

20. If the number of nominations received is equal to or less than the number of candidates to be elected, the Registrar shall declare the candidate or candidates to be duly elected. If the number of candidates exceeds the number to be elected, the election shall be by postal ballot.

21. The election shall be conducted in the following manner:—

(*a*) At least fourteen days before the date fixed for the election the Registrar shall transmit a voting paper through the post to each graduate eligible to vote, addressed to the last known address of the graduate as noted in the records of the Registrar.

Each voting paper shall be accompanied by an envelope marked "voting paper" and by a second envelope addressed to the Registrar on the inside of which shall be printed a form of declaration to be signed by the applicant stating that he is a graduate of the University.

The envelopes addressed to the Registrar shall be numbered in consecutive numerical order, and the number appearing on such an envelope sent to each graduate eligible to vote shall be entered on the list of electors prepared by the Registrar opposite the name of the graduate to whom such envelope is sent.

(*b*) The voting papers shall contain the names of all duly nominated candidates arranged in alphabetical order. The voter shall record his vote by placing the number "1" opposite the name of the candidate for whom he desires to give his first preference vote, and shall give contingent votes for all the remaining candidates by placing the numbers "2," "3," "4" and so on, as the case may require, opposite the names of such candidates respectively so as to indicate by numerical sequence the order of his preference for them.

(*c*) Having marked his voting paper and signed the declaration, the voter shall place the voting paper without any other matter in the envelope marked "voting paper," which he shall seal and transmit to the Registrar in the envelope provided for that purpose.

All voting papers so transmitted and received at the University not later than 5 p.m. on the day of the election shall be counted in the ballot.

(*d*) The ballot shall be conducted by the Registrar who shall be assisted in the counting of votes by scrutineers to be appointed by the Chancellor. Each candidate shall be entitled to nominate one scrutineer.

(*e*) As soon as practicable after the closing of the poll the Registrar, in the presence of such of the scrutineers as choose to be present, shall proceed to the examination of the voting papers.

(*f*) The method of counting votes to ascertain the result of the election shall be as prescribed in By-law 29A of this Chapter.

(*g*) The Registrar shall reject as informal any voting paper upon which the voter has failed to indicate the number of his preference in respect of the name of any candidate: Provided that where there are not more than two candidates a voting paper shall not be informal by reason only of the fact that the voter has recorded his vote by placing the number "1" opposite the name of one candidate and has failed to place the number "2" opposite the name of the other candidate.

Member Elected by Undergraduates.

22. The member to be elected pursuant to paragraph (*i*) of subsection two of section nineteen of the Technical Education and New South Wales University of Technology Act, 1949-1955, shall be elected in May in 1950 and in 1951 and in every alternate year after 1951.

The election shall be held on such day in that month as the Council may determine.

23. At least sixty days' notice of the day of election shall be given by notice posted at the University and in such other places as the Council may determine.

24. (1) No person shall be eligible for election—

(*a*) (i) at the elections to be held in 1950 and 1951 unless he is a registered student of the University and of the full age of twenty-one years;

(ii) at any subsequent election unless he is a graduate of the University and of the full age of twenty-one years; and

(*b*) unless his name has been communicated to the Registrar under the hands of two qualified voters not less than twenty-eight days before the day fixed for the election;

(*c*) if he is engaged on duties connected with the University either on the teaching staff or otherwise.

(2) Every nomination of a person for election shall contain the written consent of such person to his nomination.

25. On the expiration of the time for receiving nominations the Registrar shall cause the name of each person so nominated and the fact of his candidature to be forthwith posted at the University.

26. In the case of there being only one nomination the Registrar shall declare the candidate duly elected. If there are two or more candidates, the election shall be by ballot of qualified voters voting personally.

27. The election shall be conducted in the following manner:—

(*a*) A ballot shall be taken on the day appointed for the election at the University and at such other place as the Council may determine, of which due notice shall be given.

(*b*) The ballot shall commence at 10 a.m. and close at 9.30 p.m. on the day appointed.

(*c*) The provisions of paragraphs (*b*), (*d*), (*e*) and (*g*) of By-law twenty-one of this Chapter shall apply to and in respect of any such election.

(*d*) The method of counting votes to ascertain the result of the election shall be as prescribed in By-law twenty-nine of this Chapter.

Method of Counting Votes at Elections by Teaching Staff and Undergraduates.

28. By-law twenty-nine of this Chapter applies to elections by the Teaching Staff and Undergraduates.

29. (1) (*a*) The Registrar shall count the total number of first preference votes given for each candidate.

(*b*) The candidate who has received the largest number of first preference votes shall, if that number constitutes an absolute majority of votes, be elected.

(*c*) If no candidate has received an absolute majority of first preference votes, the Registrar shall make a second count.

(*d*) On the second count the candidate who has received the fewest first preference votes shall be excluded, and each ballot-paper counted to him shall be counted to the candidate next in the order of the voter's preference.

(*e*) If any candidate then has an absolute majority of votes he shall be declared elected; but if no candidate then has an absolute majority of votes, the process of excluding the candidate who has the fewest votes and counting each of his ballot-papers to the continuing candidate next in the order of the voter's preference shall be repeated until one candidate has received an absolute majority of votes.

(*f*) The candidate who has received an absolute majority of votes shall be declared elected.

(2) If on any count two or more candidates have an equal number of votes, and one of them has to be excluded, the Registrar shall determine between them by lot which of them shall be excluded.

(3) In the foregoing provisions of this By-law—

The expression "an absolute majority of votes" means a greater number than one-half of the whole number of ballot-papers counted.

The expression "continuing candidate" means a candidate not already excluded at the count.

The expression "determine by lot" means determine in accordance with the following directions:—The names of the candidates concerned having been written on similar slips of paper, and the slips having been folded so as to prevent identification and mixed and drawn at random, the candidate whose name is first drawn shall be excluded.

(4) Where in the final count under this By-law two candidates have an equal number of votes, the Registrar shall determine between them by lot which of them shall be elected.

In reckoning an absolute majority of votes for the purposes of this By-law, the candidate so elected shall be deemed to have received an additional vote.

In this clause the expression "determine by lot" means determine in accordance with the following directions:—The names of the candidates concerned having been written on similar slips of paper and the slips having been folded so as to prevent identification and mixed and drawn at random, the candidate whose name is first drawn shall be the candidate elected.

Method of Counting Votes at Elections by Graduates.

29A. (1) This By-law applies to elections by Graduates.

(2) At the first count the Registrar shall count the total number of first preference votes given for each candidate.

(3) On the second count the candidate who has received the fewest first preference votes shall be excluded and if the number of candidates then remaining in the ballot is greater than the number to be elected, each ballot paper counted to the candidate so excluded shall be counted to the candidate next in the order of the voter's preference.

(4) If after the second count more candidates remain in the ballot than require to be elected, the process of excluding the candidate who has the fewest votes and counting each of his ballot papers to the continuing candidate next in order of the voter's preference shall be repeated until the number of candidates remaining is equal to the number to be elected.

(5) Where as the result of any exclusion of a candidate pursuant to this By-law the number of candidates remaining in the ballot is equal to the number to be elected, the candidate so remaining shall be declared to be elected.

(6) If on any count two or more candidates have an equal number of votes, and one of them has to be excluded, the Registrar shall determine between them by lot which of them shall be excluded.

(7) In this By-law—

The expression "continuing candidate" means a candidate not already excluded at the count.

The expression "determine by lot" means determine in accordance with the following directions:—The names of the candidates concerned having been written on similar slips of paper, and the slips having been folded so as to prevent identification and mixed and drawn at random, the candidate whose name is first drawn shall be excluded.

CHAPTER III.—THE PROFESSORIAL BOARD.

1. The Professors and Associate Professors in the several Faculties and such other persons as Council may appoint shall form a Board, to be called the Professorial Board.

2. The members of the Professorial Board shall elect a Chairman at a duly convened meeting to be held in May in 1950 and in 1951 and in May of every alternate year after 1951.

The Chairman shall hold office for a period of two years from the first day of July following the election: Provided that the first Chairman shall hold office for a period of one year from the first day of July following his election.

If the office becomes vacant by death, resignation or otherwise before the expiration of the full term, a successor shall be elected at a duly convened meeting of the Board to be held as soon as conveniently may be, and the Chairman so elected shall hold office during the remainder of his predecessor's term of office.

3. The Registrar shall, by virtue of his office, be a member of the Professorial Board and shall act as Secretary to the Board.

4. (i) The Professorial Board shall be specially charged with the duty of furthering and co-ordinating the work of Faculties and Departments and of encouraging scholarship and research and of considering the studies and discipline of the University.

The Board shall consider and report upon all matters referred to it by the Council or by the Vice-Chancellor.

(ii) Subject to By-laws and to any resolution of the Council the Board—

(a) may consider and take action upon reports submitted to it by any Faculty;

(b) may refer matters to Faculties for consideration and report;

(c) may appoint internal and external examiners after report from the Faculty or from the Dean of the Faculty concerned;

(*d*) shall, on the recommendation of the appropriate Faculties, annually prescribe all books and details of subjects for lectures or annual examinations in the University, but in any of these subjects pertaining to more than one Faculty when the recommendations of the Faculties concerned do not coincide, the Professorial Board shall, after further communication with the said Faculties, prescribe such books and details;

(*e*) may determine the conditions of competition for any post-graduate fellowship, scholarship or prize and make the awards: Provided that any conditions of competition approved by the Board for any post-graduate fellowship, scholarship or prize shall be subject to conditions, if any, with respect thereto made by the founder or donor;

(*f*) may, after report from the Faculties concerned, decide all questions of admission ad eundem gradum. The Professorial Board may by an absolute majority of its members (provided that the Faculty, if any, concerned concurs by an absolute majority of its members) recommend to the Council that a person who has obtained any degree or diploma in another University or educational establishment be admitted to a Degree in the New South Wales University of Technology without any examination;

(*g*) may submit recommendations to the Council on the invitation of the Council with respect to the selection of Professors, Lecturers, and other teaching and research staff;

(*h*) may, after a report of the Faculties concerned, decide all questions of admission with advanced standing. The Professorial Board may by an absolute majority of its members (provided that the Faculty, if any, concerned concurs by an absolute majority of its members) recommend to Council that a person who has completed an approved course of study in a University or educational establishment approved by the Council be admitted with such advanced standing as may be permitted in each case to a course leading to a Degree of the New South Wales University of Technology;

(*i*) may perform the duties of a Faculty for all subjects not pertaining to any faculty and perform any function committed to it by this By-law, although any Faculty or Faculties may have failed to report;

(*j*) may submit recommendations to Council with respect to any other matter pertaining to academic standards or facilities.

Where the Board does not approve without amendment any recommendation made by a Faculty, the Board shall, if so requested by the Faculty, transmit the recommendation to the Council.

(iii) The Board shall have such other duties and powers as may from time to time be assigned to it by the Council.

(iv) A report of the proceedings of the Board shall be circulated to members of the Council with the notice or supplementary notice of matters to be considered at the meeting of the Council next following that of the Board and shall be laid upon the table of the Council at that meeting.

(v) The Council may at any time of its own motion or at the request of a Faculty review any decision of the Board.

5. (*a*) The Vice-Chancellor or any member of the Professorial Board may suspend any student from attendance at classes and examinations for breach of discipline or misconduct, and may impose penalties in accordance with academic usage on any student for breach of discipline or misconduct, provided that the circumstances relating to the suspenson or fine shall be reported in writing by the member to the Vice-Chancellor forthwith. This By-law shall only extend to breach of discipline or misconduct committed in or with respect to the classes or work of the Department of such member, or committed in his presence.

(*b*) On reference by the Vice-Chancellor the Board shall investigate matters which involve any question as to breach of discipline or misconduct of any kind by any student or candidate at any University examination and may impose penalties in accordance with academic usage.

(*c*) Any person affected by a decision of any member of the Professorial Board (other than the Vice-Chancellor) in respect of breach of discipline or misconduct may appeal to the Vice-Chancellor, and in the case of disciplinary action by the Vice-Chancellor, whether on appeal or otherwise, to the Council.

6. (*a*) The Professorial Board shall meet at the discretion of the Chairman or upon the written request of the Chancellor, or Vice-Chancellor, or of three members of the Board.

(*b*) Except where otherwise provided by these By-laws, all questions which shall come before a meeting of the Professorial Board at which a quorum is present shall be decided by the majority of members present, and the Chairman shall have a vote, and in the case of an equality of votes, a casting vote.

The number of members who shall constitute a quorum of the Professorial Board shall be the product obtained by multiplying the total number of members of the Board by two-thirds, any fraction in the product being disregarded.

(*c*) All meetings shall be convened by written notice from the Registrar, specifying the time and place and agenda of the meeting.

Chapter IV—The Faculties.

1. (*a*) The Council may constitute such Faculties as it may deem fit.

(*b*) Each Faculty so constituted shall consist of the Professors and Associate Professors in the subjects of the curriculum of the Faculty concerned and of such lecturers and other persons having appropriate qualifications as the Council may appoint thereto.

(*c*) The Registrar shall, by virtue of his office, be a member of each Faculty.

2. The Dean appointed to a Faculty pursuant to the Technical Education and New South Wales University of Technology Act, 1949-1955, shall be the Chairman thereof.

3. Each Faculty shall—

(*a*) supervise the teaching in the subjects with which the Faculty is concerned;

(*b*) be responsible, with the assistance of such examiners as the Professorial Board may from time to time appoint on the report of the Faculty or of the Dean, for the conduct of examinations in those subjects;

(*c*) take cognizance of and encourage scholarship and research in those subjects;

(*d*) consider and report upon all matters referred to it by the Council or by the Vice-Chancellor, or by the Professorial Board.

4. Each Faculty shall consider and report to the Professorial Board upon all matters relating to the studies, lectures, examinations and Degrees of the Faculty.

5. Each Faculty shall have such other duties and powers as may from time to time be assigned to it by the Council.

6. Except where otherwise provided by these By-laws all questions which come before a meeting of a Faculty at which a quorum is present shall be decided by the majority of the members present and the Chairman shall have a vote, and in the case of an equality of votes, a casting vote.

The number of members who shall constitute a quorum of any Faculty shall be the product obtained by multiplying the total number of that Faculty by two-thirds, any fraction in the product being disregarded.

7. The Chairman of a Faculty shall be the Executive Officer of the Faculty and shall have such other duties and powers as may from time to time be assigned to him by the Council.

8. Each Faculty shall deal with all applications for information and other correspondence on subjects appropriate to such Faculty which may be brought before it by the Dean or by the Registrar.

CHAPTER V.—VICE-CHANCELLOR.

1. The Vice-Chancellor shall, by virtue of his office, be a member of every Board, Faculty and Committee within the University, and may, if he so desires, preside at any meeting of such Board, Faculty or Committee.

Nothing in this By-law shall affect the precedence or authority of the Chancellor or Deputy Chancellor.

CHAPTER VI—HONORARY DEGREES.

1. The Council may admit on Honoris Causa to any Degree of Doctor in the New South Wales University of Technology any graduate of another University who is recommended for such admission by an absolute majority of the Professorial Board and by an absolute majority of the Faculty in which the Degree is to be conferred as being a person of distinguished eminence in some branch of learning appropriate to such Faculty.

2. The Council may admit on Honoris Causa to the Degree of Doctor in an appropriate field in the New South Wales University of Technology any person considered by the Council to be distinguished by eminent public service in a particular technical field.

THE NEW SOUTH WALES UNIVERSITY OF TECHNOLOGY.

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WALLACE CHARLES WURTH, C.M.G., LL.B.

Deputy Chancellor.

The Hon. Mr. Justice JOHN SYDNEY JAMES CLANCY, LL.B.

Vice-Chancellor.

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Pro-Vice-Chancellor.

DAVID WATKIN PHILLIPS, B.Sc., Ph.D., Dip.Met.Min., F.G.S., M.I.Min.E., M.Amer.I.M.E., M.Aus.I.M.M.

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Senior Lecturer in English.
D. C. Muecke, B.A. Adel., M.A. Oxon.

Senior Lecturer in French.
K. H. Hartley, M.A. Syd., D.de l'U. Paris.

Senior Lecturer in German.
O. Spindler, Dr.phil., Dip.Ed. Vienna.

Senior Lecturer in Geography.
A. D. Tweedie, M.A. N.Z.

Senior Lecturer in History.
G. A. Cranfield, B.A., Ph.D. Cantab.

Senior Lecturer in Philosophy.
C. F. Presley, B.A. Wales, B.Litt. Oxon.

Senior Lecturer in Psychology.
D. Martin, B.A. Syd.

Lecturer in English.
B. V. Share, M.A., B.Litt., Dublin.

Lecturer in German.
L. R. P. McGlashan, B.A., Dip. Ed. Syd., Dr.phil. Munster.

Lecturer in History
J. P. S. Bach, M.A. Syd.

Lecturer in Philosophy.
A. J. Anderson, B.A. Syd.

Teaching Fellow in Geography.
M. G. A. Wilson, M.A. N.Z.

SCHOOL OF MATHEMATICS.

Senior Lecturer.
I. L. Rose, B.E. Syd.

Lecturers.
J. A. Lambert, B.Sc. Syd.
R. F. Matlak, Ph.Mgr. Cracow, B.A. Syd.
M. Temple, M.A. Dublin.

SCHOOL OF MECHANICAL ENGINEERING.

Senior Lecturer.
A. K. Johnston, B.E. Syd., M.S. Iowa.

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Lecturers.

E. Betz, A.S.T.C., A.M.I.E.Aust.

K. R. Bridger, A.S.T.C., A.M.I.E.Aust.

M. J. Hallinan, A.S.T.C.

J. Rector, B.Sc., B.E. Syd.

SCHOOL OF METALLURGY.

Lecturers.

C. H. Cooke, A.S.T.C., A.I.M.(Lond.).

V. J. Moran, B.Sc., A.S.T.C., A.M.Aus.I.M.M.

J. E. McLennan, A.S.T.C.

SCHOOL OF MINING ENGINEERING AND APPLIED GEOLOGY.

Lecturers.

Mrs. B. Nashar, B.Sc., Dip.Ed. Syd., Ph.D. Tas.

A. S. Ritchie, A.S.T.C.

TECHNICAL STAFF.

SCHOOL OF APPLIED CHEMISTRY.

Technical Officer.

J. Miller, A.S.T.C.

SCHOOL OF MECHANICAL ENGINEERING.

Technical Officers.

H. M. Anderson, A.S.T.C.

G. D. Butler, A.S.T.C.

K. R. Irvine, A.S.T.C.

WOLLONGONG.

HEAD OF UNIVERSITY DIVISION—C. A. W. Devitt, B.E. Syd., A.M.I.E.Aust.

SCHOOLS OF APPLIED CHEMISTRY AND METALLURGY.

Lecturers.

T. W. Barnes, A.S.T.C. (Metallurgy), A.R.A.C.I.

P. Beckman, M.Sc., F.S.T.C. (Chem.), A.R.I.C., A.R.A.C.I. (*on leave*).

F. M. Hall, A.S.T.C. (Chem.), A.R.A.C.I.

SCHOOL OF ELECTRICAL ENGINEERING.

Lecturers.

C. A. Stapleton, B.Sc., B.E. Syd., A.M.I.E.Aust.

W. H. Charlton, A.S.T.C., A.M.I.E.E.

SCHOOL OF MATHEMATICS.

Lecturer.

B. E. Clancy, B.Sc., Dip.Ed. Syd.

SCHOOL OF MECHANICAL ENGINEERING.

Lecturers.

G. T. Csanady, Dipl.Ing. Munich.
C. M. Sapsford, B.Sc. (Eng.) Lond., A.M.I.E.Aust., G.I.Mech.E.
R. W. Upfold, B.E., A.S.T.C.

Technical Officer.

R. M. Kinnell, A.S.T.C.

BROKEN HILL.

HEAD OF UNIVERSITY DIVISION—M. A. Watson, B.Ec. Syd., Lisc. A.A.A.

SCHOOL OF APPLIED CHEMISTRY.

Lecturer.

K. G. O'Brien, M.Sc. Syd., A.R.A.C.I., A.M.Aus.I.M.M.

SCHOOL OF ELECTRICAL ENGINEERING.

Lecturer.

R. C. Yates, B.E. Adel., F.S.A.S.M., A.M.I.E.E.

SCHOOL OF MECHANICAL ENGINEERING.

Lecturer.

J. R. Allen, B.E. Syd., A.M.I.E.Aust.

Technical Officer.

B. Santich, A.S.T.C.

SYDNEY TECHNICAL COLLEGE.

(Staff seconded to the University under the provisions of Section 34 of the Technical Education and New South Wales University of Technology Act, 1949-1955.)

SCHOOL OF APPLIED PSYCHOLOGY.

L. M. Haynes, B.A. Syd.

SCHOOL OF ARCHITECTURE AND BUILDING.

A. A. Jack, A.S.T.C., A.A.I.B.

GENERAL INFORMATION.

There are five Faculties in the University, each being responsible under the Professorial Board for the supervision of courses of study given in their respective fields. The Faculties are Applied Science, Engineering, Architecture, Humanities and Social Sciences, and Commerce.

The Academic Year.

The academic year is divided into three terms. Each term is of twelve weeks' duration. In the third term classes cease at the close of the tenth week and examinations begin one week later. Vacations, each of two weeks' duration, occur between the first and second terms and between the second and third terms. The dates of commencement and ending of each term are given in the Calendar on pages 5 to 7.

Undergraduate Courses of Study.

The undergraduate courses of the New South Wales University of Technology aim to provide—

(*a*) a thorough training in the fundamental sciences of mathematics, physics and chemistry;

(*b*) a sound training in the professional topics of the course chosen and such subjects in allied professional fields as are considered necessary;

(*c*) a study of the art of expression, both written and oral, and of selected general subjects which aim to extend the student's understanding of himself and his environment;

(*d*) a close link with industry on the practical aspects of the profession throughout the course.

This last-named objective applies to all courses with one exception, General Science, and is achieved through requiring students to complete an approved period of industrial training prior to graduation. The staff at the University will assist students to obtain this employment either as sponsored students or as trainees employed on a temporary basis. Private students may make their own arrangements for industrial training but such employment and training must be of a standard approved by the University. Where reports are required on industrial experience, they must be submitted by 31st March following the training period.

The University provides undergraduate courses leading to the degrees of Bachelor of Science, Bachelor of Science (Optometrical Science), Bachelor of Science in Psychology, Bachelor of Engineering, Bachelor of Engineering (Geology) and Bachelor of Architecture.

Undergraduate courses in Textile Technology, leading to the degree of Bachelor of Science, and in Commerce, leading to the degree of Bachelor of Commerce, are in preparation and will be offered in 1957.

First Degree Courses.

Faculty of Applied Science.

Three first degrees are awarded in the Faculty of Applied Science, namely, Bachelor of Science, Bachelor of Science (Optometrical Science), and Bachelor of Science in Psychology. The degree of Bachelor of Science may be taken by completing courses specialising in Applied Physics, Applied Chemistry, Chemical Engineering, Industrial Chemistry, Leather Chemistry, Applied Biology, Metallurgy, Food Technology or Wool Technology. In addition, students may take a General Science course as distinct from Applied Science.

Faculty of Engineering.

Two first degrees are awarded in the Faculty of Engineering, namely, Bachelor of Engineering and Bachelor of Engineering (Geology). The degree of Bachelor of Engineering may be taken by completing courses specialising in Mechanical Engineering, Electrical Engineering, Mining Engineering or Civil Engineering.

Faculty of Architecture.

One first degree is awarded in the Faculty of Architecture, the degree of Bachelor of Architecture.

Faculty of Humanities and Social Sciences.

The Faculty of Humanities and Social Sciences conducts Arts degree courses at Newcastle University College and provides instruction in Humanities subjects for all undergraduate courses given in the University.

A number of the first degree courses may be taken either by full-time attendance at the University or by part-time attendance concurrently with employment in industry. Details of the alternative courses where they occur are set out in the section of the Calendar headed "Syllabuses for Undergraduate Courses".

Diploma Courses.

By arrangement with the Department of Technical Education the University provides the undermentioned diploma courses leading to the award of the Associateship of Sydney Technical College (A.S.T.C.). Students enrolled in these courses are Registered Students of the University.

Faculty of Architecture—

Diploma courses in: Architecture, Building, Quantity Surveying.

Faculty of Applied Science—

Diploma courses in: Applied Biology, Applied Chemistry, Chemical Engineering, Food Technology, Leather Chemistry, Metallurgy, Optometry, Physics, Science, Secondary Metallurgy.

Faculty of Engineering—

Diploma courses in: Aeronautical, Civil, Electrical, Mechanical, Metalliferous Mining, Production and Radio Engineering, Naval Architecture.

Details of these courses are published in the Handbook of the Department of Technical Education.

Conversion Courses for Diplomates of the New South Wales Department of Technical Education.

Associates of the New South Wales Department of Technical Education are given special consideration by the University of Technology so as to permit them to pursue their studies in the appropriate degree course with the minimum of repetition or overlap.

The Professorial Board may refuse to accept applications for conversion courses from students who completed their diploma course prior to 1944, and may require such students to enter the normal undergraduate courses with such advanced standing as it determines. The acceptance of such applicants for entry into conversion courses shall be at the discretion of the Professorial Board.

In all cases, an Associate wishing to proceed to a degree must first make application in writing to the Registrar of the University of Technology for a statement of requirements for conversion. Each application is considered individually according to the applicant's academic record and professional experience. Applications for conversion requirements should be made before 31st December of the year prior to that in which the applicant wishes to enter upon the additional studies. This applies equally to students who are completing the final year of their diploma course and are not in possession of the results of their final examinations. The application must set out full details of the applicant's academic and professional career.

Each application will be considered on its merits, but the minimum requirements to qualify for a degree, subsequent to completing a diploma course, are indicated following the outline of the related degree course in later pages of the Calendar.

Examinations.

In assessing students' progress in the University courses, consideration is given to work in laboratory, and class exercises and any term or other tests given throughout the year, as well as to the annual examination results.

Students are required to attend lectures punctually and diligently, and to complete all practical work prescribed for the year and course in which they are enrolled. In general, no exemptions from subjects or examinations are granted.

No student will be permitted to attend lectures or to sit for examination in any subject in any year until he has passed in all subjects of the previous year, unless special permission has been granted by the faculty in which he is enrolled. Such permission must be applied for, and, if allowed, will be for one subject only in any year. The student must then, during the subsequent year, pass the examination in the subject for which the special permission has been granted. A student availing himself of the provisions of this section will not be eligible for any prizes or scholarships at the annual examinations.

Higher Degrees and Graduate Courses.

Graduate students may proceed to the degree of Master of Science, Master of Science in Psychology, Master of Engineering, Master of Architecture or Doctor of Philosophy in Science, Engineering, or Architecture. Conditions for the award of these degrees are set out on pages 95 to 104 of the Calendar.

Special, short, intensive graduate courses are provided throughout each year designed to keep practising scientists and technologists in touch with the latest developments in their various fields. The programme of such courses for 1956 is advertised separately.

Fees.

Undergraduate (Diploma, Degree or Conversion) Courses.

(*a*) Courses other than Arts.

(i) Full-time Courses—£60 per annum or two payments of £30 per term or three payments of £20 per term, according to number of terms in year.

(ii) Part-time Courses (including part-time years of Degree courses in Applied Chemistry, Chemical Engineering and Architecture)—£24 per annum or £8 per term for instruction involving over 5 hours per week, otherwise £12 per annum or £4 per term.

In addition all students enrolling for the first time in courses in categories (i) and (ii) above will be required to pay a matriculation fee of £2. A graduation fee of £3 is also payable before admission to a degree.

For the purpose of fee determination assessment is on a term basis. A full-time course fee will be charged for any term where more than 15 hours per week instruction, etc., is involved. Where 15 hours or less per week instruction is involved in any term, fees for part-time courses will be charged.

(*b*) Arts Courses (Newcastle).*

(i) Full-time Courses—£30 per annum or £10 per term.

(ii) Part-time Courses—£30 per annum or £10 per term, or £10 per annum per subject where subjects taken are less than 3, with no term payment.

Higher Degrees.

		£
(*a*) Master of Science, Engineering or Architecture.		
(i)	Qualifying Examination	5
(ii)	Registration Fee	2
(iii)	Internal full-time student annual fee	30
	Internal full-time student term fee	10
(iv)	Internal part-time student annual fee	15
	Internal part-time student term fee	5
(v)	External student annual fee	10
(vi)	Final Examination	15
(*b*) Doctor of Philosophy.		
(i)	Qualifying Examination	5
(ii)	Registration Fee	2
(iii)	Annual Fee	30
(iv)	Final Examination	21

Research.

(*a*) One day per week—£10 per annum.

(*b*) Two or three days per week—£20 per annum.

(*c*) Four or five days per week—£30 per annum.

Deferred Examinations.

£2 for each paper.

Late Fees.

(*a*) Any student who enrols after the third week of any term, irrespective of whether he/she is responsible for the payment of his/her fees, shall be charged a late fee of £1 per term.

(*b*) The late fee will be increased to £2 in the case of enrolments effected after 31st March (1st term), 30th June (2nd term), and 30th September (3rd term).

University of Technology Students' Union.

Annual subscription, £1 1s. (compulsory for all registered students).

N.S.W. University of Technology Sports Association.

Annual subscription, 10s. (compulsory for all registered students).

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* Arts students at Newcastle are also required to pay the following fees for transmission to the University of New England—Matriculation Fee £[illegible] Examination Fee £3 (annually), Graduation Fee £3.

General.

It is pointed out that fees are payable on a term basis. Students who find difficulty in paying the annual fee are advised—

(i) to pay the terminal fee by the appointed date;

(ii) that any application for extension of time in which to pay fees due (a maximum of one month may be permitted) must be submitted in writing to the Registrar *before* the date on which late fees are payable.

ENROLMENT PROCEDURE.

First Degree and Diploma Courses.

First Enrolments.—All students enrolling at the University for the first time, whether in first year or with advanced standing, must enrol through the Guidance Office. Students wishing to enrol in the first year of a course should make application for enrolment as soon as the results of their qualifying examination (Leaving Certificate, Qualifying and Matriculation, or Matriculation examination) are known. Applicants for enrolment with advanced standing are advised to lodge an application as soon as possible and prior to 31st December in the year preceding that in which enrolment is proposed.

Later Year Enrolments.—All students enrolling other than for the first time should enrol through the appropriate School. In the case of full-time degree courses, students should enrol during Enrolment Week at the commencement of the academic year. In the case of part-time degree and diploma courses, enrolment forms must be obtained from the Enrolling Officer of the appropriate School during the third term of the preceding year, when directions as to the subsequent procedure to be followed will be given.

Where students have only paid fees for the first term of any year, it is necessary to re-enrol for the second and third terms at the commencement of those terms: forms for this purpose may be obtained from the appropriate School.

Conversion Courses.

Enrolment in these courses must commence with an application to the Registrar for admission, and the applicant will be notified of the subsequent procedure.

Higher Degree Enrolments.

Details of the procedure to be followed in order to enrol for a higher degree are given in the statement of the conditions of award of the various higher degrees as set out on page 95 to 104 of this Calendar.

Student Hostel.

Single room accommodation is now available for approximately 200 students in a hostel on the University site at High Street, Kensington.

Terms are weekly in advance, the fee being £4 per week. This fee covers full board and residence (excluding personal laundry). A deposit of £1 is also required for the room key which is refunded on completion of residence after all dues have been paid and all equipment returned.

Students wishing to reside at the hostel should make application to the Supervisor of Amenities, Major R. K. Wilthew, Box 24, P.O., Kensington.

Guidance Office.

Through the Guidance Office a general student educational and vocational counselling service is provided to all students and prospective students of the University. The activities of the Guidance Office may be indicated under the following headings:—

1. *Student Counselling Service.*

For the prospective student, the aim of the counselling service, stated briefly, is to enable the individual to take the fullest advantage of the educational and vocational opportunities available to him. A guidance officer may thus assist in the choice of a career, firstly discussing with the prospective student the relation between his previous educational attainments, assessed abilities, special aptitudes and interests and the demands of the many University courses offering and, secondly, by facilitating contact with other sources of information and advice.

Each student of the University is therefore invited to discuss with a guidance officer at any time during his course, his methods of study, his general adjustment to the course and other factors complementary to the normal relationship existing between him and his lecturers and of significance to his progress in his chosen course—e.g., a distracting personal problem.

An appointment may be arranged personally or by telephone.

2. *Educational and Occupational Information Service.*

Information concerning training facilities within the University, the N.S.W. Department of Technical Education and other training institutions may be regarded as essential for a person's proper choice of, and adjustment and success in, a particular vocation. For this reason, the Guidance Office provides facilities for answering enquiries concerning—

(*a*) Courses of training offered, e.g. types, duration, entrance and occupational requirements, fees and special conditions applicable.

(*b*) Financial assistance in studies, e.g. scholarships, bursaries, exhibitions.

(*c*) Occupational Information.—Information booklets concerning a wide variety of occupations are available. These cover such points as methods of entry, fees, methods of training, prospects, personal qualifications needed and descriptions of the actual work involved in a particular vocation. Quite often it is necessary for arrangements to be made for enquiries to be referred for detailed advice on particular vocations to experts in the respective teaching departments.

3. *Applications for Variations in Courses.*

Applications for permission to vary, or to secure special admission to courses laid down in the University Calendar or the Department of Technical Education Handbook, or to defer or resume courses of study, should be made, in the first instance, at the Guidance Office. Where applicable, documentary evidence should be tendered on lodging the application for such a variation. In the case of certificates a copy should accompany the original, as this will allow the immediate return of the original document.

4. *Service to Students from Overseas.*

(*a*) Initial Application for Enrolment—

Students from overseas already resident in New South Wales should enquire initially and in person at the Guidance Office regarding enrolment procedure.

Intending students who have not yet arrived in New South Wales are advised to address their enquiries to the Guidance Officer, New South Wales University of Technology, Broadway, Sydney, clearly stating details of their educational standing.

(*b*) Documentary Evidence—

It is desirable that students from overseas seeking admission to, or advanced standing within, a course should bring with them to the Guidance Office documentary evidence of all relevant subjects studied in other countries. This evidence might include diplomas, statements of examinations passed, course syllabuses and samples of examination papers. Original certificates should be produced. If these are in a language other than English, it may be necessary subsequently to secure translations from accredited authorities such as the appropriate consular representative, or the New South Wales Government Interpreter and Translator, Central Court of Petty Sessions, Liverpool-street, Sydney.

(*c*) English Language Test—

A special examination in the English language is generally required of overseas applicants. In certain cases they may be required to undertake a Special English Course before, or concurrently with, the main course, and progression in the course may depend on success in this subject. Each person will be advised by the Guidance Officer concerning the requirements in his own particular case, and close liaison should be maintained with the Guidance Office until the English language requirement has been satisfied.

(*d*) Landing Permits—

The Guidance Office (or the University of Technology or the Technical Education Department) is unable to assist in the procurement of "landing permits" for overseas students, who are advised to contact the Australian Commonwealth Government representative in their own country for further advice in this matter.

5. *Location and Hours of Guidance Office.*

At *Sydney* the Guidance Office is located at 45-47 Broadway (ground floor) and is open from 9 a.m. to 9 p.m. daily. Telephone enquiries should be made to M0422, Extension 284.

At *Newcastle* the Guidance Office is located at the University College, Tighe's Hill—Telephone M1281.

LIBRARY.

A library, servicing courses conducted at Kensington, is situated in the main building on that site. The library for courses conducted on the Ultimo site is housed in the Sydney Technical College library at the corner of Mews and Thomas streets, Broadway. Libraries are also provided at Newcastle University College, Tighe's Hill, and in the metropolitan and country technical colleges conducting degree and diploma courses, and all Schools have working collections of books and periodicals for the use of staff.

Each library provides a reference and lending service for staff and students, and is open in term during day and evening sessions.

The Sydney Technical College library includes in its dictionary catalogue entries for publications housed on the Kensington site.

REQUIREMENTS FOR ADMISSION.

1. A candidate for any degree of the New South Wales University of Technology must satisfy the conditions for admission set out hereunder *before* entering upon the prescribed course for a degree.

Candidates who have satisfactorily met the conditions for admission shall be classed as "registered students" of the University after enrolment.

2. (i) Applicants for entry to undergraduate courses leading to a degree may satisfy entrance requirements by passing the New South Wales Leaving Certificate, or equivalent examination, in at least five subjects, of which one must be English and one other must be Mathematics I, or Mathematics II, or General Mathematics, three other subjects being chosen from the following groups, at least one of the three being from Group A:—

Group A.—Latin, French, Greek, German, Italian, Hebrew, Chinese, Japanese, Russian, Dutch, Geology, Geography, Agriculture, Economics, Modern History, Ancient History, Combined Physics and Chemistry, Physics, Chemistry, Physiology, Biology, Botany, or Zoology.

Group B.—Applied Mathematics, Theory and Practice of Music, General Mathematics, Mathematics I, Mathematics II, or Descriptive Geometry and Drawing.

(It should be noted that a number of subjects taken for the Leaving Certificate are *not* approved subjects for admission to the University of Technology.)

(ii) *General Requirements.*

The following general provisions apply:—

(A) Candidates must meet the requirements set out in section 2 (i) above at one examination provided that—

(*a*) neither Physics nor Chemistry be taken with the combined subject Physics and Chemistry;

(*b*) neither Botany nor Zoology be taken with Biology;

(*c*) neither Botany nor Zoology nor Biology be taken with Physiology;

(*d*) neither Mathematics I nor Mathematics II be taken with General Mathematics;

(*e*) a candidate who offers Mathematics and elects to take General Mathematics may not sit for Mathematics I or Mathematics II; a candidate who offers Mathematics and does not elect to take General Mathematics *must take both* Mathematics I and Mathematics II; a pass in either Mathematics I or Mathematics II will count as a pass in one subject; a pass in both papers will count as passes in two subjects;

(*f*) Theory and Practice of Music is accepted only from March, 1946;

(*g*) Ancient History is accepted only in cases where the pass was obtained at an examination held in 1945 or subsequent years; and further, both Modern History and Ancient History may be offered as qualifying subjects at the examinations held at the end of 1951 and subsequent years;

(*h*) Agriculture is accepted only in cases where the pass was obtained at an examination held in 1945 or subsequent years;

(*i*) Economics is accepted only in cases where the pass was obtained at an examination held in 1947 or subsequent years;

(*j*) Descriptive Geometry and Drawing is acceptable only in cases where the pass was obtained at an examination held in 1954 or subsequent years.

(B) Candidates who have presented themselves for the Leaving Certificate or equivalent examination in five or six subjects selected in accordance with the requirements prescribed in (A) and who have passed in English and a Mathematics and two other of the subjects shall be granted admission provided that they have been awarded "A" passes or passes with Honours in at least three of these four subjects.

[*Special Requirements—Part-time Courses.*

Students proceeding to a degree by means of a part-time course are required to have reached Leaving Certificate standard in certain subjects before they are permitted to take certain related subjects in the part-time courses. The requirements are as follow:—

Part-time degree subject.	*Pre-requisite subject at Leaving Certificate, Qualifying, Qualifying (Deferred), Matriculation or equivalent examination.*
10.11 Mathematics .. .. 10.11B Mathematics	Mathematics I *and* Mathematics II.
1.11 Physics .. .. .. 1.41 Physics .. .. .. 1.41D Physics	Physics *or* Honours at L.C. examination in combined Physics and Chemistry.
2.41 General Chemistry ..	Chemistry *or* Honours at L.C. examination in combined Physics and Chemistry.

Part-time degree subject.	*Pre-requisite subject at Leaving Certificate, Qualifying, Qualifying (Deferred), Matriculation or equivalent examination.*
11.101 Theory of Structures I	Mathematics I *or* Mathematics II *or* General Mathematics.
5.101 Engineering Drawing and Materials. 5.11 Engineering Drawing .. 5.11D Engineering Drawing .. 5.41 Descriptive Geometry .. 5.41D Descriptive Geometry ..	Mathematics II.]

(iii) *Examinations.*

Candidates may qualify for entry at the Leaving Certificate Examination held by the Department of Education, or the Matriculation Examination conducted by the University of Sydney, or the Qualifying or Qualifying (Deferred) Examination of the Department of Technical Education.

The Leaving Certificate Examination is usually held in November, and entries must be lodged with the Department of Education during August.

The Matriculation Examination is held in February, and applications must be lodged at the University of Sydney during the first ten days of January except by candidates who have taken the Leaving Certificate Examination in the previous November. The closing date for such candidates will be announced when the Leaving Certificate results are published.

The Qualifying Examination is conducted by the Department of Technical Education in November-December for students attending Qualifying and Matriculation courses conducted by the Department of Technical Education. The Qualifying (Deferred), an open examination, is held in February. Entries must be lodged at the Technical College, Broadway, or other participating Technical Colleges throughout the State for the Qualifying (Deferred) Examination before the middle of January.

Candidates who have satisfactorily met the matriculation requirements of the University of Sydney, but who have not obtained the requisite pass in Mathematics as prescribed for entrance to the New South Wales University of Technology, will be permitted to complete their qualifications to enter the University of Technology by passing in Mathematics only, at a subsequent Matriculation, Leaving Certificate, Qualifying or Qualifying (Deferred) Examination.

3. Notwithstanding By-law 2 above, candidates may be accepted as "registered students" of the University of Technology under the following conditions, subject to the approval of the Professorial Board:—

(i) Any person who has satisfied the examination requirements for entrance to the diploma courses of the Department of Technical Education, New South Wales, since and including the Qualifying examinations of the Department of Technical Education held at the end of 1940 may be admitted as a "registered student" of the University of Technology, but this provision shall not apply to examinations held later than March, 1957.

(ii) Any person who holds a diploma from the New South Wales Department of Technical Education, or any other Technical College which may from time to time be recognised by the University of Technology, may be admitted to the University of Technology as a "registered student" with such status as the Board may determine, provided that, in the opinion of the Board, the applicant's qualifications are sufficient for entry into the Faculty nominated.

(iii) Persons of other than Australian education may be admitted as "registered students" of the University of Technology after examination as directed by the Board, provided they give evidence that satisfies the Board that they are of good fame and character.

(iv) The Board may admit as "registered students" in any Faculty with such status as the Board may determine in the circumstances—

(*a*) A graduate of any approved University.

(*b*) An applicant who presents a certificate from any University, showing that he is qualified for entrance to that University, and who, in addition, satisfies the Board that he has met the requirements of the University of Technology, provided that, in the opinion of the Board there is an acceptable correspondence between the qualifying conditions relied upon by the applicant and conditions laid down for ordinary entrance to the nominated Faculty of the New South Wales University of Technology.

4. Any person qualified to enter a degree course in the University of Technology in terms of the preceding By-laws shall become a "registered student" of the University of Technology after he has signed his name in the Student Register in the presence of the Registrar or other person appointed for the purpose by the Council, and has paid the first term fee.

5. (i) The Board may in special cases declare any person qualified to enter a Faculty as a "provisionally registered student" although he has not complied with the requirements set out above, and in so doing may prescribe the completion of certain requirements before confirming the person's standing as a "registered student". Students who satisfactorily complete these requirements will be permitted to count the courses so passed as qualifying for degree purposes.

(ii) Persons over the age of twenty-five years may be admitted to provisional status provided that—

(*a*) they have a meritorious pass at the Leaving Certificate Examination or an equivalent examination and have passed in at least five subjects at such examination, or

(*b*) they have satisfactorily completed an approved course of systematic study extending over at least three years after passing the Intermediate Certificate Examination, or

(*c*) they satisfy the Board that they have reached a standard of education sufficient to enable them profitably to pursue the first year of the proposed course.

(iii) Any applicant for provisional status may be required to take such examination as the Board may prescribe before such status is granted.

6. Any person desirous of attending lectures at the University of Technology may be granted permission to do so by the Board without satisfying the requirements for admission and without being a "registered student," on payment of such fee as the Council may from time to time direct, but such person shall not necessarily have the privileges of "registered students" and shall not be eligible to proceed to a degree.

SCHOLARSHIPS, BURSARIES, AND CADETSHIPS.

Following are particulars of scholarships, bursaries, cadetships, etc., tenable at the New South Wales University of Technology.

Many industrial organisations and Government Departments sponsor students at the University. Such students generally have their University fees paid by the employer and are employed at cadet rates of pay during their course.

Mining Scholarships.

A number of scholarships tenable in Mining Engineering are offered each year by the Joint Coal Board and the Combined Colliery Proprietors' Association.

The values of the scholarships are as follows:—

Joint Coal Board.

Basic Rate.*	Plus Allowance.				Total Value.
	Fees.	Books.	Instruments.	Students Residing Away from Home.	
	£	£	£	£	£ s. d.
1st year—£253 10s. 0d. ...	60	12	10	65	400 10 0
2nd year—£279 10s. 0d. ..	60	12	...	65	416 10 0
3rd year—£305 10s. 0d. ...	60	12	...	65	442 10 0
4th year—£331 10s. 0d. ...	60	12	...	65	468 10 0

Combined Colliery Proprietors' Association.

Basic Rate.*	Plus Allowance.				Total Value.
	Fees.	Books.	Instruments.	Students Residing Away from Home.	
	£	£	£	£	£
1st year—£265	60	12	10	52	399
2nd year—£291	60	12	...	52	415
3rd year—£317	60	12	...	52	441
4th year—£343	60	12	...	52	467

* Weekly equivalent.

Note.—The Joint Coal Board scholarships cover, in addition, expenses of compulsory geology and survey camps, and fees for membership in the Students' Union and the Sports Association.

Particulars and application forms for these scholarships can be obtained from the Guidance Office, Broadway, Sydney.

Mining and Metallurgical Bursaries Fund.

1. The Mining and Metallurgical Bursaries Fund provides for the award of bursaries to students proceeding to the degree of Bachelor of Engineering in Mining or Metallurgy or Bachelor of Science with Geology as a major subject. The bursaries are each valued at £30 per annum up to a total value of £90, payable in annual instalments.

2. Candidates must be British subjects and must have completed the first year of their course for the degree of Bachelor of Engineering or Bachelor of Science.

3. The bursaries will be awarded by the Trustees of the Mining and Metallurgical Bursaries Fund, Melbourne, upon the recommendation of a local selection committee, consisting of representatives of the Trustees, the University and the Australasian Institute of Mining and Metallurgy.

4. The selection committee will base its recommendations on considerations of personality and scholarship, and candidates should submit evidence under both these headings. The committee will give chief consideration under the heading of scholarship to proficiency in subjects relating to mining engineering and metallurgy, respectively.

5. No recommendation will be made if, in the opinion of the selection committee, no candidate is qualified.

6. Candidates must lodge their applications and credentials, endorsed "Mining and Metallurgical Bursaries," with the Registrar of the University on or before 31st December.

7. Payments will be made during the first term of the second, third and fourth years. The payment of the second and third annual instalments of each bursary will be contingent on the holder having completed his second and third years, respectively, and on the decision of the selection committee that he has sufficiently distinguished himself in the subjects of the year.

In general, the attainment of distinction in two subjects or credit in three subjects will be accepted as evidence of sufficient distinction. Special consideration will be given to engineering and geological subjects in the case of a bursary in Mining and to engineering and chemical subjects in the case of a bursary in Metallurgy.

8. Bursars in any year desiring renewal of their bursaries for the following year must apply in writing for such renewal before 31st December.

Commonwealth Scholarships.

Students attending first degree or diploma courses at the New South Wales University of Technology are eligible to apply for Commonwealth scholarships. Open Entrance Scholarships are awarded at matriculation. In addition, a limited number of scholarships is awarded to students proceeding to second or later years of their course who have not failed either in the first year or in the year immediately preceding the award of the scholarship, and who have not previously received benefits under the Commonwealth Scholarship Scheme, the Commonwealth Financial Assistance Scheme or the Commonwealth Reconstruction Training Scheme. Mature Age Scholarships are also awarded, either in the first or later years of a course, to students between the ages of 25 and 30 years on the 1st of January of the year in which a scholarship is sought, who have resided in Australia for the two years immediately prior to that date, who have no previous professional or tertiary qualifications and who have not previously received assistance under the Commonwealth Scholarship Scheme, the Commonwealth Financial Assistance Scheme or the Commonwealth Reconstruction Training Scheme.

The award of Commonwealth scholarships will be made entirely on merit, and all students awarded Commonwealth scholarships will be entitled to the following benefits, irrespective of the means of their parents:—

(*a*) tuition fees;

(*b*) examination fees;

(*c*) degree fees;

(*d*) general service fees;

(*e*) other compulsory fees.

Winners of Commonwealth scholarships who undertake full-time courses on a full-time basis may also apply for living allowances, subject to a means test. The maximum living allowances are £169 per annum for a student living with his parents, and £240 10s. per annum for a student living away from his parents.

The maximum living allowances will be granted where the adjusted family income does not exceed £600 per annum. The adjusted family income is the income of the student and his parents for the financial year immediately preceding the year in which the scholarship is awarded less £100 for the first dependent child under 16 years of age (other than the applicant) and £50 for each other dependent child under 16 years of age. Where the adjusted family income exceeds £600, the amount of living allowance payable abates at the rate of £3 for every £10 by which the adjusted family income exceeds £600. Thus, if the living allowance is to be payable in any particular case the adjusted family income must be less than (i) £1,150 if the student is living at home or (ii) £1,388 if the student is living away from home. In the case of Mature Age Scholarships the student is also permitted to earn some income from other sources without reduction of the maximum living allowance. A single scholar's permissible income is £1 11s. 6d. per week and the permissible income of a married scholar and his/her spouse is £3 1s. 6d. per week, with an additional allowance of 9s. a week for one child.

Any scholar may receive from other sources, without deduction from his living allowance, an income of up to £1 a week during short vacations and up to £3 a week during long vacations.

Apart from Mature Age Scholarships, an applicant should be under 21 years of age on 21st January of *the year in which the course is commenced,* but consideration will also be given to students between the ages of 21 and 25 years upon indication by them of the reasons preventing the commencement of a tertiary course before the age of 21.

The closing date for applications for all Commonwealth scholarships is 30th November of the year immediately preceding the year in which the scholarship is desired. Full particulars and application forms may be obtained from the Officer-in-Charge, University Branch Office, Department of Education, University Grounds, University of Sydney. (Telephone MW2911.)

New South Wales Public Service Board Traineeships.

The N.S.W. Public Service Board award a number of traineeships in Civil and Mechanical Engineering, Wool Technology and Applied Chemistry. Under these traineeships University fees are paid and also allowances at the following rates while the student is in attendance at the University:

1st and 2nd years—
£187 per annum if living at home,
£312 per annum if living away from home.

3rd year—
£234 per annum if living at home,
£364 per annum if living away from home.

4th and subsequent years—
£260 per annum if living at home,
£390 per annum if living away from home.

On reaching the age of 21 years, the trainee receives an allowance at the rate of £286 per annum if living at home or £416 per annum if living away from home.

Married students receive £416 per annum, plus 15s. per week for dependent wife and 10s. per week for each child.

During industrial training periods salaries are paid in accordance with the appropriate agreement.

State Bursaries and Exhibitions.

A number of exhibitions and bursaries are awarded by the New South Wales Government on the results of the Leaving Certificate Examination and the Qualifying Examination of the Department of Technical Education. The award of an exhibition exempts the student from payment of fees. Bursaries are awarded subject to the applicant holding an exhibition and satisfying a means test. They are tenable for the duration of one first degree course, and provide a living allowance of £52 per annum (£75 per annum if the student is living away from home), and a book allowance of up to £7 10s. per annum. The permissible income of the applicant's family is £1,050 if there are three or fewer dependents, with an increase in the permissible family income of £80 for each additional dependent. Bursary holders are allowed to engage in employment only when it is associated with the course, and the income from such employment must not exceed £300 per annum. Further information can be obtained from the Bursary Endowment Board, c/o. Department of Education, Bridge Street, Sydney.

Department of Railways, New South Wales, Scholarships.

The Department of Railways, N.S.W., calls applications annually from its employees for scholarships to the degree courses in Civil, Mechanical, and Electrical Engineering.

The scholarships are available under the following conditions:—

Group 1—Cadets and apprentices under 19 years of age as at 31st January in the year in which the scholarships are to be awarded are eligible for consideration provided they have had at least one year's service and have satisfactorily completed the technical course set down for that period.

The applicant must be eligible for enrolment in the complete Stage I of the relevant diploma course and also be acceptable to the University as a student of a degree course.

Group 2—Cadets and apprentices or employees with previous training as cadets or apprentices, who are not over 23 years of age as at 31st January in the year in which the scholarships are to be awarded, who have completed Stages 1 and 2 of the relevant diploma course without post examinations and who obtain credit passes in the principal subjects of Stage 2 in the year prior to the award.

Group 3—Employees who have had at least one year's service, who are not over 25 years of age as at 31st January in the year in which the scholarships are to be awarded, who have completed the relevant diploma course in the Honours or Credit Grade, and who have the necessary qualifications for entry to the degree course.

General—Scholarship holders will have all fees paid, be paid full salary while at the University, retain all benefits as an employee of the Commissioner for Railways, and will be required to complete a bond with surety to cover the period of training and to remain in the Commissioner's service after completion of the training period for five years in the case of Group 3, and ten years in the case of Groups 1 and 2.

The John Heine Memorial Scholarship.

The Scholarship is awarded annually at the discretion of the Directors of the John Heine Memorial Foundation, and is designed to encourage the recipient to undertake *either* the final two years of the degree course *or* the conversion course in Mechanical, Electrical, or Chemical Engineering, Applied Chemistry, or Metallurgy. Applicants for the scholarship will be required to furnish evidence of being qualified for admission to the third year of the degree course (fourth year in the case of Chemical Engineering) or to the appropriate conversion course.

The Scholarship has a total value of £250, which is paid at the following rates:—

(i) Final two years of the degree courses—
First year of tenure £100
Second year of tenure £150

(ii) Conversion courses—

(*a*) Mechanical and Electrical Engineering—

One part-time year followed by one full-time year—£50 in the first year and £200 in the second year.

Three part-time years—£50 in each of the first and second years, £150 in the third year.

(*b*) Applied Chemistry, Chemical Engineering, and Metallurgy—

Two part-time years—£100 in the first year and £150 in the second year.

One full-time year, £250.
One part-time year, £150.

Applicants for the scholarship are required to furnish evidence of good character, personality and address and medical fitness. They must also be an employee of a member of the Metal Trades Employers' Association. The tenure of the scholarship is conditional upon satisfactory report as to the recipient's progress in the course being made by the appropriate University authorities.

Application should be made not later than the 31st January of each year to the Secretary, The John Heine Memorial Foundation, c/o the Metal Trades Employers' Association, 7 Wynyard Street, Sydney.

The A. E. Goodwin Memorial Scholarship.

The Directors of A. E. Goodwin Ltd. have made provision for the annual award of a scholarship in commemoration of the late A. E. Goodwin.

1. The scholarship shall be known as the A. E. Goodwin Memorial Scholarship.
2. The scholarship shall be open for award each year to students who are eligible to enrol in the second year of the Mechanical Engineering degree course, and, in making the award, consideration shall be given to scholarship, personality and aptitude for the engineering profession.
3. The total value of the scholarship shall be £90, payable in three equal amounts of £30 each at the beginning of the second, third and fourth years of the course.
4. Continued tenure of the scholarship shall be subject to satisfactory progress on the part of the holder.
5. Applications shall be made to the Registrar by 31st January in each year.

The Broadcasting, Radio, Electrical Industries Fellowship (B.R.E.I.F.) Club, Sydney, Scholarship.

Two scholarships may be awarded annually by the Broadcasting, Radio, Electrical Industries Fellowship Club (B.R.E.I.F.), Sydney. The scholarships will be tenable in the second, third or fourth year of the Electrical Engineering degree course and will exempt holders from payment of fees during the year of tenure. Applicants must be qualified for admission to the second, third or fourth year of the degree course in Electrical Engineering and may so qualify—

(i) by completion of the first, second or third year of the Electrical Engineering degree course;

(ii) by completion of such portion of the Electrical Engineering or Radio Engineering diploma courses (and such further courses, if necessary) as enable admission to the second, third or fourth year of the Electrical Engineering degree course.

The Scholarships will be awarded according to academic merit but the financial circumstances of the applicant will receive special consideration in making the award, and applicants must not be more than 35 years of age on the 1st January in the year of award. Holders of the scholarship may be eligible for a further award in subsequent years.

Applications should be made on the prescribed form obtainable from the Registrar and should be lodged by 31st January in the year of proposed tenure.

The Imperial Chemical Industries of Australia and New Zealand Research Fellowship.

Imperial Chemical Industries of Australia and New Zealand has undertaken to provide a sum of £800 annually to establish a Fellowship to be known as the Imperial Chemical Industries of Australia and New Zealand Research Fellowship. The following conditions apply to the award:—

1. The Research Fellowship is to be used to promote knowledge in those fields which have some direct relation to the scientific interests and national responsibilities of ICIANZ, such as pure and applied chemistry, biochemistry, agricultural science, chemotherapy, pharmacology, physics, engineering, mining and metallurgy.
2. The appointment to a Fellowship is to be made by the University subject to agreement by ICIANZ and is to be open to any subject of a nation in the British Commonwealth who is a graduate of a recognised University.
3. The normal period of tenure will be two years.
4. It is a condition of the appointment that a Fellow should engage in teaching activities in the University in addition to research.
5. A Fellow will not be under any obligation to take out a higher degree.
6. It is intended that the grant should increase the output of research and not be used to relieve the burden on any other source of revenue.
7. The annual grant to the University is fixed at £800.
8. Where no suitable candidate applies in any year, the University may carry the grant forward.
9. Application should be made to the Registrar by 31st December in 1957 and each alternate year thereafter.

The Monsanto Research Scholarship.

Monsanto Chemicals (Australia) Ltd. has established a scholarship for research in Chemical Engineering to the value of £700 per annum. The scholarship will be awarded under the following rules:—

1. The scholarship shall be known as the Monsanto Research Scholarship.
2. It shall be open for award each year, normally in February, from applications lodged with the Registrar by December 31st of the previous year. Awards shall be made by the Professorial Board on the recommendation of the Professor of Chemical Engineering, after consultation with Monsanto Chemicals (Australia) Ltd.

3. The scholarship shall have an annual value of £700, of which a minimum of £550 shall be paid to the scholar as his emoluments and the remaining £150 to the scholar or to the University towards meeting the expenses connected with the scholar's work, this to be at the discretion of the University.

4. The scholarship shall be awarded for research in Chemical Engineering, the subject of the research to be approved by the Professor of Chemical Engineering and to be carried out under his direction.

5. The scholarship shall be tenable at the New South Wales University of Technology for a period of one year, but may be re-awarded for a second, though not for a further year. The scholar's tenure shall at all times be subject to his work being satisfactory to the Professor of Chemical Engineering.

6. Scholars shall be required to devote their full time to research, save that they will be permitted to undertake a limited amount of demonstrating work at the University.

7. Candidates for the scholarship shall be graduates in science or engineering (preferably having completed a four-year course) of an Australian University or have at least equivalent qualifications. They should have a good scholastic record and show some aptitude for research. Personality and leadership qualities shall also be taken into consideration.

8. The scholar shall forward a copy of any written account of his research work to the library of Monsanto Chemicals (Australia) Ltd. and shall have the right to publish the results of his research.

Consolidated Zinc Metallurgical Research Scholarship.

One post-graduate Metallurgical research scholarship is awarded annually by Consolidated Zinc Proprietary Limited to graduates in metallurgy. The scholarship is of an annual value of £500, and has a maximum tenure of three years. The conditions of award are as follows:—

1. The scholarship is open to graduates of a recognised University.

2. Applications close on 30th November, and should be lodged with the Company at 95 Collins Street, Melbourne.

3. Applicants must state their age, marital status, and previous academic and practical experience.

4. The subject of the research must be described by the applicant, together with a short statement of the objects towards which the research is directed. It is intended that the research should have some bearing on the industry with which the Company is associated.
5. The suggested research must also be acceptable to the University as submission for a thesis towards a higher degree, and the applicant must reach agreement with the University to this effect before lodging his application with the Company.
6. Final choice of a selected applicant will be made by the Chairman of the Company acting on the recommendation of a chosen official or officials of the Company.

Wool Industry Fund Scholarships.

Two scholarships financed from the Wool Industry Fund established by the Commonwealth Government are available from time to time for students attending the Wool Technology degree course. The value of each scholarship is £300 per annum for four years, continued tenure being subject to satisfactory progress. Further information may be obtained from the Registrar, with whom applications should be lodged not later than 31st January.

Services Canteens Trust Fund Post-Graduate Scholarship.

The Trustees of the Services Canteens Trust Fund offer annually one post-graduate scholarship for study or research in Australia in any field of knowledge prescribed by the University concerned to an outstanding student whose father or mother served in the Australian Forces during the 1939-45 war.

The scholarship shall be valued at £600 per annum and shall be available for a period of up to three years.

The scholarship is open to a child (including step-child, adopted child or ex-nuptial child) of a person who was at any time between 3rd September, 1939, and 30th June, 1947—

(*a*) a member of the Naval, Military or Air Forces of the Commonwealth; or

(*b*) a member of any nursing service or women's service attached or auxiliary to any branch of the Defence Force of the Commonwealth; including

(*c*) members of the Canteens Staff of any ship of the Royal Australian Navy, and any person duly accredited to any part of the Defence Force who served in an official capacity on full-time paid duty.

In awarding the scholarship the Trustees will take into account:

(i) Academic career of the applicant.

(ii) Ability for research work.

(iii) Character.

(iv) The future value to Australia of the subject of research selected.

The Scholarship will only be awarded if there is a candidate of sufficient merit.

The scholar must not take paid employment or accept remuneration without the express approval of the Trustees, and must submit to the Trustees at the end of each term reports and a certificate of supervision by the Supervisor of his research, as to the progress of his studies.

Applications must be lodged with the General Secretary, Services Canteens Trust Fund, Victoria Barracks, St. Kilda Road, Melbourne, before 10th January.

Application forms and any further information may be obtained from the Regional Secretary, Services Canteens Trust Fund, 84 Pitt Street, Sydney.

Commonwealth Public Service Cadetships.

The Commonwealth Public Service each year offers cadetships tenable in certain undegraduate courses at the University of Technology, in order to enable selected employees in its service to obtain professional qualifications. During the training period the cadet receives the following salary:—

Under 19 years	£431 p.a.
At 19 years	£524 p.a.
At 20 years	£616 p.a.
At 21 years	£722 p.a.
At 22 years	£764 p.a.
At 23 years	£806 p.a.
Rising by two increments of £42 p.a. to	£890 p.a.

Fees are refunded to the cadet on a proportionate basis according to his salary: a full refund is given up to and including the £616 p.a. salary rate, a 75 per cent. refund in the range £722 to £764 p.a., and a 50 per cent. refund thereafter

Applicants must have passed the Leaving Certificate or equivalent examination with passes in English, Mathematics, and Physics, and they will be required to enter into a bond. Either full-time or part-time courses may be undertaken if available.

In 1956, Cadetships will be offered in the following fields:—

Postmaster-General's Department—Cadet Engineers or Cadet Draftsmen.

Department of Works—Cadet Quantity Surveyors.

Further information can be obtained from the Employment Officer, Commonwealth Public Service Inspector's Office, 119 Phillip-street, Sydney (Telephone BW 5701).

Rural Bank Fellowship in Agricultural Engineering.

The Rural Bank of New South Wales provides a fellowship for post-graduate research in agricultural engineering, tenable at the University of Technology. The successful applicant must be an Honours graduate who is interested in the engineering problems of the primary industries, and will be required to pursue research under the general direction of the Professor of Mechanical Engineering. The Fellowship is valued at £834-£987 per annum, with a possible maximum of £1,159 per annum for persons of exceptional qualifications and experience.

Further information may be obtained from the Professor of Mechanical Engineering. Applications should be made to the Bursar by 15th October in the year preceding the year of award.

The Australian Atomic Energy Commission Post-graduate Research Studentships.

The Australian Atomic Energy Commission awards studentships tenable at the N.S.W. University of Technology to suitable University graduates desiring to undertake research work within fields of importance to Australia's programme of atomic energy research, development and application such as applied physics, chemistry, chemical engineering, electrical engineering, mechanical engineering or metallurgy. The Studentship is usually awarded to a graduate working for a Ph.D. degree, and is of one year's duration, but may be renewed at the discretion of the Commission for a second or third year.

The Studentships have an annual value of at least £700 per annum, and the Commission also meets all compulsory University tuition fees *except* those fees payable for enrolment and for the actual taking out of a degree. The Commission may also, upon request by the University, provide funds for the purchase of equipment or materials that would materially assist the student's programme of research.

At the end of each year the student is required to submit to the Commission a technical report on the progress of his work. The student is expected to devote the whole of his time to training in research, except for customary vacations. He may be permitted to undertake limited teaching or demonstrating duties, but he must inform the Commission of the extent of such activities and the income therefrom.

Award of the Studentship is made on the nomination of the University, and applicants should in the first place consult the Head of the appropriate School with a view to securing such nomination.

The Australian Atomic Energy Commission Undergraduate Scholarships.

The Australian Atomic Energy Commission from time to time invites applications for undergraduate scholarships in fields of importance in Australia's programme of atomic energy development and application. The scholarships are open to male students enrolled, or about to be enrolled, in any year of an approved course of study leading to a degree in Science or Engineering.

Further information concerning the undergraduate scholarships may be obtained from the Secretary, Australian Atomic Energy Commission, Box 5343, G.P.O., Sydney.

CONDITIONS FOR THE AWARD OF DEGREE OF MASTER IN THE FACULTY OF APPLIED SCIENCE.

1. An application to register as a candidate for the degree of Master of Science shall be made on the prescribed form which shall be lodged with the Registrar at least one full calendar month before the commencement of the term in which the candidate desires to register.

2. An applicant for registration for the degree of Master shall have been admitted to the degree of Bachelor of Science in the New South Wales University of Technology, or other approved University, in an appropriate School.

3. (i) In exceptional cases persons may be permitted to register as candidates for the degree of Master if they submit evidence of such academic and professional attainments as may be approved by the Professorial Board.

(ii) The registration of diplomates of the New South Wales Department of Technical Education as candidates for the degree of Master of Science shall be determined in each case by the Professorial Board. Normally, such applicants shall be required to produce evidence of academic and professional progress over a period of five years from the time of gaining the diploma.

4. Notwithstanding any other provisions of these regulations the Professorial Board may require an applicant to demonstrate his fitness for registration by carrying out such work and sitting for such examinations as the Board may determine.

5. In every case, before permitting an applicant to register as a candidate, the Professorial Board shall be satisfied that adequate supervision and facilities are available.

6. An applicant approved by the Professorial Board shall register in one of the following categories:—

(i) Student in full-time attendance at the University.
(ii) Student in part-time attendance at the University.
(iii) Student working externally to the University.

7. An approved applicant shall be required to pay the undermentioned fees:—

(i) a registration fee of £2;
(ii) the appropriate laboratory and supervision fee according to the category in which the student is registered;
(iii) a fee of £15 when submitting the thesis for examination.

The combined laboratory and supervision fee shall be—

(*a*) £30 p.a. for students in full-time attendance at the University.
(*b*) £15 p.a. for students in part-time attendance at the University.

(*c*) £10 p.a. for students working externally to the University. Fees to be paid in advance.

8. (i) Every candidate for the degree shall be required to submit a thesis embodying the results of an original investigation or design, to take such examinations and to perform such other work as may be prescribed by the Professorial Board. The candidate may submit also for examination any work he has published, whether or not such work is related to the thesis.

(ii) The investigation, design and other work as provided in paragraph 8 (i) shall be conducted under the direction of a supervisor appointed by the Board or under such conditions as the Board may determine.

(iii) Every candidate shall submit three copies of the thesis as provided under paragraph 8 (i).* All copies of the thesis shall be in double-spaced typescript, shall include a summary of approximately 200 words, and a certificate signed by the candidate to the effect that the work has not been submitted for a higher degree to any other University or institution. Two copies of the thesis shall be bound in such manner as allows them transmission to the examiners without possibility of disarrangement and the third copy shall be in accordance with the following specification:—

> The size of the paper shall be quarto (approximately 10 in. x 8 in.) except for drawings and maps on which no restriction is placed. There shall be a margin of 1½ in. on the left-hand side of each page. The whole is to be arranged in order for binding but to be unbound.

(iv) Unless there is a specific arrangement to the contrary, it shall be understood that the University retains the three copies of the thesis and is free to allow the thesis to be consulted or borrowed or to be issued in whole or in part in photostat or micro-film or other copying medium.

9. No candidate shall be considered for the award of the degree until the lapse of six complete terms from the date from which the registration becomes effective, save that in the case of a candidate who has obtained the degree of Bachelor with Honours or who has had previous research experience, this period may, with the approval of the Professorial Board, be reduced by up to three terms.

10. For each candidate there shall be two examiners appointed by the Professorial Board, one of whom shall, if possible, be an external examiner.

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* The thesis and other relevant work may be submitted to the Registrar at any time during the year, within the provisions of paragraph 9 of the Master of Science Regulations.

In order that a successful candidate may have a reasonable chance of having his degree conferred at one of the formal degree conferring ceremonies, the candidate should arrange for his thesis and other relevant work to be in the hands of the Registrar at least fourteen weeks prior to the date of such ceremony.

CONDITIONS FOR THE AWARD OF DEGREE OF MASTER IN THE FACULTY OF ENGINEERING.

1. Applications to register for the degree of Master of Engineering shall be made on the prescribed form which shall be lodged with the Registrar at least one full calendar month before the commencement of the term in which the candidate desires so to register.

2. A candidate for the degree of Master shall have obtained the degree of Bachelor with Honours in the New South Wales University of Technology, or other approved University, in an appropriate department, save that a graduate who holds the degree of Bachelor without Honours may be admitted as a candidate if evidence is submitted to the satisfaction of the Professorial Board that such candidate has attained, by additional work and study since graduating, a standard not lower than Second Class Honours. The Board may require such applicants to sit for such examinations or carry out such prescribed work as the Board may determine before the student is accepted as a candidate for the degree.

3. (i) In exceptional cases persons may be admitted as candidates for the degree of Master if they submit evidence of such general and professional qualifications as may be approved by the Professorial Board.

(ii) The admission of diplomates of the New South Wales Department of Technical Education as candidates for the degree of Master shall be determined in each case by the Professorial Board. Normally such candidates shall be required to produce evidence of academic and professional progress over a period of five (5) years from the time of gaining the diploma.

4. A candidate approved by the Professorial Board shall register in one of the following categories:—

(i) Student in full-time attendance at the University.

(ii) Student in part-time attendance at the University.

(iii) Student working externally to the University.

5. An approved candidate shall be required to pay the undermentioned fees:

(i) a registration fee of £2;

(ii) the appropriate laboratory and supervision fee according to the category in which the candidate is registered;

(iii) a fee of £15 when submitting the thesis for examination.

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The combined laboratory and supervision fee shall be—

(*a*) £30 p.a. for students in full-time attendance at the University;

(*b*) £15 p.a. for students in part-time attendance at the University;

(*c*) £10 p.a. for students working externally to the University.

Fees shall be paid in advance and no fees shall be refunded under any circumstances.

6. (i) Every candidate for the degree shall be required to submit a thesis embodying the results of an original investigation or design, to take such examinations and to perform such other work as may be prescribed by the Professorial Board. The candidate may submit also for examination any work he has published, whether or not such work is related to the thesis.

(ii) The thesis, investigation, design and other work as provided in paragraph (i) shall be conducted under the direction of a supervisor appointed by the Board or under such conditions as the Board may determine.

(iii) Every candidate shall submit three copies of the thesis as provided under paragraph (i) by 31st December of the year next preceding that in which the candidate may graduate. All copies of the thesis shall be in double-spaced typescript, shall include a summary of approximately 200 words in the nature of an abstract, and a certificate over the hand of the candidate to the effect that the work has not been submitted to any other University or institution for a Higher Degree and one of the three copies of the thesis shall be in accordance with the following specification:—

The size of the paper shall be quarto (approximately 10 in. x 8 in.) except for drawings and maps on which no restriction is placed. A margin of 1½ in. shall occur on the left-hand side of each page and the whole shall be bound in a cover to be supplied by the University.

(iv) Unless there is a specific arrangement to the contrary, the candidate understands that the University shall retain the three copies of the thesis and is free to allow the thesis to be consulted or borrowed or to be issued in whole or in part in photostat or microfilm or other copying medium.

7. No candidate shall be considered for the award of the degree until the lapse of six complete terms from the date of registration.

8. There shall be two examiners appointed by the Professorial Board, one of whom shall, if possible, be an external examiner.

CONDITIONS FOR THE AWARD OF DEGREE OF MASTER IN THE FACULTY OF ARCHITECTURE.

1. Applications to register for the degree of Master of Architecture shall be made on the prescribed form which shall be lodged with the Registrar at least one full calendar month before the commencement of the term in which the candidate desires so to register.

2. *Qualifications.*—Admission as candidate for the degree of Master of Architecture shall be decided in each case by the Professorial Board. Persons in one of the following categories may be admitted as registered candidates:

(i) Those holding the degree of Bachelor of Architecture with Honours in the New South Wales University of Technology or other approved University, in an appropriate department, save that a graduate who holds the degree of Bachelor of Architecture without Honours may be admitted as a candidate if evidence is submitted to the satisfaction of the Professorial Board that such candidate has attained, by additional work and study since graduating, a standard not lower than Second Class Honours. The Board may require such applicants to sit for such examinations or carry out such prescribed work as the Board may determine before the student is accepted as a candidate for the degree.

(ii) The admission of diplomates of the New South Wales Department of Technical Education as candidates for the degree of Master shall be determined in each case by the Professorial Board. Normally such candidates shall be required to produce evidence of academic and professional progress over a period of five (5) years from the time of gaining the diploma.

(iii) In exceptional cases persons may be admitted as candidates for the degree of Master if they submit evidence of such general and professional qualifications as may be approved by the Professorial Board.

3. *Registration.*—A candidate for registration for the degree of Master shall submit with his application, a certificate from the Head of the School of Architecture, stating that the candidate is a fit person to undertake a course of study or research leading to the degree of Master of Architecture and that the School is willing to undertake the responsibility of supervising the work of the candidate and of reporting to the Professorial Board at the end of the course on the merits of the candidate's performance.

4. A candidate approved by the Professorial Board shall register in one of the following categories:—

(i) Student working externally to the University;

(ii) Student in part-time attendance at the University;

(iii) Student in full-time attendance at the University.

5. *Fees.*—An approved candidate shall be required to pay the undermentioned fees:—

(i) A registration fee of £2.

(ii) The appropriate laboratory and studio and supervision fee, as follows—

(*a*) £10 p.a. for students working externally to the University;

(*b*) £15 p.a. for students in part-time attendance at the University;

(*c*) £30 p.a. for students in full-time attendance at the University.

(iii) A fee of £15 when submitting the thesis for examination.

Fees shall be paid in advance and no fees shall be refunded under any circumstances.

6. *Thesis:*

(i) Every candidate for the degree shall be required to submit a thesis embodying the results of original investigation or design or advanced study relative to Architecture or Building, to take such examinations and to perform such work as may be prescribed by the Professorial Board. The candidate may submit also for examination any other work he has undertaken or published, whether or not such work is related to the thesis.

(ii) The thesis, investigation, design and other prescribed work as provided in paragraph (i) shall be conducted under the guidance of a supervisor appointed by the Board or under such conditions as the Board may determine.

(iii) Every candidate shall submit three copies of the thesis (including any necessary plans and illustrations) as provided under paragraph (i) by 1st December of the year next preceding that in which the candidate may graduate. All copies of the thesis shall include a summary of approximately 200 words in the nature of an abstract, and a certificate over the hand of the candidate to the effect that the work has not been submitted to any other University or institution for a Degree, Diploma or any other qualification.

(iv) The thesis shall be in double-spaced typescript. Two copies shall be bound in such manner as allows their transmission to the examiners without possibility of disarrangement and the third copy shall be in accordance with the following specification:

The size of the paper shall be quarto (approximately 10 inches x 8 inches), except for drawings, plans and maps, on which no restriction is placed. A margin of 1½ inches to be left on the left-hand side of each page and the whole to be arranged in order for binding, but to be unbound.

(v) Unless there is a specific arrangement to the contrary, the candidate understands that the University shall retain the three copies of the thesis and is free to allow the thesis to be consulted or borrowed or to be issued in whole or in part in photostat or microfilm or other copying medium.

7. No candidate shall be considered for the award of the degree until the lapse of six complete terms from the date of registration.

8. There shall be two examiners appointed by the Professorial Board, one of whom shall, if possible, be an external examiner.

CONDITIONS FOR THE AWARD OF DEGREE OF DOCTOR OF PHILOSOPHY (Ph.D.) IN THE FACULTIES OF APPLIED SCIENCE, ENGINEERING, AND ARCHITECTURE.

1. The degree of Doctor of Philosophy may be granted by the Council on the recommendation of the Professorial Board to a candidate who has made an important contribution to knowledge and who has satisfied the following By-laws and Regulations made in accordance with these By-Laws.

Qualifications.

2. A candidate for registration for the degree of Ph.D. shall—

(i) hold an Honours degree from the New South Wales University of Technology; or

(ii) hold an Honours degree of equivalent standing from any other approved University; or

(iii) if he holds a degree without Honours from the New South Wales University of Technology or an approved University, have achieved by subsequent work and study a standard recognised by the Board as equivalent to Honours; or

(iv) in exceptional cases, submit such other evidence of general and professional qualifications as may be approved by the Professorial Board.

3. When the Professorial Board is not satisfied with the qualifications submitted by a candidate, the Board may require him, before he is permitted to register, to undergo such examination or carry out such work as the Board may prescribe.

Registration.

4. A candidate for registration for a course of study leading to the degree of Ph.D. shall—

(i) apply to the Registrar on the prescribed form at least one calendar month before the commencement of the term in which he desires to register; and

(ii) submit with his application a certificate from the Head of the University School in which he proposes to study stating that the candidate is a fit person to undertake a course of study or research leading to the Ph.D. degree and that the School is willing to undertake the responsibility of supervising the work of the candidate and of reporting to the Professorial Board at the end of the course on the merits of the candidate's performance in the prescribed course of study.

Course of Study.

5. Subsequent to registration the candidate shall pursue a course of advanced study and research for at least nine academic terms, save that—

(i) a candidate who is not fully engaged in research work for his degree will be required to satisfy the Professorial Board on the amount of time he can devote to research work for the degree; and he may not proceed to the degree before the expiration of ten academic terms from the date of registration as a candidate;

(ii) any candidate who before registration was engaged upon research to the satisfaction of the Professorial Board, may be exempted from three academic terms.

6. A candidate shall present himself for examination not later than fifteen academic terms from the date of his registration, unless special permission for an extension of time be granted by the Professorial Board.

7. The course, other than field work, must be carried out in a School of the University, under the direction of a supervisor appointed

by the Board, or under such conditions as the Board may determine, save that a candidate may be granted special permission by the Board to spend a period of not more than three academic terms in research at another institution approved by the Board.

8. Not later than three academic terms after registration the candidate shall submit the subject of his thesis for approval by the Professorial Board. After the subject has been approved it may not be changed except with the permission of the Board.

9. A candidate may be required to attend a formal course of study appropriate to his work.

Thesis.

10. On completing his course of study every candidate must submit a thesis which complies with the following requirements:—

(i) The greater proportion of the work described must have been completed subsequent to registration for the Ph.D. degree.

(ii) It must be a distinct contribution to the knowledge of the subject.

(iii) It must be written in English and reach a satisfactory standard of literary presentation.

11. The thesis must consist of the candidate's own account of his research. In special cases work done conjointly with other persons may be accepted, provided the Professorial Board is satisfied on the candidate's part in the joint research.

12. Every candidate shall be required to submit with his thesis a short abstract of the thesis comprising not more than 300 words.

13. A candidate may not submit as the main content of his thesis any work or material which he has previously submitted for a University degree or other similar award.

14. Unless there is a specific arrangement to the contrary, the University will be free to allow the thesis to be consulted or borrowed or to be issued in whole or in part in photostat or micro-film or other copying medium.

Entry for Examination.

15. The candidate shall give in writing two months' notice of his intention to submit his thesis and such notice shall be accompanied by the appropriate fee.

16. Three copies of the thesis shall be submitted together with a certificate from the Supervisor that the candidate has completed the course of study prescribed in his case.

17. The thesis shall be in double-spaced typescript. Two copies shall be bound in such manner as allows their transmission to the examiners without possibility of disarrangement, and the third copy shall be in accordance with the following specification:

> Size of paper, quarto (approximately 10 inches by 8 inches) except for drawings and maps on which no restriction is placed. A margin of 1½ inches to be left on the left-hand side of each page, the whole to be arranged in order for binding but to be unbound.

18. The candidate may also submit as separate supporting documents any work he has published, whether or not it bears on the subject of the thesis.

19. The Professorial Board shall appoint the examiners, one of whom shall normally be an external examiner.

20. After the examiners have read the thesis they may—

(i) without further test recommend the candidate for rejection;

(ii) request additional work on the thesis before proceeding further with the examination.

21. If the thesis reaches the required standard, the examiners shall arrange for the candidate to be examined orally, and, at their discretion, by written papers and/or practical examinations on the subject of the thesis and/or subjects relevant thereto.

22. If the thesis is adequate but the candidate fails to satisfy the examiners at the oral or other examinations, the examiners may recommend the University to permit the candidate to re-present the same thesis and submit to a further oral, practical or written examination within a period specified by them but not exceeding eighteen months.

23. At the conclusion of the examination, the examiners will submit to the Professorial Board a concise report on the merits of the thesis and on the examination results.

Fees.

24. The fee payable for an examination qualifying for registration shall be £5.

25. An approved candidate shall pay—

(i) a registration fee of £2.

(ii) a supervision fee of £30 per annum.

(iii) a fee of £21 on application for the examination.

26. Fees shall be paid in advance and no fees shall be refunded under any circumstances.

SYLLABUSES FOR UNDERGRADUATE COURSES.

The syllabuses of the courses offered in the various schools are set out in detail below.

For purposes of reference each school within the University, except the School of Humanities and Social Sciences, utilizes a Roman numeral to denote the undergraduate courses of study leading to a degree which it mainly provides. Similarly the subjects provided in the various courses by each school are denoted by an Arabic number, the first figure in which corresponds with the Roman numeral utilized by the school providing the subject.

Subjects given by the School of Humanities and Social Sciences are denoted by the letter G followed by a distinguishing number.

School.	Distinguishing Numeral.	Subject Numbers.
Applied Physics	I	1.00 to 1.92
Applied Chemistry	II	2.00 to 2.97
Chemical Engineering	III	3.00 to 3.824
Metallurgy	IV	4.00 to 4.912
Mechanical Engineering	V	5.00 to 5.74
Electrical Engineering	VI	6.00 to 6.95
Mining Engineering and Applied Geology	VII	7.00 to 7.703
Civil Engineering	VIII	8.00 to 8.94
Wool Technology	IX	9.00 to 9.94
Mathematics	X	10.00 to 10.92
Architecture and Building	XI	11.00 to 11.96
Applied Psychology	XII	12.00 to 12.70
Humanities and Social Sciences		G1 to G51

The time given to each subject is shown in two parts, the first figure respresenting lecture hours per week, the second, laboratory tutorial or practical work in hours per week. These times represent the average distribution over the term or year, but may be varied from time to time according to the nature of the work. Lecture time may not always be used for formal instruction, but may be devoted to discussions, assignments in the library, film presentation, or other means of instruction.

Descriptions of the subjects given in each course are set out in a later section of the Calendar entitled "Description of Subjects of Instruction". The subjects are there grouped under the school which provides them.

Courses at Newcastle University College.

A list of subjects offered to students taking an Arts course at the Newcastle University College appears on page 202 of this Calendar.

In general, the professional courses provided at Newcastle University College are identical with the courses as given at Sydney. Details of the courses available at Newcastle University College are given in the College Handbook.

SCHOOL OF APPLIED PHYSICS.

The course in Applied Physics is designed to equip students for research in industry and in the field of applied science generally. The course, which extends over four years, provides a thorough training in the fundamentals of physical science and in mathematics, and particular emphasis is placed on technological applications. The practical training includes courses in physical techniques (e.g., high vacuum, electronics, photometric photography) and courses in formal experimentation designed to develop the research outlook. The extra-mural training includes substantial periods in industry in each of the second and third years. On the mathematical side, not only is particular attention given to the formal training required by a physicist, but special courses are given in the application of statistical methods to industrial experimentation.

In addition to the day course in Applied Physics, which leads to the degree of Bachelor of Science (Pass or Honours), Conversion Courses in Applied Physics and Optometrical Science are offered, details of which are shown on pages 107 to 109.

COURSE I—APPLIED PHYSICS.

First Year.

(34 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.11	Physics	3 — 3–1*	3 — 3–1*	3 — 3–1*
1.21	Physical Techniques I	0 — 2	0 — 2	0 — 2
2.21	Chemical Techniques	0 — 3	0 — 0	0 — 0
2.41A	General Chemistry	3 — 3	3 — 3	3 — 6
5.101	Eng. Drawing and Materials	1 — 0	1 — 0	1 — 3
10.11	Mathematics	4 — 2*	4 — 2*	0 — 0
10.11B	Mathematics	0 — 0	0 — 0	2 — 2*
G10	English	2 — 0	2 — 0	0 — 0
G20.1	History	1 — 0	1 — 0	0 — 0
		14 —14	14 —11	9 —17

Second Year.

(24 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.
1.12	Physics	3 — 3–1*	3 — 3–1*
1.22	Physical Techniques II	0 — 3	0 — 3
2.32A	Physical Chemistry	2 — 0	1 — 2
4.912	Materials Technology	1 — 2	1 — 0
5.211A	Workshop Processes and Practice	0 — 3	0 — 3
10.12	Mathematics	3 — 2*	3 — 2*
G20.2	History	2 — 0	0 — 0
G1	Logic	0 — 0	2 — 0
		11 —14	10 —14

* Tutorial.

Third Year.

(24 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.
1.13	Physics	6 — 3–1*	6 — 3–1*
1.23A	Physical Techniques III	0 — 0	0 — 3
1.23B / 1.23C	Physical Techniques IV *or* Physical Techniques V	0 — 3	0 — 3
1.23D	Physical Techniques VI	0 — 2	0 — 2
6.83	Electrical Engineering	2 — 3	2 — 3
10.13	Mathematics	5 — 0	5 — 0
G2	Philosophy	2 — 0	0 — 0
	Minor Elective (Humanities)	0 — 0	2 — 0
		15 —12	15 —15

* Tutorial.

Fourth Year.

(34 weeks day course.)

The fourth year is much more flexible than the earlier years in the allocation of time between lectures and laboratory and tutorial work, and the formal instruction is interspersed with colloquia and study group work. The following time-table is representative:

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.14	Physics	5 — 9–2*	5 — 9–2*	4 — 9–2*
10.14	Mathematics	6 — 0	6 — 0	6 — 0
	Major Elective (Humanities)	3 — 0	3 — 0	0 — 0
		14 —11	14 —11	10 —11

* Tutor

CONVERSION COURSE—Ic1—APPLIED PHYSICS.

Holders of a diploma in Physics who have completed the course of study set out in the current Handbook of the N.S.W. Department of Technical Education may qualify for the degree of Bachelor of Science in Applied Physics by—

†(*a*) Full-time attendance and successful completion of the fourth year of the degree course, with the following variation—

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†Option (*a*) is available only to holders of the Physics diploma who have had at least one year's industrial experience in an occupation involving the application of physical principles, or who have equivalent occupational qualifications.

Portion of the syllabus already taken in the diploma course to be omitted and replaced by 4.912, Materials Technology, and Humanities fourth year degree to be replaced by conversion Humanities ((i) English, History or Philosophy and (ii) Government, Psychology or Economics.)

Or

†(*b*) Successful completion of a part-time course of two years' duration as follows—

	Hours per week. 1st year.	2nd year.
Physics—Lectures	2½	2½
Physics—Laboratory	3	3
Mathematics	2	4
Materials Technology	2¼	—
Conversion Humanities—		
English, History *or* Philosophy	2	—
Government, Psychology *or* Economics	—	2
	11¾	11½

CONVERSION COURSE Ic2—OPTOMETRICAL SCIENCE.

Associates of the Sydney Technical College in Optometry may qualify for the award of the degree of Bachelor of Science (Optometrical Science) by satisfactorily completing the requirements as set out below. In general, the requirements fall into two main categories as shown hereunder, but these may be varied by the Professorial Board in individual cases according to the record of the student.

A. Conversion Course for holders of 5-year Diploma
(1952 and subsequently).

Subject.	Hours per week.
Advanced Visual Physiology and Physiological Optics	5
Advanced Clinical Optometry	3
Mathematics and Statistics	2
Conversion Humanities—English, History *or* Philosophy *and* Psychology, Economics *or* Government	4
	14

To be taken in one year of full-time study, or two years of part-time study of approximately 7 hours per week.

† Option (*b*) is available only to holders of the Physics diploma who, at the conclusion of the conversion course, will have had at least three years' experience of the type mentioned in connection with option (*a*).

B. Conversion Course for holders of 4-year Diploma

(1930-1951).

Subject.	Hours per week.
Optometry II	2
Clinical Optometry II	3
Theory of Optical Instruments	1
Psychology II	2
Optometry III	2
Advanced Visual Physiology and Physiological Optics	5
Advanced Clinical Optometry	3
Mathematics and Statistics	2
Conversion Humanities— English, History *or* Philosophy, *and* Psychology, Economics *or* Government	4
	24

To be taken in two or three years of part-time study, as elected by the student, of approximately 12 or 8 hours per week.

SCHOOL OF APPLIED CHEMISTRY.

The needs of the chemical industry for men competent to develop, design and operate new processes and to improve existing ones, make essential two different types of training. One need involves a general and fundamental education based on science for those who seek a career in some field in which a sound knowledge of chemistry is important; the other requires a similar training to which is added knowledge of the engineering principles basic to design, construction and operation of plant and equipment.

Training of the first type is provided by the courses in Applied Chemistry, in which students receive instruction in the principles of inorganic, analytical, organic and physical chemistry, supplemented by instruction in mathematics and physics and other scientific subjects. In his final year the student is given the opportunity of electing certain subjects so as to enable him to extend his knowledge in fields of special interest. Training of the second type is provided by the courses in Chemical Engineering, details of which are given on pages 130 to 142.

It should be noted that the work in chemistry, physics and mathematics taken in the first year of the full-time course, and in the first and second years of the part-time course in Applied Chemistry is identical with that taken in the same years of the courses in Chemical Engineering and Metallurgy. Students in any of these courses may transfer from one to another without loss of standing up to the end of the first year full-time, or second year part-time.

In addititon to the courses in Applied Chemistry, the School of Applied Chemistry offers courses in General Science, Leather Chemistry and Applied Biology.

COURSE II—APPLIED CHEMISTRY.

This course extends over four years. The first and fourth years of the course each require full-time day attendance at the University for 34 weeks. The second and third years are spent in combined academic study and works practice, students attending the University on two half days and two evenings per week over 34 weeks in each year.

A student at the end of the third year may apply to take an Honours degree, the additional work for Honours being taken in the final year.

First Year.
(34 weeks day course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.11	Physics	3 — 3	3 — 3	3 — 3
2.21	Chemical Techniques	0 — 3	0 — 0	0 — 0
2.41	General Chemistry	3 — 3	3 — 6	3 — 9
5.101	Eng. Drawing and Materials	2 — 0	1 — 3	0 — 0
5.211	Workshop Processes and Practice	0 — 0	0 — 0	0 — 3
10.11	Mathematics	4 — 2*	4 — 2*	0 — 0
10.11B	Mathematics	0 — 0	0 — 0	2 — 2*
G10	English	2 — 0	2 — 0	0 — 0
G20	History	1 — 0	1 — 0	2 — 0
		15 —11	14 —14	10 —17

* Tutorial.

Second Year.
(34 weeks of 2 half days and 2 evenings per week.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.92	Physics	1½— 0	1½— 1½	1½— 1½
2.32	Physical Chemistry	1 — 2½	1 — 0	1 — 0
2.42	Inorganic Chemistry	1 — 0	1 — 0	1 — 2½
2.52	Quantitative Analysis	1 — 2½	1 — 2½	1 — 2½
2.62	Organic Chemistry	1 — 0	1 — 2½	1 — 0
2.72	Mathematical Chemistry	1 — 0	1 — 0	1 — 0
G1	Logic	0 — 0	2 — 0	0 — 0
G2	Philosophy	0 — 0	0 — 0	2 — 0
		6½— 5	8½— 6½	8½— 6½

Third Year.

(34 weeks of 2 half days and 2 evenings per week.)

		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
		Hours per week.		
2.33	Physical Chemistry	1 — 2	1 — 2½	1 — 2½
2.53	Quantitative Analysis	1 — 2½	1 — 2½	1 — 2
2.63	Organic Chemistry	1 — 2½	1 — 2	1 — 2½
2.73	Mathematical Chemistry	1 — 0	1 — 0	1 — 0
3.14*	Industrial Chemistry	1½— ½	1½— ½	1½— ½
	Minor Elective (Humanities)	1 — 0	1 — 0	0 — 0
		6½— 7½	6½— 7½	5½— 7½

* Includes Factory visits.

Fourth Year.

(34 weeks day course.)

		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
		Hours per week.		
Elective A—				
2.34	Physical Chemistry	1 — 4½	1 — 4½	1 — 4½
2.44	Inorganic Chemistry	1 — 4½	1 — 4½*	0 — 0
2.54	Quantitative Analysis	0 — 0	1 — 4½†	1 — 4½
2.64 or ‡2.64A	Organic Chemistry	1 — 4½	1 — 4½	1 — 4½
	Major Elective (Humanities)	3 — 0	3 — 0	0 — 0
		6 —13½	6 —13½	3 —13½

* First half of term. † Second half of term.

‡ 2.64A is to be taken by all students desiring to proceed to an Honours degree.

Or

		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
Elective B—				
2.34	Physical Chemistry	1 — 4½	1 — 4½	1 — 4½
2.64A	Organic Chemistry	1 — 4½	1 — 4½	1 — 4½
2.65A *Or* 2.65B	Applied Organic Chemistry *Or* Applied Organic Chemistry (Chemistry and Analysis of Food)	1 — 4½	1 — 4½	1 — 4½
	Major Elective (Humanities)	3 — 0	3 — 0	0 — 0
		6 —13½	6 —13½	3 —13½

Additional for Honours.

		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
		Hours per week.		
2.44 2.54	Inorganic Chemistry Quantitative Analysis	1 — 4½	1 — 4½	1 — 4½
	Or			
2.65A *Or* 2.65B	Applied Organic Chemistry *Or* Applied Organic Chemistry (Chemistry and Analysis of Food)	1 — 4½	1 — 4½	1 — 4½
	Research Project	0 — 7	0 — 7	0 — 7
		1 —11½	1 —11½	1 —11½

COURSE IIB1—APPLIED CHEMISTRY.

Course IIB1 has been designed for students employed in the chemical industry. The programme of study is equivalent to that of Course II, but Course IIB1 extends over six or seven part-time years, depending on whether a Pass or Honours degree is taken.

FIRST YEAR.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.11	Physics, Part I	1½— 1¾	1½— 1¾	1½— 1¾
2.21	Chemical Techniques }	2 — 4	2 — 4	2 — 4
2.41	General Chemistry, Part I }			
10.11–B	Mathematics, Part I	2 — 1*	2 — 1*	2 — 1*
		5½— 6¾	5½— 6¾	5½— 6¾

* Tutorial.

SECOND YEAR.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.11	Physics, Part II	1½— 1½	1½— 1½	1½— 1½
2.41	General Chemistry, Part II	1 — 2½	1 — 2½	1 — 4
5.101	Eng. Drawing and Materials	2 — 0	1 — 3	0 — 0
10.11–B	Mathematics, Part II	2 — 1*	1 — 1*	1 — 1*
		6½— 5	4½— 8	3½— 6½

* Tutorial.

THIRD YEAR.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.92	Physics *	1½— 0	1½— 1½	1½— 1½
2.32	Physical Chemistry	1 — 0	1 — 0	1 — 2½
2.42	Inorganic Chemistry	1 — 2½	1 — 0	1 — 0
2.52	Quantitative Analysis	1 — 2½	1 — 2½	1 — 2½
2.62	Organic Chemistry	1 — 0	1 — 2½	1 — 0
2.72	Mathematical Chemistry	1 — 0	1 — 0	1 — 0
		6½— 5	6½— 6½	6½— 6½
* Alternative Subject—				
2.23	Chemical Instrumentation	1 — 2 †	1½— 1	1½— 1

† As an alternative 2 hours per week laboratory work in Fire Assaying may be taken in Term 1, by a limited number of students.

Fourth Year.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
2.33	Physical Chemistry	1 — 2	1 — 2½	1 — 2½
2.53	Quantitative Analysis	1 — 2½	1 — 2½	1 — 2
2.63	Organic Chemistry	1 — 2½	1 — 2	1 — 2½
2.73	Mathematical Chemistry	1 — 0	1 — 0	1 — 0
3.14A	Industrial Chemistry*	1½— ½	1½— ½	1½— ½
		5½— 7½	5½— 7½	5½— 7½

* Includes Factory visits

Fifth Year.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
Elective A—				
2.34D	Physical Chemistry	1 — 3	1 — 3	1 — 3
2.44D	Inorganic Chemistry	1 — 3	1 — 3*	0 — 0
2.54D	Quantitative Analysis	0 — 0	1 — 3†	1 — 3
2.64D	Organic Chemistry	1 — 3	1 — 3	1 — 3
		3 — 9	3 — 9	3 — 9

* First half of term. † Second half of Term.

Or

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
Elective B—				
2.34D	Physical Chemistry	1 — 3	1 — 3	1 — 3
2.64A	Organic Chemistry	1 — 3	1 — 3	1 — 3
2.65A / 2.65B	Applied Organic Chemistry ... *Or* Applied Organic Chemistry (Chemistry and Analysis of Food)	1 — 3	1 — 3	1 — 3
		3 — 9	3 — 9	3 — 9

Sixth Year.

(34 weeks part-time course.)

	Hours per week.		
	Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
English, History *or* Philosophy	2 — 1*	2 — 1*	2 — 1*
and			
Psychology, Economics *or* Government	2 — 1*	2 — 1*	2 — 1*
	4 — 2	4 — 2	4 — 2

* Tutorial.

Additional for Honours.

(Students desiring to take Honours must apply to the Professor of Applied Chemistry not later than 31st December in the year in which the fifth year is completed. The full programme of study may be taken over two part-time years or one full-time year.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
2.44D 2.54D	Inorganic Chemistry Quantitative Analysis	1 — 3	1 — 3	1 — 3
	Or			
2.65	Applied Organic Chemistry	1 — 3	1 — 3	1 — 3
	Research Project	0 —10	0 —10	0 —10

COURSE IIB3—LEATHER CHEMISTRY.

This part-time course provides advanced instruction in chemistry for persons employed in the Leather industry. The course may be taken over six years for a Bachelor of Science (Pass) degree, or over seven years for an Honours degree.

First Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.11	Physics, Part I	$1\frac{1}{2}$— $1\frac{3}{4}$	$1\frac{1}{2}$— $1\frac{3}{4}$	$1\frac{1}{2}$— $1\frac{3}{4}$
2.21 2.41	Chemical Techniques General Chemistry, Part I }	2 — 4	2 — 4	2 — 4
10.11–B	Mathematics, Part I	2 — 1*	2 — 1*	2 — 1*
		$5\frac{1}{2}$— $6\frac{3}{4}$	$5\frac{1}{2}$— $6\frac{3}{4}$	$5\frac{1}{2}$— $6\frac{3}{4}$

* Tutorial.

Second Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.11	Physics, Part II	$1\frac{1}{2}$— $1\frac{1}{2}$	$1\frac{1}{2}$— $1\frac{1}{2}$	$1\frac{1}{2}$— $1\frac{1}{2}$
2.41	General Chemistry, Part II	1 — $2\frac{1}{2}$	1 — $2\frac{1}{2}$	1 — 4
10.11–B	Mathematics, Part II	2 — 1*	1 — 1*	1 — 1*
	Materials for Leather Manufacture	1 — 2	1 — 3	1 — 1
		$5\frac{1}{2}$— 7	$4\frac{1}{2}$— 8	$4\frac{1}{2}$— $7\frac{1}{2}$

* Tutorial.

Third Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab., tut.
2.32	Physical Chemistry	1 — 0	1 — 0	1 — $2\frac{1}{2}$
2.42	Inorganic Chemistry	1 — $2\frac{1}{2}$	1 — 0	1 — 0
2.52	Quantitative Analysis	1 — $2\frac{1}{2}$	1 — $2\frac{1}{2}$	1 — $2\frac{1}{2}$
2.62	Organic Chemistry	1 — 0	1 — $2\frac{1}{2}$	1 — 0
2.72	Mathematical Chemistry	1 — 0	1 — 0	1 — 0
	Light and Heavy Leather Manufacture	2 — $0\frac{1}{2}$	1 — $1\frac{1}{2}$	1 — $1\frac{1}{2}$
		7 — $5\frac{1}{2}$	6 — $6\frac{1}{2}$	6 — $6\frac{1}{2}$

Fourth Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
2.33	Physical Chemistry	1 — 2	1 — 2½	1 — 2½
2.53	Quantitative Analysis	1 — 2½	1 — 2½	1 — 2
2.63	Organic Chemistry	1 — 2½	1 — 2	1 — 2½
	Science of Leather Chemistry...	1 — 0	1 — 0	1 — 0
	Analytical Chemistry of Leather Manufacture	1 — 0	1 — 0	1 — 0
		5 — 7	5 — 7	5 — 7

Fifth Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
2.34D / 2.64D	Physical Chemistry *or* Organic Chemistry	1 — 3	1 — 3	1 — 3
2.94	Biochemistry	0 — 0	2 — 3	2 — 3
	Leather Laboratory	0 — 7½	0 — 3	0 — 3
		1 —10½	3 — 9	3 — 9

Sixth Year.

(34 weeks part-time course.)

	Hours per week.		
	Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
English, History *or* Philosophy	2 — 1*	2 — 1*	2 — 1*
and			
Psychology, Economics *or* Government	2 — 1*	2 — 1*	2 — 1*
	4 — 2	4 — 2	4 — 2

* Tutorial.

Additional for Honours.

Students desiring to take Honours must apply to the Professor of Applied Chemistry not later than 31st December in the year in which the fifth year is completed. The programme of study will be taken over two part-time years.

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
2.34D	Physical Chemistry .... or			
2.64D	Organic Chemistry, depending on the subject taken in the fifth year	1 — 3	1 — 3	1 — 3
2.73	Mathematical Chemistry	1 — 0	1 — 0	1 — 0
	Microbiology Ia and the Bacteriology and Mycology of Leather	1 — 2	1 — 2	1 — 2
	Leather Project	0 — 6	0 — 6	0 — 6

COURSE IIB4—APPLIED BIOLOGY.

In order to meet the increasing demand in Australian industry for scientists trained to degree level in one or other of the biological sciences, a part-time course in Applied Biology is offered. In this course, biochemistry, entomology, or microbiology are taken as major subjects. The course extends over six years for a Bachelor of Science (Pass) degree, and over seven years for an Honours degree.

First Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut
1.11	Physics, Part I	$1\frac{1}{2}$— $1\frac{3}{4}$	$1\frac{1}{2}$— $1\frac{3}{4}$	$1\frac{1}{2}$— $1\frac{3}{4}$
2.21	Chemical Techniques			
2.41	General Chemistry, Part I ...	2 — 4	2 — 4	2 — 4
10.11–B	Mathematics, Part I	2 — 1*	2 — 1*	2 — 1*
		$5\frac{1}{2}$— $6\frac{3}{4}$	$5\frac{1}{2}$— $6\frac{3}{4}$	$5\frac{1}{2}$— $6\frac{3}{4}$

* Tutorial.

Second Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.11	Physics, Part II	$1\frac{1}{2}$— $1\frac{1}{2}$	$1\frac{1}{2}$— $1\frac{1}{2}$	$1\frac{1}{2}$— $1\frac{1}{2}$
2.41	General Chemistry, Part II	1 — $2\frac{1}{2}$	1 — $2\frac{1}{2}$	1 — $2\frac{1}{2}$
2.902	General Biology	2 — 4	2 — 4	2 — 4
		$4\frac{1}{2}$— 8	$4\frac{1}{2}$— 8	$4\frac{1}{2}$— 8

Third Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.32D	Physical Chemistry	1 — $2\frac{1}{2}$	1 — 2	1 — $2\frac{1}{2}$
2.62	Organic Chemistry	1 — 0	1 — $2\frac{1}{2}$	1 — 0
	Plus *TWO* electives from—			
2.184	Botany	1 — $2\frac{1}{2}$	1 — 2	1 — $2\frac{1}{2}$
2.194	Zoology	1 — $2\frac{1}{2}$	1 — 2	1 — $2\frac{1}{2}$
2.52	Quantitative Analysis	1 — $2\frac{1}{2}$	1 — $2\frac{1}{2}$	1 — $2\frac{1}{2}$
2.42	Inorganic Chemistry	1 — $2\frac{1}{2}$	1 — 0	1 — 0
		4 — $7\frac{1}{2}$	4 — $6\frac{1}{2}$–$9\frac{1}{2}$	4 — 5–$7\frac{1}{2}$

Students majoring in Entomology must take 2.184 Botany and 2.194 Zoology as electives.

Fourth Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
2.95	Biochemistry	1 — 2	1 — 2	1 — 2
	Plus *THREE* electives from—			
2.33	Physical Chemistry	1 — 2	1 — $2\frac{1}{2}$	1 — $2\frac{1}{2}$
2.63 / 2.63A	Organic Chemistry *or* Organic Chemistry	1 — $2\frac{1}{2}$	1 — 2	1 — $2\frac{1}{2}$
2.924	Microbiology	1 — 2	1 — 2	1 — 2
	Experimental Biology	1 — 2	1 — 2	1 — 2
	Entomology	1 — 2	1 — 2	1 — 2
		4 — 8–$8\frac{1}{2}$	4 — 8–$8\frac{1}{2}$	4 — 8–9

Elective subjects must be chosen with due regard for pre-requisites. Students majoring in Entomology must include Experimental Biology as an elective.

Fifth Year.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
EITHER—any two pairs of major subjects from :				
2.925 2.926	Microbiology *and* Microbiology	2 — 4	2 — 4	2 — 4
2.96 2.97	Biochemistry *and* Biochemistry	2 — 4	2 — 4	2 4
	Etomology II *and* Etomology III	2 — 4	2 — 4	2 — 4
		4 — 8	4 — 8	4 — 8
OR—one pair of major subjects (from above) *plus two* electives from :				
2.34	Physical Chemistry	1 — 3	1 — 3	1 — 3
2.64D	Organic Chemistry	1 — 3	1 — 3	1 — 3
2.65B	Chemistry and Analysis of Food	1 — 3	1 — 3	1 — 3
2.96	Biochemistry	1 — 2	1 — 2	1 — 2
2.925	Microbiology	1 — 2	1 — 2	1 — 2
	Etomology II	1 — 2	1 — 2	1 — 2
		4 — 8–10	4 — 8–10	4 — 8–10

Sixth Year.

(34 weeks part-time course.)

	Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
English, History, *or* Philosophy	2 — 1*	2 — 1*	2 — 1*
and			
Psychology, Economics *or* Government	2 — 1*	2 — 1*	2 — 1*
	4 — 2	4 — 2	4 — 2

* Tutorial.

ADDITIONAL FOR HONOURS.

Students desiring to take Honours must apply to the Professor of Applied Chemistry not later than 31st December in the year in which the fifth year is completed. The programme of study can be taken over two part-time years or one full-time year, and will be made up as follows (for two part-time years):—

	Hours per week.
Humanities	3
Advanced formal instruction in the field of study	3
Research project	7
	13

Advanced formal study and a research project can only be undertaken in the subjects(s) in which the student has majored. The three fields in which Honours may be taken are:—

Biochemistry, Entomology, Microbiology.

A thesis embodying the results of the research project is required to be submitted.

CONVERSION COURSE IIc—APPLIED CHEMISTRY.

Holders of a diploma in Chemistry who completed the course of study prior to 1954 are required to complete the following additional subjects to qualify for the degree of Bachelor of Science:—

	Hours per week.
10.11 Mathematics, Part II	2
1.11 Physics, Part II	3
Conversion Humanities—	
English, History *or* Philosophy	2
and	
Psychology, Economics *or* Government	2
	9

Plus the presentation of a thesis which may involve advanced laboratory work, together with any special subjects prescribed in each case.

The student is required to attend full time for one academic year or for such other time as approved by the Professorial Board.

General Science.*

The General Science course is designed to meet the needs of students who desire a more broadly based course than is provided in the Applied Science courses (viz., Applied Physics, Optometrical Science, Applied Chemistry, Leather Chemistry, Applied Biology, Chemical Engineering, Industrial Chemistry, Food Technology, Metallurgy and Wool Technology).

No industrial experience is required. A Pass degree may be taken after three years of full-time study or an Honours degree after four years. The course may be taken by part-time study, requiring seven years for the Pass degree.

Students are advised to discuss their choice of sequences of subjects in the General Science course with the Dean of the Faculty of Applied Science or his representative.

In 1956 the full-time course will be offered at Newcastle and the part-time course at Sydney and Newcastle.

Not all the subjects listed will be available immediately at Newcastle University College so that students at Newcastle will be required, until further notice, to select their courses from the following:—

Full-time Course.

FIRST YEAR.

Chemistry I.
Mathematics I.
Physics I.
Geology I.

SECOND YEAR.

Chemistry II.
Mathematics II.
Higher Mathematics II.
Physics II.
Geology I.

THIRD YEAR.

Chemistry III.
Mathematics III.
Higher Mathematics III.
Physics III.
Geology II.

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*Students commencing the General Science course in 1955 or later years will follow the syllabus as here set out. Students who have completed a stage of the General Science course IIB2 prior to 1955 may, subject to normal progression, follow the syllabus set out in the 1954 Calendar.

Part-time Course

The equivalent subjects of the above with the exception of Higher Mathematics II and III.

COURSE IIs—GENERAL SCIENCE.

First Year.

(34 weeks day course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
G10	English	2 — 0	2 — 0	0 — 0
G20	History	1 — 0	1 — 0	2 — 0
PLUS three subjects from—				
	Chemistry I	3 — 4	3 — 4	3 — 4
	Mathematics I	4 — 2	4 — 2	4 — 2
	Physics I	3 — 3	3 — 3	3 — 3
	General Biology	2 — 4	2 — 4	2 — 4
	General Mathematics	3 — 0	3 — 0	3 — 0
	Geology I	3 — 4	3 — 4	3 — 4

provided that—

(i) students intending to take Chemistry, Physics or Mathematics in Third Year, must take Chemistry I, Mathematics I and Physics I in First Year;

(ii) students intending to take Biological Science as a major subject in Third Year, must take General Biology, Chemistry I, Physics I and General Mathematics in First Year;

(iii) students wishing to take Geology as a major subject in Third Year, must take Geology I, Chemistry I, and Mathematics I in First Year, and Physics I in Second Year;

(iv) a pass in General Mathematics does not qualify for admission to Mathematics II.

Second Year.

(34 weeks day course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
G1	Logic	2 — 0	0 — 0	0 — 0
G2	Philosophy	0 — 0	1 — 0	1 — 0
	Minor Elective (Humanities)	0 — 0	1 — 0	1 — 0

PLUS three subjects from the following—

Group A—

*	Chemistry II	4 — 8	4 — 8	4 — 8
†	Mathematics II	3 — 2	3 — 2	3 — 2
	Physics II	4 — 4	4 — 4	4 — 4
	Geology II	4 — 6	4 — 6	4 — 6
	Botany I	4 — 6	4 — 6	4 — 6
	Zoology I	4 — 6	4 — 6	4 — 6

Group B—

General Biology	2 — 4	2 — 4	2 — 4
Geology I	3 — 4	3 — 4	3 — 4
Physics I	3 — 4	3 — 4	3 — 4

provided that—

(i) at least two subjects are taken from Group A;

(ii) students taking Geology II must also take Physics I;

(iii) Mathematics II may be taken only by students who have completed Mathematics I;

(iv) Botany I and Zoology I may be taken only by students who have completed General Biology;

(v) students intending to take either Botany II or Zoology II in Third Year must take Chemistry IIA.

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*A modified Chemistry II (Chemistry IIA, 3-6, 3-6, 3-6) is available for students doing Biological Sciences as major subjects. This course includes Biochemistry in place of Analytical Chemistry and Inorganic Chemistry.

†A special Mathematics course (Higher Mathematics II) of seven hours per week is provided for students wishing to proceed to Honours in the School of Mathematics.

THIRD YEAR.

(34 weeks day course.)

	Hours per week.		
	Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
Major Elective (Humanities)	3 — 0	3 — 0	0 — 0

PLUS two subjects from the following—

Group A—

Chemistry III	4 —10	4 —10	4 —10
Mathematics III	5 — 0	5 — 0	5 — 0
Or			
Higher Mathematics III	10 — 0	10 — 0	10 — 0
Physics III	4 — 8	4 — 8	4 — 8
Botany II	3 —10	3 —10	3 —10
Zoology II	3 —10	3 —10	3 —10
Geology III	5 — 8	5 — 8	5 — 8

Group B—

Biochemistry I	3 — 6	3 — 6	3 — 6
Biochemistry IA	3 — 6	3 — 6	3 — 6
Botany I	4 — 6	4 — 6	4 — 6
Zoology I	4 — 6	4 — 6	4 — 6
Geology II	4 — 6	4 — 6	4 — 6
Advanced Organic Chemistry	2 — 8	2 — 8	2 — 8
Physics II	4 — 4	4 — 4	4 — 4
Chemistry II	4 — 8	4 — 8	4 — 8
Advanced Inorganic Chemistry ...	2 — 8	2 — 8	2 — 8
Advanced Physical Chemistry	2 — 8	2 — 8	2 — 8

provided that—

(i) at least one subject is taken from Group A;

(ii) before proceeding to Physics III, a student must have completed Mathematics II;

(iii) students who wish to be considered for admission to the Honours course in Physics will be required to complete a course in Physical Techniques in the Third Year (approximately seven hours per week);

(iv) Biochemistry I may be taken only with Chemistry III and by students who have completed General Biology;

(v) Advanced Organic, Inorganic or Physical Chemistry may be taken only with Chemistry III;

(vi) Botany I and Zoology I may be taken only by students who have completed General Biology;

(vii) Biochemistry IA may be taken only in conjunction with Botany II or Zoology II;

(viii) Higher Mathematics III may be taken only by students who have completed Higher Mathematics II.

FOURTH YEAR (HONOURS).

Suitably qualified candidates may be admitted to an Honours course during the Fourth Year in one of the following subjects:—

(*a*) Botany.

(*b*) Chemistry (Biochemistry, Inorganic, Organic, Physical, or Analytical).

(*c*) Geology.

(*d*) Mathematics.

(*e*) Physics.

(*f*) Zoology.

(i) Students proceeding to Honours in any School must attend lectures, read and engage in laboratory work as may be required by the Head of the School.

(ii) Students proceeding to Honours in Physics will be required to have completed Mathematics I, II and III, Physics I, II and III, and a course in Physical Techniques.

(iii) Students proceeding to Honours in Mathematics must have completed Higher Mathematics II and Higher Mathematics III.

(iv) Students who have completed Higher Mathematics III and Physics III may elect to proceed to Honours in Theoretical Physics.

COURSE IISB—GENERAL SCIENCE.

The various subjects of the full-time course are divided into sections so that the requirements for a Pass degree may be satisfied by seven years of part-time study each with a minimum attendance of 12 hours per week. The course is so arranged that students can transfer from full-time to part-time study without loss of status at the end of any year.

It is not proposed to set out all the possible combinations of subjects which could be selected but rather to set down courses leading to a major in the Physical sciences (Chemistry, Physics and Mathematics), Geology, and the Biological sciences (Botany and Zoology). The rules governing sequence of subjects in the full-time course apply also to the part-time course.

In determining a part-time programme, the student is advised to select his sequence of subjects on the basis of the full-time course and to make the necessary transposition into part-time subjects observing the rules as applying to the full-time course.

A. Physical Sciences (Chemistry, Physics and Mathematics as major subjects):

	Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut
Stage 1—			
G10 English	1 — 0	1 — 0	2 — 0
Chemistry I, Part I	2 — 2	2 — 2	2 — 2
Mathematics I, Part I	2 — 1	2 — 1	2 — 1
Physics I, Part I	1½— 1¾	1½— 1¾	1½— 1¾
	6½— 4¾	6½— 4¾	7½— 4¾
Stage 2—			
G20 History	1 — 0	1 — 0	2 — 0
Chemistry I, Part II	1 — 2	1 — 2	1 — 2
Mathematics I, Part II	2 — 1	2 — 1	2 — 1
Physics I, Part II	1½— 1½	1½— 1½	1½— 1½
	5½— 4½	5½— 4½	6½— 4½

The above two stages complete 1st year of the full-time course.

Stages 3, 4 *and* 5—

The subjects of the 2nd year of the full-time course are divided into sections but not arranged in sequence. This procedure is adopted because of the number of possible combinations of subjects :—

	Term 1	Term 2	Term 3
(i) Humanities—			
G1 Logic	1 — 0	1 — 0	0 — 0
G2 Philosophy	0 — 0	1 — 0	1 — 0
Minor Elective (Humanities)	0 — 0	1 — 0	1 — 0
(ii) Chemistry II	4 — 8	4 — 8	4 — 8
Chemistry II, Part I	2 — 4	2 — 4	2 — 4
Chemistry II, Part II	2 — 4	2 — 4	2 — 4
(iii) Mathematics II	3 — 2	3 — 2	3 — 2
Mathematics II, Part I	2 — 1	2 — 1	2 — 1
Mathematics II, Part II	1 — 1	1 — 1	1 — 1
(iv) Physics II	4 — 4	4 — 4	4 — 4
Physics II, Part I	2 — 2	2 — 2	2 — 2
Physics II, Part II	2 — 2	2 — 2	2 — 2
(v) General Biology	2 — 4	2 — 4	2 — 4

A. Physical Sciences—*continued.*

	Hours per week.		
	Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
(vi) Geology I	4 — 2½	3 — 3½	3 — 3½
Geology I, Part I	2 — 1½	2 — 1½	2 — 1½
Geology I, Part II	2 — 1	1 — 2	1 — 2

Stages 6 *and* 7—

The subjects of the third year of the full-time course are divided into sections.

	Term 1	Term 2	Term 3
(i) Humanities	3 — 0	3 — 0	0 — 0
Major Elective, Part I	1 — 0	1 — 0	0 — 0
Major Elective, Part II	2 — 0	2 — 0	0 — 0
(ii) Chemistry III	4 —10	4 —10	4 —10
Chemistry III, Part I	2 — 5	2 — 5	2 — 5
Chemistry III, Part II	2 — 5	2 — 5	2 — 5
(iii) Mathematics III	5 — 0	5 — 0	5 — 0
Mathematics III, Part I	2 — 0	2 — 0	2 — 0
Mathematics III, Part II	3 — 0	3 — 0	3 — 0
(iv) Physics III	4 — 8	4 — 8	4 — 8
Physics III, Part I	2 — 4	2 — 4	2 — 4
Physics III, Part II	2 — 4	2 — 4	2 — 4
(v) Geology II	4 — 6	4 — 6	4 — 6
Geology II, Part I	2 — 3	2 — 3	2 — 3
Geology II, Part II	2 — 3	2 — 3	2 — 3
(vi) Zoology I	4 — 6	4 — 6	4 — 6
Zoology I, Part I	2 — 2	2 — 2	2 — 2
Zoology I, Part II	2 — 4	2 — 4	2 — 4
(vii) Botany I	4 — 6	4 — 6	4 — 6
Botany I, Part I	2 — 2	2 — 2	2 — 2
Botany I, Part II	2 — 4	2 — 4	2 — 4
(viii) Biochemistry I	3 — 6	3 — 6	3 — 6
Biochemistry, I, Part I	2 — 4	2 — 4	2 — 4
Biochemistry, I, Part II	1 — 2	1 — 2	1 — 2
(ix) Advanced Organic Chemistry	2 — 8	2 — 8	2 — 8
Advanced Organic Chemistry, Part I	1 — 4	1 — 4	1 — 4
Advanced Organic Chemistry, Part II	1 — 4	1 — 4	1 — 4
(x) Advanced Inorganic Chemistry	2 — 8	2 — 8	2 — 8
Advanced Inorganic Chemistry, Part I.	1 — 4	1 — 4	1 — 4
Advanced Inorganic Chemistry, Part II.	1 — 4	1 — 4	1 — 4
(xi) Advanced Physical Chemistry	2 — 8	2 — 8	2 — 8
Advanced Physical Chemistry, Part I.	1 — 4	1 — 4	1 — 4
Advanced Physical Chemistry, Part II.	1 — 4	1 — 4	1 — 4

B. Geology as Major Subject.

Hours per week.

		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
Stage 1—				
G10	English	1 — 0	1 — 0	2 — 0
	Chemistry I, Part I	2 — 2	2 — 2	2 — 2
	Mathematics I, Part I	2 — 1	2 — 1	2 — 1
	Geology I, Part I	2 — 1½	2 — 1½	2 — 1½
Stage 2—				
G20	History	1 — 0	1 — 0	2 — 0
	Chemistry I, Part II	1 — 2	1 — 2	1 — 2
	Mathematics I, Part II	2 — 1	2 — 1	2 — 1
	Geology I, Part II	2 — 1	1 — 2	1 — 2

Stages 3, 4 *and* 5—

As for Physical Sciences but including Geology II and Physics I.

	Term 1	Term 2	Term 3
Geology II, Part I	2 — 3	2 — 3	2 — 3
Geology II, Part II	2 — 3	2 — 3	2 — 3
Physics I, Part I	1½— 1¾	1½— 1¾	1½— 1¾
Physics I, Part II	1½— 1½	1½— 1½	1½— 1½

Stages 6 *and* 7—

As for Physical Sciences but including Geology III.

	Term 1	Term 2	Term 3
Geology III, Part I	3 — 4	3 — 3	2 — 4
Geology III, Part II	6	6	7

C. Biological Sciences.

		Term 1	Term 2	Term 3
Stage 1—				
G10	English	1 — 0	1 — 0	2 — 0
	Chemistry I, Part I	2 — 2	2 — 2	2 — 2
	Physics I, Part I	1½— 1¾	1½— 1¾	1½— 1¾
	General Mathematics	3 — 0	3 — 0	3 — 0
		7½— 3¾	7½— 3¾	8½— 3¾
Stage 2—				
	Chemistry I, Part II	1 — 2	1 — 2	1 — 2
	Physics I, Part II	1½— 1½	1½— 1½	1½— 1½
	General Biology	2 — 4	2 — 4	2 — 4
		4½— 7½	4½— 7½	4½— 7½

C. Biological Sciences—*continued.*

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
Stage 3—				
G20	History	1 — 0	1 — 0	2 — 0
G1	Logic	1 — 0	1 — 0	0 — 0
	Chemistry IIA, Part I	2 — 4	2 — 4	2 — 4
	Botany I, Part I *or* Zoology I, Part I	2 — 2	2 — 2	2 — 2
		6 — 6	6 — 6	6 — 6
Stage 4—				
G2	Philosophy	0 — 0	1 — 0	1 — 0
	Chemistry IIA, Part II	1 — 2	1 — 2	1 — 2
	Botany I, Part II *or* Zoology I, Part II	2 — 4	2 — 4	2 — 4
	* Botany I, Part I, *or* Zoology I, Part I	2 — 2	2 — 2	2 — 2
	or Geology I, Part I	2 — 1½	2 — 1½	2 — 1½
		5 — 7½–8	6 — 7½–8	6 — 7½–8

* Whichever was not done in Stage 3.

Stage 5—				
	Minor Elective (Humanities)	0 — 0	1 — 0	1 — 0
	Botany II, Part I *or* Zoology II, Part I	1 — 5	1 — 5	1 — 5
	Botany I, Part II, *or* Zoology I, Part II	2 — 4	2 — 4	2 — 4
	or Geology I, Part II	2 — 1	1 — 2	1 — 2
		3 — 6–9	3–4 — 6–9	3–4 — 7–9
Stages 6 and 7—				
(i)	Humanities			
	Major Elective, Part I	1 — 0	1 — 0	0 — 0
	Major Elective, Part II	2 — 0	2 — 0	0 — 0
(ii)	Botany II, Part II	2 — 5	2 — 5	2 — 5
(iii)	Zoology II, Part II	2 — 5	2 — 5	2 — 5
(iv)	Biochemistry IA, Part I	2 — 4	2 — 4	2 — 4
	Biochemistry IA, Part II	1 — 2	1 — 2	1 — 2
(v)	Geology II, Part I	2 — 3	2 — 3	2 — 3
	Geology II, Part II	2 — 3	2 — 3	2 — 3

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SCHOOL OF CHEMICAL ENGINEERING.

The courses in Chemical Engineering, Industrial Chemistry and Food Technology are planned to give students a broad training in the fundamentals of science, chemistry and engineering, and knowledge of the engineering principles basic to design, construction and operation of plant and equipment. The work in chemistry, physics and mathematics is the same as that given in the Applied Chemistry and the Metallurgy courses in the first year of the full-time courses and in the first and second years of the part-time courses. In subsequent years students in the School of Chemical Engineering take, in addition to the fundamental studies, courses in mechanical, electrical and chemical engineering and industrial chemistry.

COURSE III—CHEMICAL ENGINEERING.

This course may be taken at Pass or Honours standard. The Pass course extends over four years of 34 weeks each and the additional work for Honours may be taken in one full-time year, or in two part-time years as set out in Course IIIB1.

The course in Chemical Engineering is closely linked with practical training in industry. It is arranged so that the second and third years are spent in combined academic study and works practice. During these years students attend the University on two half days and two evenings per week.

First Year.

(34 weeks day course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.11	Physics	3 — 3	3 — 3	3 — 3
2.21	Chemical Techniques	0 — 3	0 — 0	0 — 0
2.41	General Chemistry	3 — 3	3 — 6	3 — 9
5.101	Engineering Drawing and Materials	2 — 0	1 — 3	0 — 0
5.211	Workshop Processes and Practice	0 — 0	0 — 0	0 — 3
10.11	Mathematics	4 — 2 *	4 — 2 *	0 — 0
10.11B	Mathematics	0 — 0	0 — 0	2 — 2 *
G10	English	2 — 0	2 — 0	0 — 0
G20	History	1 — 0	1 — 0	2 — 0
		15 —11	14 —14	10 —17

* Tutorial.

Second Year.

(34 weeks of 2 half days and 2 evenings per week.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.92	Physics	1½— 0	1½— 1½	1½— 1½
2.32	Physical Chemistry	1 — 0	1 — 2½	1 — 0
2.42	Inorganic Chemistry	1 — 0	1 — 0	1 — 2½
2.62	Organic Chemistry	1 — 2½	1 — 0	1 — 0
8.132 8.92M	Theory of Structures Properties of Materials	0 — 0	2 — 1	2 — 1
10.22	Mathematics	1 — 0	1 — 0	1 — 0
G1	Logic	0 — 0	2 — 0	0 — 0
G2	Philosophy	0 — 0	0 — 0	2 — 0
		5½— 2½	9½— 5	9½— 5

Third Year.

(34 weeks of 2 half days and 2 evenings per week.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
2.33	Physical Chemistry	1 — 2	1 — 3	1 — 3
2.52A	Quantitative Analysis	1 — 3	1 — 2	1 — 0
2.63	Organic Chemistry	1 — 2	1 — 2	1 — 3
10.23	Mathematics	2 — 0	2 — 0	2 — 0
	Minor Elective (Humanities)	1 — 0	1 — 0	0 — 0
		6 — 7	6 — 7	5 — 6

Fourth Year.

(34 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
3.14	Industrial Chemistry*	1½— 2½	1½— 2½	1½— 2½
3.24	Chemical Engneering Unit Operations	3 — 3	3 — 3	3 — 3
3.34	Chemical Engineering Design	2 — 3	2 — 3	2 — 3
3.44	Chemical Engineering Calculations	2 — 0	2 — 0	2 — 0
3.54	Chemical Engineering Materials	2 — 0	2 — 0	2 — 0
5.32D	Engineering Mechanics	1 — ½*	1 — ½*	1 — ½*
5.72	Thermodynamics	1 — 1*	1 — 1*	1 — 1*
6.94	Electrical Engineering	1 — 2	1 — 2	1 — 2
	Major Elective (Humanities)	3 — 0	3 — 0	0 — 0
		17—13½	17—13½	11½—10½

* Includes Factory visits.

Additional for Honours.

Students desiring to take Honours must apply to the Professor of Chemical Engineering not later than the 31st December of the year in which the fourth year is completed. The undermentioned additional courses must be taken.

Fifth Year.

(34 weeks day course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
3.25	Chemical Engineering Unit Operations	4 — 3	4 — 3	4 — 3
3.35	Advanced Chemical Engineering Design	2 — 3	2 — 3	2 — 3
3.55	Chemical Engineering Materials	1 — 0	1 — 0	1 — 0
3.65	Chemical Engineering Thermodynamics and Kinetics	3 — 0	3 — 0	3 — 0
3.75	Chemical Engineering Project	0 — 7	0 — 7	0 — 7
6.95	Electrical Engineering	2 — 3	2 — 3	2 — 3
		12 —16	12 —16	12 —16

The Honours year may be taken in two part-time years as set out under the part-time course, except that the Humanities subjects of the seventh year are not required, a design project being substituted. Four additional hours per week are required on the design project.

COURSE IIIA—FOOD TECHNOLOGY.

Course IIIA may be taken at Pass or Honours standard. The Pass course extends over four years of 34 weeks each, and the additional work for Honours may be taken in one full-time year or two part-time years. During the second and third years, students attend the University part-time, while gaining practical experience in a related occupation in the food industry. For the first year, students follow the same course as full-time Chemical Engineering, and later specialize in methods of food preservation and related biological sciences.

First Year.

(34 weeks full-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.11	Physics	3 — 3	3 — 3	3 — 3
2.21	Chemical Techniques	0 — 3	0 — 0	0 — 0
2.41	General Chemistry	3 — 3	3 — 6	3 — 9
5.101	Engineering Drawing and Materials	2 — 0	1 — 3	0 — 0
5.211	Workshop Processes and Practice	0 — 0	0 — 0	0 — 3
10.11	Mathematics	4 — 2*	4 — 2*	0 — 0
10.11B	Mathematics	0 — 0	0 — 0	2 — 2*
G10	English	2 — 0	2 — 0	0 — 0
G20	History	1 — 0	1 — 0	2 — 0
		15 —11	14 —14	10 —17

* Tutorial.

SECOND YEAR.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
2.32	Physical Chemistry	1 — 0	1 — 0	1 — 2½
2.42	Inorganic Chemistry	1 — 2½	1 — 0	1 — 0
2.52A	Quantitative Analysis	1 — 3	1 — 2	1 — 0
2.62	Organic Chemistry	1 — 0	1 — 2½	1 — 0
10.22	Mathematics	1 — 0	1 — 0	1 — 0
	Industrial Botany, Entomology and Statistics	1 — 1	1 — 2½	1 — 2
G1	Logic	0 — 0	2 — 0	0 — 0
G2	Philosophy	0 — 0	0 — 0	2 — 0
		6 — 6½	8 — 7	8 — 4½

THIRD YEAR.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
2.33	Physical Chemistry	1 — 2	1 — 2½	1 — 2½
2.63A	Organic Chemistry	1 — 2½	1 — 2	1 — 2½
2.924	Microbiology	1 — 2	1 — 2	1 — 2
2.95	Biochemistry	1 — 2	1 — 2	1 — 2
	Minor Elective (Humanities)	1 — 0	1 — 0	0 — 0
		5 — 8½	5 — 8½	4 — 9

FOURTH YEAR.

(34 weeks full-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
2.65A	Applied Organic Chemistry	1 — 2	1 — 2	1 — 2
2.925	Microbiology	1 — 2	1 — 2	1 — 2
3.24D	Chemical Engineering Unit Operations	3 — 2½	3 — 2½	3 — 2½
3.814	Food Technology I	1 — 2	1 — 2	1 — 2
3.824	Food Technology II	2 — 4	2 — 4	2 — 4
5.32D	Engineering Mechanics	1 — ½*	1 — ½*	1 — ½*
5.72	Thermodynamics	1 — 1*	1 — 1*	1 — 1*
	Major Elective (Humanities)	3 — 0	3 — 0	0 — 0
		13½—15½	13½—15½	8 —12½

* Tutorial.

Additional for Honours.

Students desiring to take Honours must apply to the Professor of Chemical Engineering not later than 31st December of the year in which the third year is completed. The undermentioned additional courses must be taken. Portion of the additional work may be combined with the fourth year and the remainder completed in a fifth year.

		Hours per week.		
		Term 1	Term 2	Term 3
3.54	Chemical Engineering Materials ...	2	2	2
	Advanced Food Technology	8	8	8
	Food Technology Project	10	10	10

COURSE IIIB1—CHEMICAL ENGINEERING.

Course IIIB1 has been designed for students in appropriate employment in the chemical industry. The programme of study is equivalent to that of Course III but in Course IIIB1 attendance is required over seven part-time years for a Pass degree and over eight part-time years for an Honours degree.

First Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.11	Physics, Part I	$1\frac{1}{2}$— $1\frac{3}{4}$	$1\frac{1}{2}$— $1\frac{3}{4}$	$1\frac{1}{2}$— $1\frac{3}{4}$
2.21	Chemical Techniques .... }	2 — 4	2 — 4	2 — 4
2.41	General Chemistry, Part I ... }			
10.11–B	Mathematics, Part I	2 — 1*	2 — 1*	2 — 1*
		$5\frac{1}{2}$— $6\frac{3}{4}$	$5\frac{1}{2}$— $6\frac{3}{4}$	$5\frac{1}{2}$— $6\frac{3}{4}$

* Tutorial.

Second Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.11	Physics, Part II	$1\frac{1}{2}$— $1\frac{1}{2}$	$1\frac{1}{2}$— $1\frac{1}{2}$	$1\frac{1}{2}$— $1\frac{1}{2}$
2.41	General Chemistry, Part II	1 — $2\frac{1}{2}$	1 — $2\frac{1}{2}$	1 — 4
5.101	Engineering Drawing and Materials	2 — 0	1 — 3	0 — 0
5.211	Workshop Processes and Practice	0 — 0	0 — 0	0 — 3
10.11–B	Mathematics, Part II	2 — 1*	1 — 1*	1 — 1*
		$6\frac{1}{2}$— 5	$4\frac{1}{2}$— 8	$3\frac{1}{2}$— $9\frac{1}{2}$

* Tutorial.

THIRD YEAR.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.92	Physics	1½— 0	1½— 1½	1½— 1½
2.32	Physical Chemistry	1 — 0	1 — 0	1 — 2½
2.42	Inorganic Chemistry	1 — 2½	1 — 0	1 — 0
2.62	Organic Chemistry	1 — 0	1 — 2½	1 — 0
8.132	Theory of Structures	0 — 0	2 — 1	2 — 1
8.92M	Properties of Materials			
10.22	Mathematics	1 — 0	1 — 0	1 — 0
		5½— 2½	7½— 5	7½— 5

FOURTH YEAR.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
2.33	Physical Chemistry	1 — 2	1 — 2½	1 — 2½
2.52A	Quantitative Analysis	1 — 3	1 — 2	1 — 0
2.63	Organic Chemistry	1 — 2½	1 — 2	1 — 2½
10.23	Mathematics	2 — 0	2 — 0	2 — 0
		5 — 7½	5 — 6½	5 — 5

FIFTH YEAR.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
3.14	Industrial Chemistry*	1½— 2½	1½— 2½	1½— 2½
3.44	Chemical Engineering Calculations	2 — 0	2 — 0	2 — 0
5.32D	Engineering Mechanics	1 — ½*	1 — ½*	1 — ½*
5.72D	Thermodynamics	1 — 1*	1 — 1*	0 — 2*
6.94	Electrical Engineering	1 — 2	1 — 2	1 — 2
		6½— 6	6½— 6	5½— 7

* Includes Factory visits.

Sixth Year.

(34 weeks part-time course.)

		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
		Hours per week.		
3.24D	Chemical Engineering Unit Operations	3 — 2½	3 — 2½	3 — 2½
3.34D	Chemical Engineering Design ...	2 — 2½	2 — 2½	2 — 2½
3.54	Chemical Engineering Materials	2 — 0	2 — 0	2 — 0
		7 — 5	7 — 5	7 — 5

Seventh Year.

(34 weeks part-time course.)

	Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
	Hours per week.		
English, History *or* Philosophy	2 — 1*	2 — 1*	2 — 1*
and			
Psychology, Economics *or* Government	2 — 1*	2 — 1*	2 — 1*
	4 — 2	4 — 2	4 — 2

* Tutorial.

Additional for Honours.

Students desiring to take Honours must apply to the Professor of Chemical Engineering not later than 31st December of the year in which the sixth year is completed. The undermentioned additional courses must be taken. The first year of the additional work may be combined with the normal seventh year or taken separately. In either case two years' part-time attendance is required.

		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
		Hours per week.		
3.25	Chemical Engineering Unit Operations	4 — 3	4 — 3	4 — 3
3.35	Advanced Chemical Engineering Design	2 — 3	2 — 3	2 — 3
3.75	Chemical Engineering Project...			
3.55	Chemical Engineering Materials	1 — 0	1 — 0	1 — 0
3.65	Chemical Engineering Thermodynamics and Kinetics	3 — 0	3 — 0	3 — 0
6.95	Electrical Engineering	2 — 3	2 — 3	2 — 3

COURSE IIIB2—INDUSTRIAL CHEMISTRY.

This course provides part-time instruction for students in appropriate employment in the chemical industry. Students are given a sound general background of fundamental sciences, with particular emphasis on analytical chemistry, and are then trained in the broad aspects of plant and process development. The course may be taken at Pass or Honours standard. Students taking a Pass degree may complete the course in six years, while those attempting Honours take additional work in the sixth year and are required to complete a seventh year.

FIRST YEAR.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.11	Physics, Part I	1½— 1¾	1½— 1¾	1½— 1¾
2.21	Chemical Techniques }	2 — 4	2 — 4	2 — 4
2.41	General Chemistry, Part I }			
10.11–B	Mathematics, Part I	2 — 1*	2 — 1*	2 — 1*
		5½— 6¾	5½— 6¾	5½— 6¾

* Tutorial.

SECOND YEAR.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.11	Physics, Part II	1½— 1½	1½— 1½	1½— 1½
2.41	General Chemistry, Part II	1 — 2½	1 — 2½	1 — 4
5.101	Engineering Drawing and Materials	2 — 0	1 — 3	0 — 0
10.11–B	Mathematics, Part II	2 — 1*	1 — 1*	1 — 1*
		6½— 5	4½— 8	3½— 6½

* Tutorial.

THIRD YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.92	Physics *	1½— 0	1½— 1½	1½— 1½
2.32	Physical Chemistry	1 — 0	1 — 0	1 — 2½
2.42	Inorganic Chemistry	1 — 2½	1 — 0	1 — 0
2.52	Quantitative Analysis	1 — 2½	1 — 2½	1 — 2½
2.62	Organic Chemistry	1 — 0	1 — 2½	1 — 0
2.72	Mathematical Chemistry	1 — 0	1 — 0	1 — 0
		6½— 5	6½— 6½	6½— 6½
* Alternative subjects—				
2.23	Chemical Instrumentation	1 — 0	1½— 1	1½— 1
	Fire Assaying	0 — 2	0 — 0	0 — 0

FOURTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
2.33	Physical Chemistry	1 — 2	1 — 2½	1 — 2½
2.53	Quantitative Analysis	1 — 2½	1 — 2½	1 — 2
2.73	Mathematical Chemistry	1 — 0	1 — 0	1 — 0
3.14	Industrial Chemistry	1½— 2½	1½— 2½	1½— 2½
		4½— 7	4½— 7½	4½— 7

FIFTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
2.34D	Physical Chemistry	1 — 3	1 — 3	1 — 3
3.15	Industrial Chemistry	1 — 3	1 — 3	1 — 3
3.44	Chemical Engineering Calculations	2 — 0	2 — 0	2 — 0
3.54	Chemical Engineering Materials	2 — 0	2 — 0	2 — 0
		6 — 6	6 — 6	6 — 6

Sixth Year.

(34 weeks part-time course.)

	Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
English, History *or* Philosophy	2 — 1*	2 — 1*	2 — 1*
and			
Psychology, Economics *or* Government	2 — 1*	2 — 1*	2 — 1*
	4 — 2	4 — 2	4 — 2

* Tutorial.

Additional for Honours.

Students desiring to take Honours must apply to the Professor of Chemical Engineering not later than 31st December of the year in which the fifth year is completed. The undermentioned additional courses must be taken. Portion of the additional work may be combined with the normal sixth year and the remainder completed in the seventh year.

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
3.55	Chemical Engineering Materials	1 — 0	1 — 0	1 — 0
	Industrial Safety (General)	1½— 0	1½— 0	1½— 0
	Advanced Industrial Chemistry	3 — 0	3 — 0	3 — 0
	Industrial Chemistry Project ...	0 —12	0 —12	0 —12

COURSE IIIB3—FOOD TECHNOLOGY.

This course has been designed for students already gaining practical experience in a related occupation in the food industry. The course extends over seven years for a Pass degree and over eight years for an Honours degree.

Students in this course follow the same syllabus as Chemical Engineers for the first three years and thereafter specialise in methods of food preservation. A study is also made of the biological sciences, a knowledge of which is necessary for the successful plant control of a food industry.

First Year.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.11	Physics, Part I	1½— 1¾	1½— 1¾	1½— 1¾
2.21	Chemical Techniques }			
2.41	General Chemistry, Part I }	2 — 4	2 — 4	2 — 4
10.11–B	Mathematics, Part I	2 — 1*	2 — 1*	2 — 1*
		5½— 6¾	5½— 6¾	5½— 6¾

* Tutorial.

Second Year.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.11	Physics, Part II	1½— 1½	1½— 1½	1½— 1½
2.41	General Chemistry, Part II	1 — 2½	1 — 2½	1 — 4
5.101	Engineering Drawing and Materials	2 — 0	1 — 3	0 — 0
5.211	Workshop Processes and Practice	0 — 0	0 — 0	0 — 3
10.11–B	Mathematics, Part II	2 — 1*	1 — 1*	1 — 1*
		6½— 5	4½— 8	3½— 9½

* Tutorial.

Third Year.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
2.32	Physical Chemistry	1 — 0	1 — 0	1 — 2½
2.42	Inorganic Chemistry	1 — 2½	1 — 0	1 — 0
2.52A	Quantitative Analysis	1 — 3	1 — 2	1 — 0
2.62	Organic Chemistry	1 — 0	1 — 2½	1 — 0
10.22	Mathematics	1 — 0	1 — 0	1 — 0
	Industrial Botany, Entomology and Statistics	1 — 1	1 — 2½	1 — 2
		6 — 6½	6 — 7	6 — 4½

Fourth Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
2.33	Physical Chemistry	1 — 2	1 — 2½	1 — 2½
2.63A	Organic Chemistry	1 — 2½	1 — 2	1 — 2½
2.924	Microbiology	1 — 2	1 — 2	1 — 2
2.95	Biochemistry	1 — 2	1 — 2	1 — 2
		4 — 8½	4 — 8½	4 — 9

Fifth Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
2.65A	Applied Organic Chemistry	1 — 2	1 — 2	1 — 2
2.925	Microbiology	1 — 2	1 — 2	1 — 2
3.814	Food Technology I	1 — 2	1 — 2	1 — 2
5.32D	Engineering Mechanics	1 — ½*	1 — ½*	1 — ½*
5.72D	Thermodynamics	1 — 1*	1 — 1*	0 — 2*
		5 — 7½	5 — 7½	4 — 8½

Sixth Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
3.24D	Chemical Engineering Unit Operations	3 — 2½	3 — 2½	3 — 2½
3.824	Food Technology II	2 — 4	2 — 4	2 — 4
		5 — 6½	5 — 6½	5 — 6½

Seventh Year.

(34 weeks part-time course.)

	Hours per week.		
	Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
English, History *or* Philosophy	2 — 1*	2 — 1*	2 — 1*
and			
Psychology, Economics *or* Government	2 — 1*	2 — 1*	2 — 1*
	4 — 2	4 — 2	4 — 2

* Tutorial.

Additional for Honours.

Students desiring to take Honours must apply to the Professor of Chemical Engineering not later than 31st December of the year in which the sixth year is completed. The undermentioned additional courses must be taken. Portion of the additional work may be combined with the normal seventh year and the remainder completed in the eighth year.

		Hours per week.		
		Term 1	Term 2	Term 3
3.54	Chemical Engineering Materials	2	2	2
3.85	Advanced Food Technology ...	8	8	8
	Food Technology Project	10	10	10

CONVERSION COURSE IIIc—CHEMICAL ENGINEERING.

Holders of a diploma in Chemical Engineering who completed the course of study prior to 1954 are required to complete the following additional work in order to qualify for the degree of Bachelor of Science.

		Hours per week.
10.11	Mathematics Part II	2
1.11	Physics Part II	3
	Conversion Humanities—	
	English, History *or* Philosophy	2
	and	
	Psychology, Economics *or* Government	2
		9

Plus advanced laboratory work on a specified project and the presentation of a thesis, together with such special subjects as are prescribed in each case.

The student is required to attend either for one full-time academic year in accordance with the dates prescribed for the normal final year of the undergraduate course, or for such other time as approved by the Professorial Board.

SCHOOL OF METALLURGY.

The courses in Metallurgy have been designed to prepare students for employment in metallurgical industries and research institutions and involve a general training in basic sciences and engineering. These fundamental principles are then applied to problems relating to the extraction, refining, working, fabrication and use of metals.

Two main courses in Metallurgy are available. In Course IV, which leads to the degree of Bachelor of Science (Pass or Honours), students study full-time during the day and may complete the course in four years. Between the third and fourth years they are expected to obtain a full-time position in industry. Course IVB, which leads to the degree of Bachelor of Science (Pass degree), is primarily for students employed in metallurgical industries and instruction is given mainly in the evenings.

The first year of the full-time course and the first and second years of the part-time course are identical with those of the Applied Chemistry and Chemical Engineering courses.

COURSE IV—METALLURGY.

This course extends over four years and students study full-time during the day as follows:—

First Three Years.—34 weeks over three terms from late February to November (excluding examinations and vacations) of full-time study, five days per week.

Fourth Year.—22 weeks over two terms from early June (excluding examinations and vacations) of full-time day study, five days per week.

The degree of Bachelor of Science, Pass or Honours, is awarded depending on the degree cf success of the student during the course. As will be seen above, the fourth year of the course commences at the beginning of the second University term so as to provide a six-months period between the third and fourth years in which a student must obtain industrial experience. Lectures and laboratory work during this period cease completely so that students may travel to other centres for their industrial training.

Provision is made in the course for a limited amount of specialisation of the student's own choice in the final year.

First Year.
(34 weeks day course.)

		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.11	Physics	3 — 3	3 — 3	3 — 3
2.21	Chemical Techniques	0 — 3	0 — 0	0 — 0
2.41	General Chemistry	3 — 3	3 — 6	3 — 9
5.101	Engineering Drawing and Materials	2 — 0	1 — 3	0 — 0
5.211	Workshop Processes and Practice	0 — 0	0 — 0	0 — 3
10.11	Mathematics	4 — 2	4 — 2	0 — 0
10.11B	Mathematics	0 — 0	0 — 0	2 — 2
G10	English	2 — 0	2 — 0	0 — 0
G20	History	1 — 0	1 — 0	2 — 0
		15 —11	14 —14	10 —17

Hours per week.

Second Year.
(34 weeks day course.)

		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.92	Physics	1½— 0	1½— 1½	1½— 1½
2.32	Physical Chemistry	1 — 0	1 — 0	1 — 2½
2.42	Inorganic Chemistry	1 — 0	1 — 0	1 — 0
2.52	Quantitative Analysis	1 — 2½	1 — 2½	1 — 2½
2.72	Mathematical Chemistry	1 — 0	1 — 0	1 — 0
4.12	General Metallurgy	1 — 0	1 — 0	1 — 0
4.22	Metallurgical Engineering I	1 — 2–1*	3 — 3†–1*	2 — 2–1*
4.32	Physical Metallurgy I	1 — 3	2 — 3	2 — 3
7.612	Mineralogy‡	1 — 1½	1 — 1½	1 — 0
8.912	Properties of Materials‡	0 — 0	1 — 1½	1 — 1½
G1	Logic	0 — 0	2 — 0	0 — 0
G2	Philosophy	0 — 0	0 — 0	2 — 0
		9½—10	15½—14	14½—14

Hours per week.

* Tutorial. † Includes one hour report writing.
‡ These courses begin in the sixth week of first term.

Third Year.
(34 weeks day course.)

		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
2.33	Physical Chemistry	1 — 2	1 — 2½	1 — 2½
2.73	Mathematical Chemistry	1 — 0	1 — 0	1 — 0
4.23	Metallurgical Engineering II A and B	4 — 3	4 — 3	4 — 5
4.33	Physical Metallurgy II	2 — 3½	2 — 3½	2 — 3½
4.54	Metallurgy Seminar, Part I	0 — 1*	0 — 0	0 — 0
6.94	Electrical Engineering	1 — 2	1 — 2	1 — 2
7.034	Mineral Dressing	2 — 3	2 — 3	0 — 0
	Minor Elective (Humanities)	1 — 0	1 — 0	0 — 0
		12 —14½	12 —14	9 —13

Hours per week.

* Discussion on report and paper presentation. Seminars will be conducted jointly by *part-time* students in sixth year and *full-time* students in fourth year.

Fourth Year.

(22 weeks day course.)

2nd and 3rd terms only—Vacation and 1st term in industry.

		Hours per week. Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
4.24	Metallurgical Engineering III	2 — 3	2 — 0
4.34	Physical Metallurgy III	2 — 3	1 — 3
4.44	Industrial Metallurgy	2 — 3	2 — 3
4.54	Metallurgy Seminar, Part II	0 — 2*	0 — 2†
4.64	Metallurgy Project	0 — 6+	0 —12+
	Major Elective (Humanities)	3 — 0	3 — 0
		9 —17+	8 —20+

* Taken jointly with sixth year students in *part-time* course.

† Portion of this period will be used for discussion of "industrial experience" reports.

During the second, third and fourth years of the course, excursions will be made to various metallurgical works. Detailed reports of some of these visits will be required.

A detailed report of the student's activities during his six months' period in industry after the third year will be required, and will be taken into consideration during classification for the honours list.

COURSE IVB—METALLURGY.

The part-time course, which leads to the degree of Bachelor of Science (Pass degree), extends over seven years of three terms each. Students are required to have at least three years' experience in a metallurgical industry or institution before completing the course.

First Year.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.11	Physics, Part I	1½— 1¾	1½— 1¾	1½— 1¾
2.21	Chemical Techniques	0 — 3	0 — 0	0 — 0
2.41	General Chemistry, Part I	3 — 0	2 — 4	1 — 5
10.11–B	Mathematics, Part I	2 — 1*	2 — 1*	2 — 1*
		6½— 5¾	5½— 6¾	4½— 7¾

* Tutorial.

Second Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.11	Physics, Part II	1½— 1½	1½— 1½	1½— 1½
2.41	General Chemistry, Part II ...	1 — 2½	1 — 2½	1 — 4
5.101	Engineering Drawing and Materials	2 — 0	1 — 3	0 — 0
5.211	Workshop Processes and Practice	0 — 0	0 — 0	0 — 3
10.11-B	Mathematics, Part II	2 — 1*	1 — 1*	1 — 1*
		6½— 5	4½— 8	3½— 9½

* Tutorial.

Third Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.92	Physics	1½— 0	1½— 1½	1½— 1½
2.32	Physical Chemistry	1 — 2½	1 — 0	1 — 0
2.52	Quantitative Analysis	1 — 2½	1 — 2½	1 — 2½
2.72	Mathematical Chemistry	1 — 0	1 — 0	1 — 0
4.12	General Metallurgy	1 — 0	1 — 0	1 — 0
8.912	Properties of Materials (equivalent time)	0 — 0	1 — 1½	1 — 1½
		5½— 5	6½— 5½	6½— 5½

Fourth Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
2.33	Physical Chemistry	1 — 1	1 — 1	1 — 1
2.42	Inorganic Chemistry (lecture course)	1 — 0	1 — 0	1 — 0
2.73	Mathematical Chemistry	1 — 0	1 — 0	1 — 0
4.32	Physical Metallurgy I..............	1 — 3	2 — 3	2 — 3
7.612D	Mineralogy	1 — 1½	1 — 1½	1 — 0
		5 — 5½	6 — 5½	6 — 4

Fifth Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
4 22	Metallurgical Engineering I	2 — 3†–1*	2 — 2–1*	2 — 2–1*
4 33	Physical Metallurgy II	2 — 3½	2 — 3½	2 — 3½
		4 — 7½	4 — 6½	4 — 6½

* Tutorial. † Includes one hour report writing.

Sixth Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
4.23	Metallurgical Engineering IIA and Project	2 — 3	2 — 3	2 — 5
4.44A	Industrial Metallurgy*	2 — 1	2 — 1	1 — 0
4.54	Metallurgy Seminar†	1 — 0	0 — 2	0 — 0
4.23	Metallurgical Engineering IIB...	2 — 0	2 — 0	2 — 0
	or			
6.94	Electrical Engineering I	1 — 2	1 — 2	1 — 2
		7–6—4–6	6–5—6–8	5–4—5–7

* Includes Factory visits.

† Report and paper presentation covered in first term, then joint seminar in second term with full-time students.

Seventh Year.

(34 weeks part-time course.)

	Hours per week.		
	Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
English, History *or* Philosophy	2 — 1*	2 — 1*	2 — 1*
and			
Psychology, Economics *or* Government	2 — 1*	2 — 1*	2 — 1*
	4 — 2	4 — 2	4 — 2

* Tutorial.

CONVERSION COURSES—METALLURGY.

Students who hold current diplomas of the Sydney Technical College in Metallurgy or Secondary Metallurgy may apply for permission to take a conversion course which will enable them to qualify for the degree of Bachelor of Science. Details of the conversion courses are as shown below—

CONVERSION COURSE IVc1—METALLURGY.

Conversion course to Bachelor of Science (Pass) from current Secondary Metallurgy diploma course (Sydney).

		Hours per week.
1.92	Physics	2½
2.72	Mathematical Chemistry	1
2.73	Mathematical Chemistry	1
	Conversion Humanities—	
	English, History *or* Philosophy	2
	and Psychology, Economics *or* Government	2
4.54	Metallurgy Seminar	1
		9½

Together with any special subjects prescribed.

CONVERSION COURSE IVc2—METALLURGY.

Conversion course to Bachelor of Science (Pass) from current Metallurgy diploma course (Newcastle and Wollongong).

		Hours per week.
2.72	Mathematical Chemistry	1
2.73	Mathematical Chemistry	1
	Conversion Physics	3
	Conversion Humanities—	
	English, History *or* Philosophy	2
	and Psychology, Economics *or* Government	2
4.54	Metallurgy Seminar	1
		10

Together with any special subjects prescribed.

SCHOOL OF MECHANICAL ENGINEERING.

The courses in Mechanical Engineering are planned to provide a sufficient foundation of basic science applied to engineering methods and techniques to prepare the graduate to enter any industry dealing with heat, power, materials and machinery. The course does not attempt to teach current commercial practice nor specialised knowledge of the product of any one industry. On the contrary, undergraduates are expected to obtain their practical experience by direct service in industry.

In general, instruction by lectures is paralleled by laboratory work in which the student is given opportunity, not only to familiarise himself with materials, engines and machinery, but also to develop his ability to apply theory to the analysis of their characteristics.

Three courses are provided leading to the degree of Bachelor of Engineering (Pass or Honours): Course V, a four years day course; Course VB, a part-time course extending over seven years; and Conversion Course VC, to enable Associates of Sydney Technical College in Mechanical Engineering to qualify for the degree.

COURSE V—MECHANICAL ENGINEERING.

Course V is of four years' duration. The first three years of the course each require attendance at the University for twenty-four weeks. For the remainder of each of these years the student gains practical experience in industry. The fourth year requires full-time day attendance for thirty-four weeks.

During the first two years the fundamental subjects which are the basis of the student's later professional work are studied, viz., mathematics, chemistry, physics and applied mechanics, a thorough knowledge of which is essential in all branches of mechanical engineering. The student is also trained in elements of the more important mechanical processes in order that he may acquire the knowledge of modern machine tools, foundry practice, forging and welding, necessary for the successful designer of machinery. This knowledge is further enlarged by five-month periods in industry between the various academic sessions.

The professional work of the third and fourth years includes the study of the mechanics of fluids and of rigid and elastic bodies with applications to design. The study of thermodynamics is applied to heat engineering, and to the analysis and design of power plants, turbines, steam and internal combustion engines, industrial heating, and to refrigeration and air-conditioning systems. Engineering processes are considered in relation to design for production; and work on metrology, gauges and fixtures, tool design, tolerances and inspection is introduced.

The professional elective subjects in the fourth year permit students to choose a broad phase of mechanical engineering as a special study. In this way the student learns to use libraries and technical journals, and is made to realise how fully the knowledge he has gained during his course is used in engineering development and practice. The preparation of a thesis provides a training in report-writing and in technical exposition.

FIRST YEAR.
(24 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.
1.41	Physics	3 — 3	3 — 3
2.111	Chemistry	3 — 3	3 — 0
5.11	Engineering Drawing	0 — 3*	0 — 3*
5.21	Mechanical Technology	2½— 0	2½— 0
5.41	Descriptive Geometry	1 — 2½*	1 — 2½*
8.11	Engineering Mechanics	1 — 1*	1 — 1*
10.11	Mathematics	4 — 2*	4 — 2*
G10	English	2 — 0	2 — 0
G20.1	History	1 — 0	1 — 0
		17½—14½	17½—11½

* Tutorial.

SECOND YEAR.
(24 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.
1.42	Physics	2 — 2½	2 — 2½
4.912	Materials Technology	1½— 2	1½— 2
5.22	Mechanical Technology	3 — 0	3 — 0
5.32	Engineering Mechanics	1½— 1*	1½— 1*
5.52	Fluid Mechanics	1 — ½-½*	1 — ½-½*
5.72	Thermodynamics	1 — 1-1*	1 — 1-1*
8.112	Theory of Structures	1½— 1*	1½— 1
8.92	Properties of Materials	0 — 0	1 — 2
10.12	Mathematics	3 — 2*	3 — 2*
G1	Logic	0 — 0	2 — 0
G20.2	History	2 — 0	0 — 0
		16½—11½	17½—13½

* Tutorial.

Third Year.

(24 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.
5.13	Mechanical Engineering Design	0 — 6*	0 — 6*
5.23	Mechanical Technology	1½— 0	1½— 0
5.33	Theory of Machines	1½— 1*	1½— 1*
5.53	Fluid Mechanics	1 — 1½–½*	1 — 1½–½*
5.73	Thermodynamics	1 — 1½–½*	1 — 1½–½*
6.83	Electrical Engineering	1 — 3–1*	1 — 3–1*
8.123	Structures (Theory and Design)	2 — 3*	2 — 3*
8.33	Engineering Computations	1½— 0	1½— 0
G2	Philosophy	2 — 0	0 — 0
	Minor Elective (Humanities)	0 — 0	2 — 0
		11½—18	11½—18

* Tutorial.

Note.—A survey camp of one week's duration will be held in the third week of third term.

Fourth Year.

(34 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
5.14	Mechanical Engineering Design	0 — 6*	0 — 6*	....
5.34	Theory of Machines	1 — 2*	1 — 2*	....
5.54	Fluid Mechanics	1 — 1½–1½*	1 — 1½–1½*	....
5.74	Thermodynamics	1½— 1½–1*	1½— 1½–1*	....
6.84	Electrical Engineering	1 — 2½–½*	0 — 0	....
	Professional Elective I	1 — 2	1 — 2	....
	Professional Elective II	1 — 2	1 — 2	....
	Seminar	0 — 0	0 — 0	2 — 0
	Thesis Work	0 — 0	0 — 0	0 —26
	Major Elective (Humanities)	3 — 0	3 — 0	....
		9½—20½	8½—17½	2 —26

* Tutorial.

Professional Elective Subjects.

The full range of Professional Elective subjects is as shown hereunder. Not all subjects are offered each year.

Automatic Control Engineering.
Electric Power Generation and Utilization.
Internal Combustion Engines and Gas Turbines.
Production Engineering Design.
Refrigeration, Ventilation and Air Conditioning.
Steam Engineering.

COURSE VB—MECHANICAL ENGINEERING.

Course VB has been designed for students employed in an appropriate position in industry. The work undertaken is equivalent to that covered in Course V, but Course VB extends over seven part-time years, satisfactory completion of which, together with the necessary occupational experience, qualifies for the degree of Bachelor of Engineering (Pass or Honours).

FIRST YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.41D	Physics	1½ — 1¾	1½ — 1¾	1½ — 1¾
2.111	Chemistry	2 — 1	2 — 1	2 — 1
5.11D 5.41D	Engineering Drawing Descriptive Geometry } †	0 — 3*	0 — 3*	0 — 3*
8.11D	Engineering Mechanics	1 — 0	1 — 0	1 — 0
10.11	Mathematics, Part I	1½ — ½*	1½ — ½*	1½ — ½*
		6 — 6¼	6 — 6¼	6 — 6¼

* Tutorial.

† 1st Half Year—Descriptive Geometry. 2nd Half Year—Engineering Drawing.

SECOND YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
4.912D	Materials Technology	1 — 1½	1 — 1½	1 — 1½
5.21D	Mechanical Technology	1 — 0	1 — 0	1 — 0
5.22D	Mechanical Technology	2¼ — 0	2¼ — 0	0 — 0
8.112D	Theory of Structures	1½ — ¾*	1½ — ¾*	0 — 0
8.92D	Properties of Materials	0 — 0	0 — 0	1 — 2
10.11	Mathematics, Part II	1½ — ½*	1½ — ½*	1½ — ½*
G10	English, Part I (Language)	1 — 0	1 — 0	1 — 0
G10	English, Part II (Literature)	1 — 0	0 — 0	0 — 0
G20B	History	0 — 0	1½ — 0	1½ — 0
		9¼ — 2¾	9¾ — 2¾	7 — 4

* Tutorial.

THIRD YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
5.13D	Mechanical Engineering Design...	0 — 3*	0 — 3*	0 — 3*
5.23D	Mechanical Technology	1½— 0	1½— 0	1½— 0
5.32D	Engineering Mechanics	1 — ½*	1 — ½*	1 — ½*
5.72D	Thermodynamics	1 — 1*	1 — 1*	0 — 2
6.83D	Electrical Engineering	1 — 1½*	1 — 1½	1 — 1½
10.12	Mathematics, Part I	1 — ½*	1 — ½*	1 — ½*
		5½— 6½	5½— 6½	4½— 7½

* Tutorial.

FOURTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
5.33D	Theory of Machines	1 — 1*	1 — 1*	1 — 1*
5.52	Fluid Mechanics	1 — ½-½*	1 — ½-½*	0 — 0
5.73	Thermodynamics	1 — 0	1 — 1½*	0 — 2½
6.84D	Electrical Engineering	½— 1-½*	½— 1-½*	½— 1-½*
8.123D	Structures (Theory and Design)	1½— 1½*	1½— 1½*	1½— 1½*
8.42A	Land Surveying†	0 — 0	0 — 0	1 — 0
		5 — 5	5 — 6½	4 — 6½

* Tutorial.

† Includes four six-hour periods on Saturdays for fieldwork.

FIFTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
5.14D	Mechanical Engineering Design ..	0 — 3*	0 — 3*	0 — 3*
5.53D	Fluid Mechanics	1 — 1½-1*	1 — 1½-1*	0 — 0
5.74D	Thermodynamics	1 — 1*	1 — 1*	1 — 2½
	Seminar	1½— 0	1½— 0	0 — 0
		3½— 6½	3½— 6½	1 — 5½

* Tutorial.

Sixth Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
1.42D	Physics	1½— 1½	2½— 1½	2½— 1½
5.34D	Theory of Machines	1 — ½*	1 — ½*	1 — ½*
8.33	Engineering Computations	1 — 0	1 — 0	1 — 0
10.12	Mathematics, Part II	1 — ½*	1 — ½*	1 — ½*
G8	Philosophy	1½— 0	1½— 0	1½— 0
		6 — 2½	7 — 2½	7 — 2½

* Tutorial.

Seventh Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
5.54D	Fluid Mechanics	1 — 2*	1 — 2	1 — ½*
	† Professional Elective I	1 — 2	1 — 2	0 — 0
	† Professional Elective II	1 — ½	1 — ½	0 — 3
	Thesis Work	0 — 0	0 — 0	0 — 3
	Major Elective (Humanities)	2 — 0	2 — 0	2 — 0
		5 — 4½	5 — 4½	3 — 6½

* Tutorial.

† As set out for fourth year of Course V—Mechanical Engineering.

CONVERSION COURSE Vc—MECHANICAL ENGINEERING.

Holders of a diploma in Mechanical Engineering who have completed the course of study as set out in the 1954 Handbook of the N.S.W. Department of Technical Education are required to complete the following additional work in order to qualify for the Bachelor of Engineering degree.

1. Satisfactorily complete the following subjects in the evening as one year courses over three terms.

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab./tut.	lec. lab./tut.	lec. lab./tut.
10.12D	Mathematics Parts I and II	2 — 1*	2 — 1*	2 — 1*
1.42D	Physics	1½— 1½	2½— 1½	2½— 1½
	† Conversion Humanities— English, History *or* Philosophy	2 — 0	2 — 0	2 — 0
	and Psychology, Economics *or* Government	2 — 0	2 — 0	2 — 0
		5½–7½— 2½	6½–8½— 2½	6½–8½— 2½

† One of the two Humanities subjects required may, if desired, be taken in the next year of the Conversion programme as set out in (2) below.

* Tutorial.

2. On completion of the work prescribed under (1) above, the student may—

(*a*) enrol for the fourth year of the normal degree course less the Humanities subjects already completed and with the substitution of 8.33 Engineering Computations for 5.14 Mechanical Engineering Design: *or*

(*b*) enrol for the following programme of part-time study over two years.

First Year.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
5.54D	Fluid Mechanics	1 — 2*	1 — 2	1 — ½*
‡8.43D	Surveying	1 — 0	1 — 0	1 — 0
8.33D	Engineering Computations	1 — 0	1 — 0	1 — 0
	Professional Elective I	1 — 2	1 — 2	0 — 0
	† Conversion Humanities	2 — 0	2 — 0	2 — 0
		4–6— 4	4–6— 4	3–5— ½

‡ Plus seven six hour periods for Survey Fieldwork.

† This subject need only be taken if it is necessary for the student to complete the Humanities requirements set out in (1) above.

* Tutorial.

Second Year.

(34 weeks part-time course.)

	Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
Professional Elective II	1 — 2*	1 — 2*	0 — 0
Professional Elective III	1 — 2	1 — 2	0 — 0
Seminars	0 — 0	0 — 0	2 — 0
Thesis Work	0 — 3	0 — 3	0 — 6
	2 — 7	2 — 7	2 — 6

* Tutorial.

Note: (i) A thesis will be required of conversion students. In determining its nature and content the student's diploma thesis will be taken into consideration.

(ii) The choice of Professional Elective subjects is set out on page 151 of the Calendar.

SCHOOL OF ELECTRICAL ENGINEERING.

In preparation for a career in any branch of electrical engineering the student must acquire a knowledge of the basic sciences of mathematics and physics. Students should realise that electrical engineering, perhaps more than most other branches of engineering, is closely linked with the pure sciences, and requires a scientific outlook and approach for a proper understanding of the problems in electrical engineering.

There are three main branches of electrical engineering, viz.:— (*a*) Power apparatus and systems—concerned mainly with electrical machinery, power generation, transmission and power systems; (*b*) Utilization and control—concerned with the utilization and control of electrical plant and applied electronics; (*c*) Communications—concerned with radio and line communications, radar and other navigational aids and television. In the early stages of the course, students will concentrate on acquiring a knowledge of the basic science subjects of mathematics, physics and chemistry but will have some introduction to engineering. However, advanced students are given an opportunity to specialise in their field of interest. They may elect, with the approval of the Professor, to study one of the three branches: (*a*) Power Apparatus and Systems, (*b*) Utilization and Control, or (*c*) Communications, but will be required to study a common subject of Electrical Engineering. This will cover the portions of electrical engineering such as measurements, electron physics, servo-mechanisms, electric circuit and field theory and electronics, which are common to all three fields of study.

Each student is required to work on a project under the guidance of members of the lecturing staff. Generally, the project will involve the design and construction of experimental apparatus together with laboratory tests. Where possible the projects will be related to the research programme of the School and will be designed to develop the student's initiative. Each student will be required to deliver a seminar paper and to prepare a thesis based on the results of the project work.

Five courses are provided leading to the degree of Bachelor of Engineering (Pass or Honours), viz.:—

Course VI, a four-year day course.

Course VIB, a part-time course extending over seven years.

Conversion Course VIc1 for Associates of Sydney Technical College in both Electrical and Radio Engineering.

Conversion Course VIc2 for Associates of Sydney Technical College in Electrical Engineering.

Conversion Course VIc3 for Associates of Sydney Technical College in Radio Engineering.

COURSE VI—ELECTRICAL ENGINEERING.*

Course VI is of four years' duration. The first three years of the course each require attendance at the University for twenty-four weeks. For the remainder of each of these years the student gains practical experience in industry. The fourth year requires full-time day attendance for thirty-four weeks.

First Year.

(24 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.
1.41	Physics	3 — 3	3 — 3
2.111	Chemistry	3 — 3	3 — 0
5.11	Engineering Drawing	0 — 3*	0 — 3*
5.21	Mechanical Technology	2½— 0	2½— 0
5.41	Descriptive Geometry	1 — 2½*	1 — 2½*
8.11	Engineering Mechanics	1 — 1*	1 — 1*
10.11	Mathematics	4 — 2*	4 — 2*
G 10	English	2 — 0	2 — 0
G 20.1	History	1 — 0	1 — 0
		17½—14½	17½—11½

* Tutorial.

Second Year.

(24 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.
1.12A	Physics	4 — 3	4 — 3
4.912	Materials Technology	1½— 2	1½— 2
5.72	Thermodynamics	1 — 1-1*	1 — 1-1*
6.12	Electric Circuit Theory	2 — 0	2 — 2
8.112	Theory of Structures	1½— 1*	1½— 1*
8.92M	Properties of Materials	½— 1	½— 1
10.12	Mathematics	3 — 2*	3 — 2*
10.62	Applied Mathematics	2 — 1*	2 — 1*
G20.2	History	2 — 0	0 — 0
G1	Logic	0 — 0	2 — 0
		17½—12	17½—14

* Tutorial.

* Course VI was revised in 1955 and the new course as here set out will operate in all years in 1956.

Third Year.

(24 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Hours per week. Term 2 lec. lab./tut.
6.13	Electric Circuit Theory	3 — 3	3 — 0
6.23	Electric Power Engineering	3 — 3	3 — 6
6.303	Electronics	3 — 3	3 — 3
8.41	Surveying †	1 — 0	1 — 0
10.33	Mathematics	2 — 0	2 — 0
**5.33A	Theory of Machines	1 — 1	1 — 1
**5.52	Fluid Mechanics	1 — 1	1 — 1
**10.63	Statistics	1 — 1*	1 — 1*
G2	Philosophy	2 — 0	0 — 0
	Humanities (Minor Elective)	0 — 0	2 — 0
		16 —11	16 —11

* Tutorial.

†With Survey Camp.

**Either Theory of Machines or Fluid Mechanics may be replaced by Statistics.

Fourth Year.

(34 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Hours per week. Term 2 lec. lab./tut.
6.104	Electrical Engineering	5 — 5	5 — 5
	Major Elective (Humanities)	3 — 0	3 — 0
PLUS one of the following three options:—			
Option 1—Power Apparatus and Systems.			
6.214	Power Systems	4 — 3	4 — 3
6.224	Electrical Machines	4 — 3	4 — 3
Option 2—Utilization and Control.			
6.234	Utilization and Control of Electrical Plant	4 — 3	4 — 3
6.344	Applied Electronics	4 — 3	4 — 3
Option 3—Communications.			
6.314	Radio Communication	8 — 6	8 — 6
6.334	Line Communication		
		16 —11	16 —11

Students in doubt concerning the options subjects in the third year and the options in the final year should consult the Professor of Electrical Engineering. It is expected that students specialising in Option 1—Power Apparatus and Systems will elect to study the subjects of 5.33A Theory of Machines and 5.52 Fluid Mechanics. The subject 10.63 Statistics will be of most value to students intending to specialise in Communications or Control Systems.

Third Term.

This term is mainly devoted to directed laboratory and research work on an approved subject, with special reading and study associated with the preparation of a thesis, and seminar work is also carried out.

A course of specialist lectures, including Engineering Economics, is given by senior engineers from government departments and industry on problems met in practice. These are designed to acquaint the student with current projects and practical problems in industry and essential **electrical services.**

NOTE.—An opportunity is given to final year students to attend practical wiring classes towards qualifying for an Electrician's Licence.

COURSE VIB—ELECTRICAL ENGINEERING.

Course VIB has been designed for students employed in appropriate positions in industry. The work undertaken is equivalent to that covered in Course VI, but Course VIB extends over seven part-time years, satisfactory completion of which, together with the necessary occupational experience, qualifies for the degree of Bachelor of Engineering (Pass or Honours)

First Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.41D	Physics	1½— 1¾	1½— 1¾	1½— 1¾
2.111	Chemistry	2 — 1	2 — 1	2 — 1
5.11D 5.41D	Engineering Drawing Descriptive Geometry	0 — 3*	0 — 3*	0 — 3*
10.11	Mathematics, Part I	1½— ½*	1½— ½*	1½— ½*
		5 — 6¼	5 — 6¼	5 — 6¼

* Tutorial.

Second Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.42D	Physics	1½— 1½	2 — 1½	2½— 1½
6.12D	Electric Circuit Theory	1 — 1½-1*	1 — 1½-1*	1 — 1*
8.132	Theory of Structures	1 — 1	1 — 1	1 — 1
10.11	Mathematics, Part II	1½— ½*	1½— ½*	1½— ½*
		5 — 5½	5½— 5½	6— 4

Tutorial.

Third Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
5.32D	Engineering Mechanics	1 — ½*	1 — ½*	1 — ½*
6.13A	Electric Circuit Theory	1 — 1½–½*	1 — 1½–½*	1 — 1½–½*
6.23A 6.303A	Electric Power Engineering ... Electronics	1 — 1½–½*	1 — 1½–½*	1 — 1–1*
10.12	Mathematics Part I	1 — ½*	1 — ½*	1 — ½*
10.12	Mathematics, Part II..............	1 — ½*	1 — ½*	1 — ½*
G10	English, Part I (Language) ...	1 — 0	1 — 0	1 — 0
		6 — 5½	6 — 5½	6 — 5½

* Tutorial.

Fourth Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
6.13B	Electric Circuit Theory	1 — 1*	1 — 1*	1 — 1*
6.23B	Electric Power Engineering ...	1 — 1½–½*	1 — 1½–½*	1 — 1½ ½*
6.303B	Electronics	1 — 1½–½*	1 — 1½–½*	1 — 1½–½*
10.33	Mathematics	1 — 1	1 — 1	1 — 1
G10	English, Part II (Literature) ...	1 — 0	0 — 0	0 — 0
G20B	History	0 — 0	1½— 0	1½— 0
		5 — 6	5½— 6	5½— 6

*Tutorial.

Fifth Year.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
4.912D	Materials Technology	1 — 1½	1 — 1½	1 — 1½
5.72D	Thermodynamics	1 — 1*	1 — 1*	0 — 2*
6.304A	Industrial Electronics & Control	1 — 1–1*	1 — 1–1*	1 — 1–1*
	Major Elective—			
	(a) Power .... (b) Radio .... (c) Line Communication	1 — 2	1 — 2	1 — 2
G8	Philosophy	1½— 0	1½— 0	1½— 0
		5½— 6½	5½— 6½	4½— 7½

* Tutorial.

SIXTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
5.52	Fluid Mechanics	1 — ½–½*	1 — ½–½*	0 — 0
5.33D	Theory of Machines	0 — 0	1 — ½*	1 — 1*
6.304B	Industrial Electronics & Control	1 — 1*	1 — 1*	1 — 1*
	Major Elective— (a) Power, (b) Radio, (c) Line Communication	1 — 2	1 — 2	1 — 2
	Professional Elective	1 — 1	1 — 1	1 — 1
	Major Elective (Humanities)	2 — 0	2 — 0	2 — 0
		6 — 5	7 — 5½	6 — 5

* Tutorial.

SEVENTH YEAR.

(34 weeks part-time course.)

	Hours per week.		
	Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
Major Electives—			
(a) Power	3 — 3–2*	3 — 3–2*	3 — 3–2*
(b) Radio	3 — 4–1*	3 — 4–1*	3 — 4–1*
(c) Line Communication	3 — 3–2*	3 — 3–2*	3 — 3–2*
Professional Elective (Thesis)	0 — 4	0 — 4	0 — 4
	3 — 9	3 — 9	3 — 9

* Tutorial.

CONVERSION COURSES—ELECTRICAL ENGINEERING.

COURSE VIc1—(For diplomates in both Electrical and Radio Engineering).

Diplomates in both Electrical and Radio Engineering who have completed the courses of study as set out in the 1954 Handbook of the N.S.W. Department of Technical Education are required to complete the following subjects in order to qualify for the degree of Bachelor of Engineering.

		Hours per week for 34 weeks.
5.33D	Theory of Machines	1½
5.52	Fluid Mechanics	1½
6.304A	Industrial Electronics and Control	3
6.304B	Industrial Electronics and Control	2
10.33	Mathematics	2
	Conversion Humanities—	
	English, History *or* Philosophy	2
	and Psychology, Economics *or* Government	2
	Professional Elective	2
	Thesis	4
		20

This work would normally be completed in two years, but could be spread over a longer period.

COURSE VIc2—(For diplomates in Electrical Engineering).

Diplomates in Electrical Engineering who have completed the course of study as set out in the 1954 Handbook of the N.S.W. Department of Technical Education are required to complete the following additional work in order to qualify for the degree of Bachelor of Engineering.

		Hours per week for 34 weeks.
1.42	Physics (if not already completed)	3½
5.33D	Theory of Machines	1½
5.52	Fluid Mechanics	1½
6.13B	Electric Circuit Theory	2
6.304A	Industrial Electronics and Control	3
6.304B	Industrial Electronics and Control	2
*10.12	Mathematics Part II	1½
10.33	Mathematics	2
	Conversion Humanities	
	English, History *or* Philosophy	2
	and Pyschology, Economics *or* Government	2
	Professional Elective	2
	Thesis	4
		27

* To be taken by diplomates of later than 1951 as a prerequisite to 10.33 Mathematics. Diplomates of 1951 or earlier may be required to take conversion Mathematics in lieu of 10.12 Mathematics Part II.

This work would normally be completed in three years, but could be spread over a longer period.

COURSE VIc3—(For diplomates in Radio Engineering).

Diplomates in Radio Engineering who have completed the course of study as set out in the 1954 Handbook of the N.S.W. Department of Technical Education are required to complete the following additional work for the degree of Bachelor of Engineering.

		Hours per week for 34 weeks.
4.912	Materials Technology	$2\frac{1}{2}$
5.33D	Theory of Machines	$1\frac{1}{2}$
5.52	Fluid Mechanics	$1\frac{1}{2}$
5.72	Thermodynamics	2
6.23B	Electric Power Engineering	3
6.304A	Industrial Electronics and Control	3
6.304B	Industrial Electronics and Control	2
10.33	Mathematics	2
	Conversion Humanities—	
	English, History *or* Philosophy	2
	and Psychology, Economics *or* Government	2
	Professional Elective	2
	Thesis	4
		$27\frac{1}{2}$

This work would normally be completed in three years, but could be spread over a longer period.

GRADUATE COURSE IN AUTOMATIC CONTROL.

A graduate course in Automatic Control consisting of two part-time years of advanced evening study will be introduced in 1956. The course is designed to assist those who intend to specialise in feedback control systems and who wish to obtain the degree of Master of Engineering. Examinations will be held in each subject at the end of the year and each student will be required to undertake a project. The thesis will be subject to examination according to the regulations for the degree of Master of Engineering. The entrance qualification will be a degree of Bachelor of Engineering of a recognised University and those wishing to proceed to the degree of Master of Engineering must comply with the entrance requirements for that degree.

First Year.

		Hours per week. Lec.	Lab.
6.305	Feedback Control Systems I	2	4 (with 6.315)
6.315	Analogue Computers	2	
6.105	Advanced Mathematics	2	0

Second Year.

		Hours per week. Lec.	Lab.
6.306	Feedback Control Systems II	2	4
	Project/Thesis	0	4

SCHOOL OF MINING ENGINEERING AND APPLIED GEOLOGY.

Two courses leading to the degree of Bachelor of Engineering (Pass or Honours) are offered in the School of Mining Engineering and Applied Geology. The courses provided are:—

Course VII—Mining Engineering, a four years day course.

Conversion Course VIIc—Mining Engineering, for Associates of Sydney Technical College in Metalliferous Mining Engineering who desire to qualify for the degree of Bachelor of Engineering.

Two courses leading to the degree of Bachelor of Engineering (Geology) are also offered in this School. These courses are:—

Course VIIA—Applied Geology, a four years day course.

Course VIIB—Applied Geology, a part-time course extending over seven years.

COURSE VII—MINING ENGINEERING.

Technical developments in the mining industry are such as to demand increasing engineering proficiency from various grades of mining officials. These developments require that those who are being trained for the management of the industry shall receive firstly, a sound training in mechanical, electrical and some branches of civil engineering, and secondly, the application of these developments to the mining of coal and other minerals. A knowledge of the basic subjects, mathematics, physics, chemistry, etc., is also essential in order that such auxiliary subjects as coal cleaning, preparation of minerals, gases and atmospheric conditions in mines, etc., may be properly understood. Hence in the construction of the Mining Engineering course the object has been to produce mining engineers having a sound training in engineering subjects and well versed in the application of engineering principles in the mining industry.

In the first two years of the course, the subjects taught are the basic science subjects, together with the primary engineering subjects and an introduction to mining technology. Mining subjects proper are introduced in the second year, and are developed in the third and fourth years of the course, concurrently with the engineering subjects. Subjects which are important to mining engineers, such as surveying, preparation of minerals and geology are given their proper place in the course.

The training in mining is aimed at giving students a thorough foundation in such subjects as mine ventilation; mine drainage; mine lighting; winding, haulage and transport; these subjects being common to practically all branches of mining work. The specialised application of these subjects to coal and metalliferous mining is treated in the final year of the course. Thus, although the course is designed to give students a sound training in mining, it also permits them to specialise in either coal or metalliferous mining.

Specialisation is taken a stage further in the fourth year of the course by the provision of elective subjects for the preparation of theses. Preparatory work for the theses will commence during the practical training period following the third year of academic studies and will be continued by reading in the first and second terms of the fourth year. The whole of the third term in the fourth year will be spent on further practical investigations and in the preparation of theses.

The students in the Mining Engineering course are required to spend five months of each year in obtaining practical experience at mines, this training being based on a prepared programme designed to provide a comprehensive training in many aspects of mining work. This training is important in its relation to the academic training and in relation to the Mines Department's requirements of practical training for candidates for Statutory Certificates of Competency.

First Year.

(24 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.
1.41	Physics	3 — 3	3 — 3
2.111	Chemistry	3 — 3	3 — 0
5.11	Engineering Drawing	0 — 3*	0 — 3*
5.41	Descriptive Geometry	1 — 2½*	1 — 2½*
7.001	Mining Processes	1 — 0	0 — 0
7.511	Mineralogy	0 — 0	1 — 1
8.11	Engineering Mechanics	1 — 1*	1 — 1*
10.11	Mathematics	4 — 2*	4 — 2*
G10	English	2 — 0	2 — 0
G20.1	History	1 — 0	1 — 0
		16 —14½	16 —12½

* Tutorial.

Note.—A survey camp of one week's duration will be conducted in the third week of third term.

SECOND YEAR.

(24 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.
1.42	Physics	2 — 2½	2 — 2½
4.912	Materials Technology	1½— 2	1½— 2
5.32	Engineering Mechanics	1 — 1½*	1 — 1½*
5.72	Thermodynamics	1 — 1-1*	1 — 1-1*
7.002	Coal Mining	1 — 0	1 — 0
7.042	Mining Science	1 — 1	1 — 1
7.502	Geology	2 — 1	2 — 1
8.112	Theory of Structures	1½— 1*	1½— 1*
8.92	Properties of Materials	0 — 0	1 — 2
10.12	Mathematics	3 — 2*	3 — 2*
G20.2	History	2 — 0	0 — 0
G1	Logic	0 — 0	2 — 0
		16 —13	17 —15

* Tutorial.

NOTE.—Field excursions will be arranged on several Saturdays in connection with the instruction in Geology.

At the completion of the second year of their course all students (both metalliferous and coal mining) attend practical training at a suitable coal mine.

THIRD YEAR.

(24 weeks day course.)

		Hours per week. Term 1. lec. lab./tut.	Term 2. lec. lab./tut.
5.52	Fluid Mechanics	1 — ½-½*	1 — ½-½*
6.83	Electrical Engineering	2 — 3	2 — 3
7.013	Metalliferous Mining	3 — 3	3 — 0
7.023	Mining	2 — 0	2 — 3
7.633	Geology	2 — 3	2 — 3
8.122	Structures	1 — 2	1 — 2
8.43	Surveying	1½— 2	1 — 2
G2	Philosophy	2 — 0	0 — 0
	Minor Elective (Humanities)	0 — 0	2 — 0
		14½—14	14—14

* Tutorial.

NOTE.—A survey camp of one week's duration will be conducted in the third week of third term and will be followed by a Geology excursion also of one week's duration.

At the completion of this stage of their course, the students have the option of attending practical training at either a coal or a metalliferous mine.

Fourth Year.

(34 weeks day course.)

		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
		Hours per week.		
7.004	Advanced Mining Techniques ...	0 — 0	0 — 0	1 — 0
7.024	Mining Engineering	2 — 0	2 — 3	2 — 0
7.034	Mineral Dressing.....................	2 — 3	2 — 3	0 — 0
7.044	Mining	2 — 3	2 — 0	0 — 0
7.054	Assaying	1 — 3	1 — 3	0 — 0
7.064	Mineral Economics..................	2 — 0	2 — 0	0 — 0
7.534	Mining Geology	1 — 2	1 — 2	1 — 2
8.44	Surveying	2 — 2	2 — 2	0 — 0
8.45	Mine Surveying	0 — 0	0 — 0	2 — 0
	Major Elective (Humanities) ...	3 — 0	3 — 0	0 — 0
	First Aid	0 — 0	0 — 0	1 — 0
		15 —13	15 —13	7 — 2

During the third term of the fourth year students will devote time to the professional elective subjects and the preparation of their thesis.

COURSE VIIA—APPLIED GEOLOGY.

The development of natural resources and the allied engineering activities make essential a type of training for geologists which embraces basic geological instruction and various features of its application in practice. The structure and syllabus of this course is designed so as to enable the graduates to enter immediately upon various aspects of applied geology and to play an effective part in associated engineering practice.

In the early part of the course students receive instruction in the allied fundamental sciences and basic engineering subjects as well as introductory geology. Later geological instruction is developed and emphasis is placed progressively on engineering application and on economic aspects of geology.

The applied nature of the course is indicated by the inclusion of descriptive geometry, drawing and design, strength of materials, civil and mining engineering practice, soil mechanics, etc. Detailed treatment is given to various aspects of applied geology—engineering geology, mining geology, photogeology and geochemistry. Surveying and geophysics are also included.

Attendance at the University for students taking this full-time course is for two terms during the first three years and for three terms during the fourth year. All students will be required to complete satisfactorily a course of approved practical training during vacations.

First Year.
(24 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.
1.41	Physics	3 — 3	3 — 3
2.111	Chemistry	3 — 3	3 — 0
5.11	Engineering Drawing	0 — 3*	0 — 3*
5.41	Descriptive Geometry	1 — 2½*	1 — 2½*
7.001	Mining Processes	1 — 0	0 — 0
7.511	Mineralogy	0 — 0	1 — 1
8.11	Engineering Mechanics	1 — 1	1 — 1
10.11	Mathematics	4 — 2*	4 — 2*
G10	English	2 — 0	2 — 0
G20.1	History	1 — 0	1 — 0
		16 —14½	16 —12½

* Tutorial.

Second Year.
(24 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.
1.42	Physics	2 — 2½	2 — 2½
2.32A	Physical Chemistry	1 — 2½	1 — 2½
7.052	Mining Engineering Practice	2 — 0	2 — 0
7.054	Assaying	1 — 3	1 — 3
7.502	Geology	2 — 1	2 — 1
7.512	Mineralogy and Crystallography	1 — 3	1 — 3
10.12	Mathematics	3 — 2*	3 — 2*
G1	Logic	0 — 0	2 — 0
G20.2	History	2 — 0	0 — 0
		14 —14	14 —14

* Tutorial.

Note.—Six geological excursions will be held on Saturdays during first and second terms.

Third Year.
(24 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.
7.503	Petrology	2 — 3	2 — 3
7.513	Advanced Mineralogy	2 — 2	0 — 0
7.523	Stratigraphy and Palaeontology	1 — 3	1 — 3
7.533	Economic Geology	2 — 2	2 — 2
7.543	Geophysics	2 — 1	2 — 0
7.553	Geology of Fuels	0 — 0	2 — 2
8.43	Surveying	1½— 2	1½— 2
8.63A	Engineering Construction	1 — 0	1 — 0
8.73H	Soil Mechanics and Hydrology	1 —1½	1 — 0
G2	Philosophy	2 — 0	0 — 0
	Minor Elective (Humanities)	0 — 0	2 — 0
		14½—14½	14½—12

Note.—A survey camp of one week's duration will be conducted in the third week of third term, and will be followed by a geological survey excursion also at one week's duration.

Field Instruction—

(i) One week of general surveying, taken with the Mining and Civil Engineering III students.

(ii) One week of geological surveying.

(iii) Week-end field work on geophysical surveying.

FOURTH YEAR.
(34 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut
7.034	Mineral Dressing	2 — 3	2 — 3
7.064	Mineral Economics	2 — 0	2 — 0
7.504	Advanced Petrology	1 — 2	0 — 0
7.534	Mining Geology	1 — 2	1 — 2
7.564	Photogrammetry and Photogeology	1 — 1	0 — 2
7.574	Engineering Geology	2 — 0	0 — 0
7.644	Geophysics and Geotectonics	2 — 0	0 — 0
8.641	Engineering Administration	1 — 0	0 — 0
	Elective Subjects	4	8
	Major Elective (Humanities)	3 — 0	3 — 0
		27	23

Third Term: Mainly devoted to advanced study in Professional Elective subjects and to the preparation of a thesis.

Seminars: To be arranged during the course of the year.

Field Work: Excursions to mining centres, dam sites, etc.

Professional Elective Subjects: The formal lectures and laboratory hours included in the fourth year will be supplemented by a study of some selected phase of the course to an advanced stage, and the preparation of a thesis.

Elective subjects include:

1. Industrial Mineralogy and Petrology.
2. Structural Geology and Geophysics.
3. Mining and Economic Geology.
4. Engineering Geology.

COURSE VIIB—APPLIED GEOLOGY.

Course VIIB has been designed for students already employed in an appropriate position in industry or otherwise engaged on work allied to the subject-matter of the Course. The work undertaken is equivalent to that covered in Course VIIA, but Course VIIB extends over six part-time years, satisfactory completion of which, together with the necessary occupational experience, qualifies for the degree of Bachelor of Engineering (Geology).

First Year.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.41D	Physics	1½— 1¾	1½— 1¾	1½— 1¾
2.111	Chemistry	2 — 1	2 — 1	2 — 1
5.11D	Engineering Drawing	0 — 1½*	0 — 1½*	0 — 1½*
5.41D	Descriptive Geometry	0 — 1½*	0 — 1½*	0 — 1½*
8.11D	Engineering Mechanics	1 — 0	1 — 0	1 — 0
10.11*	Mathematics, Part I	1½— ½	1½— ½	1½— ½
		6 — 6¼	6 — 6¼	6 — 6¼

* Tutorial.

Second Year.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
2.32A	Physical Chemistry	1 — 2½	1 — 2½	0 — 0
7.054D	Assaying	0 — 0	0 — 0	0 — 5
7.602	Geology	2 — 1½	2 — 1½	2 — 1½
10.11	Mathematics, Part II	1½— ½*	1½— ½*	1½— ½*
G10	English, Part I (Language)	1 — 0	1 — 0	1 — 0
G10	English, Part II (Literature)	1 — 0	0 — 0	0 — 0
G20B	History	0 — 0	1½— 0	1½— 0
		6½— 4½	7 — 4½	6 — 7

* Tutorial.

Note.—Six geological excursions will be held on Saturdays during first and second terms.

Third Year.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.42D	Physics	1½— 1½	2½— 1½	2½— 1½
7.503A	Petrology	1 — 2	½— 1	0 — 0
7.512	Mineralogy and Crystallography	1 — 2	1 — 2	1 — 2
7.523A	Stratigraphy and Palaeontology	0 — 0	½— 1	1 — 2
8.43D	Surveying	1 — 0	1 — 0	1 — 0
10.12	Mathematics, Part I	1 — ½*	1 — ½*	1 — ½*
		5½— 6	6½— 6	6½— 6

* Tutorial.

Note.—A survey camp of one week's duration will be conducted in the third week of third term.

A Geology excursion of five day's duration will be held during third years.

FOURTH YEAR.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
7.052	Mining Engineering Practice ...	1 — 0	1 — 1	1 — 1
7.503B	Petrology	0 — 0	½— 1	1 — 2
7.513	Advanced Mineralogy	2 — 2	0 — 0	0 — 0
7.523B	Stratigraphy and Palaeontology	1 — 2	½— 1	0 — 0
7.533A	Economic Geology	1 — 1	1 — 1	1 — 1
7.553	Geology of Fuels	0 — 0	1 — 1	1 — 1
10.12	Mathematics, Part II	1 — ½*	1 — ½*	1 — ½*
		6 — 5½	5 — 5½	5 — 5½

* Tutorial.

NOTE—A Geology excursion of five day's duration will be held during fourth year.

FIFTH YEAR.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
7.034	Mineral Dressing	1 — 2	1 — 2	1 — 2
7.504	Advanced Petrology	0 — 0	0 — 0	1 — 3
7.533B	Economic Geology	1 — 1	0 — 0	0 — 0
7.543	Geophysics	1 — 1	2 — 0	0 — 0
7.564	Photogrammetry and Photogeology	0 — 0	1 — 1	1 — 1
8.63A	Engineering Construction	1 — 0	1 — 0	0 — 0
8.73D	Soil Mechanics	1 — 0	1 — 0	1 — 0
G8	Philosophy	1½— 0	1½— 0	1½— 0
		6½— 4	7½— 3	5½— 6

SIXTH YEAR.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
7·064	Mineral Economics	1 — 0	1 — 0	2 — 0
7.534	Mining Geology	1 — 2	1 — 2	0 — 0
7.574	Engineering Geology	1 — 0	1 — 0	0 — 0
7.644	Geophysics and Geotectonics ...	1 — 0	1 — 0	0 — 0
8.64I	Engineering Administration......	1 — 0	0 — 0	0 — 0
	Major Electives (Humanities) ...	2 — 0	2 — 0	2 — 0
	Electives and Thesis†	3	3	8
		12	11	12

† For details see page 169.

CONVERSION COURSE VIIc—MINING ENGINEERING.

Holders of a diploma in Metalliferous Mining Engineering who have completed the course of study given at Broken Hill as set out in the 1955 Handbook of the New South Wales Department of Technical Education, and who desire to proceed to the degree of Bachelor of Engineering, are required to satisfactorily complete the following additional work:—

Diploma Mathematics II, after which they will be permitted to enter a two-year full-time course under the Professor of Mining Engineering at Sydney.

This requires attendance in Sydney full-time from March to September in the first year, after which they will return to work in the mines until the following March. The second year requires full-time attendance in Sydney from March to November.

The syllabus of work for the first year of this two-year course will consist of some of the normal degree course second-year subjects and some of the third-year subjects as follows:—

		Hours per Week.
1.42	Physics (Exemption may be granted if the student has completed Diploma Physics II.)	4½
[8.122	Structures	3
5.52	Fluid Mechanics	2
7.002	Coal Mining	2
7.023	Mining Engineering	5
10.12	Mathematics	5
	Conversion Humanities—	
	English, History *or* Philosophy	2
	and Psychology, Economics *or* Government	2
		25½

The second year syllabus will be the normal course set out for the fourth year of the degree course, less the Humanities subject.

SCHOOL OF CIVIL ENGINEERING.

Civil Engineering is broad in its scope, utilizing other specialised branches of engineering in planning, co-ordinating and constructing national works such as water supply and conservation projects, hydro-electric development, roads, railways, bridges, tunnels, large buildings, and irrigation, sewerage and harbour and river development. The Civil Engineer adapts the forces of nature for the use and convenience of mankind. His academic training must include a study of science and of engineering practice. He must combine this with experience and judgment and the knowledge and personality necessary to control large organisations of workers. This profession offers to a young man a considerable variety of types of work, ranging from specialised research and investigations, through routine design and construction work to higher positions which are often largely managerial and organisational in their nature.

Three courses leading to the degree of Bachelor of Engineering (Pass or Honour) are offered in the School of Civil Engineering. The courses provided are:

Course VIII, requiring four years' day attendance at the University, and including three periods of practical training in industry.

Course VIIIB, requiring seven years' part-time attendance, together with at least three years of satisfactory experience in industry.

Course VIIIC, for Associates of Sydney Technical College in Civil Engineering. This course may be completed by three years' part-time study, or by one year's part-time and one year's full-time study.

The courses in Civil Engineering are arranged so that all students receive training in the basic principles of mathematics and science and in the fundamentals of engineering applications of such work to surveying, hydraulics, foundation engineering, structural design, and constructional work in the field. Ancillary subjects from other branches of engineering are also included, such as electrical engineering, mechanical engineering, engineering chemistry and the like. Satisfactory practical experience in industry, concurrent with academic training, is a feature of all courses, and detailed reports of such experience must be submitted by all degree students.

Provision is made in the final year for the student to carry out further work adapted to his special interests by electing one of the following options:—

Option I.—Civil Engineering Design.

Emphasis is given to the design aspects of civil engineering works which follow up the initial survey and investigation and precede the actual construction of the project.

Option II.—Civil Engineering Construction and Administration.

The attention of the student is directed to the problems associated with the actual construction of major civil engineering projects of all types such as the planning of construction methods and the study of administrative, social and economic aspects of major projects.

Option III.—Surveys and Investigations.

Stress is laid in this option upon the preliminary investigation necessary for large civil engineering projects with special study of such subjects as photogrammetry, hydrology, soil mechanics and geology.

Option IV.—Materials.

The study of both the fundamentals of material behaviour and the experimental analysis of engineering materials and structures is a rapidly expanding branch of applied science. This option deals with the civil engineering aspects of this field.

COURSE VIII—CIVIL ENGINEERING.

First Year.

(24 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.
1.41	Physics	3 — 3	3 — 3
2.111	Chemistry	3 — 3	3 — 0
5.11	Engineering Drawing	0 — 3*	0 — 3*
5.41	Descriptive Geometry	1 — 2½*	1 — 2½*
8.11	Engineering Mechanics	1 — 1*	1 — 1*
10.11	Mathematics	4 — 2*	4 — 2*
G10	English	2 — 0	2 — 0
G20.1	History	1 — 0	1 — 0
		15 —14½	15 —11½

* Tutorial.

Note.—A survey camp of one week's duration must be attended in the third week of third term.

SECOND YEAR.

(24 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.
1.42	Physics	2 — 2½	2 — 2½
4.912	Materials Technology	1½— 2	1½— 2
5.52	Fluid Mechanics	1 — ½-½*	1 — ½-½*
5.72	Thermodynamics	1 — 1-1*	1 — 1-1*
7.502	Geology	2 — 1	2 — 1
8.112	Theory of Structures	1½— 1*	1½— 1*
8.122	Structures	1 — 2	1 — 2
8.92	Properties of Materials	1 — 2	0 — 0
10.12	Mathematics	3 — 2*	3 — 2*
G1	Logic	0 — 0	2 — 0
G20.2	History	2 — 0	0 — 0
		16 —15½	15 —13½

* Tutorial.

NOTE—Field excursions will be arranged on several Saturdays in connection with the instruction in Geology.

THIRD YEAR.

(24 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.
5.12	Mechanical Engineering Design	1 — 2	1 — 2
6.83	Electrical Engineering	1 — 3-1*	1 — 3-1*
7.673	Engineering Geology	1 — 0	0 — 0
8.113	Structures	1½— 2	1½— 2
8.23	Materials of Construction	2 — 2	2 — 2
8.33	Engineering Computations	1½— 0	1½— 0
8.43	Surveying	1½— 2	1 — 2
8.53	Fluid Mechanics	1 — 1½	1 — 0
8.63A	Engineering Construction	1 — 0	1 — 0
8.63B	Hydrology	0 — 0	1½— 0
8.73	Soil Mechanics	1 — 1½	1 — 1½
10.43	Mathematics	1½— 0	1 — 0
G2	Philosophy	2 — 0	0 — 0
	Minor Elective (Humanities)	0 — 0	2 — 0
		16 —15	15½—13½

* Tutorial.

NOTE—A survey camp of one week's duration must be attended in the third week of third term. A geology camp must be attended in the fourth week of third term.

Fourth Year.

(34 weeks day course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.
8.114	Structures	2 — 3	2 — 3
8.44	Surveying	2 — 2	2 — 2
8.54	Applied Hydraulics	1 — 1*	1 — 1*
8.64C	Public Health Engineering	1 — 0	1 — 0
8.64D	Road Engineering	1 — 0	1 — 0
8.64E	Railway Engineering	1 — 0	0 — 0
8.64F	Harbours and Rivers Engineering	0 — 0	1 — 0
8.64G	Irrigation Engineering	1 — 0	0 — 0
8.64H	Hydro-Electric Engineering	0 — 0	1 — 0
8.64I	Engineering Administration	1 — 0	0 — 0
8.64J	Engineering Construction	2 — 0	0 — 0
8.84	Town and Country Planning	2 — 0	0 — 2
8.94	Properties of Materials	0 — 0	1 — 2
11.82A	Theory of Architecture	1 — 0	0 — 0
	Professional Elective A / Professional Elective B	Six hours per week for 3 terms consisting of 2 hours lecture and 4 hours laboratory, drawing office or tutorial.	
	Major Elective (Humanities)	3 — 0	3 — 0
		20 —10	15 —14

* Tutorial.

Note—A survey camp of one week's duration must be attended in the third week of third term.

Third Term.

The third term of fourth year is mainly devoted to directed laboratory and research work on Professional Elective Subjects, with special reading and study associated with the preparation of a thesis. Each student will also read a paper in a seminar session.

Professional Elective Subjects.

Throughout fourth year each student is required to pursue work adapted to his special interest and abilities by electing to take one of the following options. Within each option the student is required to select two subjects with the approval of the Head of the School. The work in these electives will be mainly carried out on the tutor system. Students may be instructed to attend certain lectures given by learned societies and other educational authorities during the year. The electives within each option are as follow:—

Option 1— *Civil Engineering Design.*

(*a*) Theory and Design of Structures.
(*b*) Soil Mechanics and Foundation Engineering.
(*c*) Hydrology.
(*d*) Hydraulics.
(*e*) Advanced Mathematics.
(*f*) Modern Foreign Language.

Option 2—*Civil Engineering Construction and Administration.*

(*a*) Construction Equipment and Methods.
(*b*) Geology.
(*c*) Management.
(*d*) Road Engineering.
(*e*) Public Health Engineering.

Option 3—*Surveys and Investigations.*

(*a*) Astronomy and Geodesy.
(*b*) Topographical Surveying, Aerial Surveying and Photogrammetry.
(*c*) Soil Mechanics.
(*d*) Hydrology.
(*e*) Hydraulics.
(*f*) Geology.

Option 4—*Materials.*

(*a*) Soil Mechanics.
(*b*) Concrete Technology.
(*c*) Advanced Mechanics of Materials.
(*d*) Photoelasticity and Experimental Stress Analysis.
(*e*) Advanced Mathematics.
(*f*) Modern Foreign Language.

COURSE VIIIB—CIVIL ENGINEERING.

This course provides students who are suitably employed during the day with the opportunity of obtaining the degree of Bachelor of Engineering by seven years of evening study.

The total content of the course is the same as that of the day course except that slightly less formal class time is provided in certain subjects in which the student's study is supplemented by his practical experience in industry.

FIRST YEAR.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.41D	Physics	1½— 1¾	1½— 1¾	1½— 1¾
2.111	Chemistry	2 — 1	2 — 1	2 — 1
5.11D	Engineering Drawing }	0 — 3*	0 — 3*	0 — 3*
5.41D	Descriptive Geometry† }			
8.11D	Engineering Mechanics	1 — 0	1 — 0	1 — 0
10.11	Mathematics, Part I	1½— ½*	1½— ½*	1½— ½*
		6 — 6¼	6 — 6¼	6 — 6¼

* Tutorial.

† First half year—Descriptive Geometry; Second half year—Engineering Drawing.

SECOND YEAR.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
4.912D	Materials Technology	1 — 1½	1 — 1½	1 — 1½
7.602	Geology	1 — 1	1 — 1	2 — 0
8.112D	Theory of Structures	1½— ¾*	1½— ¾*	0 — 0
10.11	Mathematics, Part II	1½— ½*	1½— ½*	1½— ½*
G10	English, Part I (Language)	1 — 0	1 — 0	1 — 0
G10	English, Part II (Literature)	1 — 0	0 — 0	0 — 0
G20B	History	0 — 0	1½— 0	1½— 0
		7 — 3¾	7½— 3¾	7 — 2

* Tutorial.

NOTE—Field excursions will be arranged on several Saturdays in connection with instruction in Geology.

Third Year.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
5.52	Fluid Mechanics	1 — ½-½*	1 — ½-½*	0 — 0
5.72D	Thermodynamics	1 — 1	1 — 1	0 — 2
8.122	Structures	1 — 1	1 — 1	1 — 1
8.43D	Surveying	1 — 0	1 — 0	1 — 0 (½term)
8.92	Properties of Materials ...	0 — 0	0 — 0	1 — 2
10.12	Mathematics, Part I ...	1 — ½*	1 — ½*	1 — ½*
G8	Philosophy	1½— 0	1½— 0	1½— 0
		6½— 3½	6½— 3½	4½-5½—5½

* Tutorial.

Note—Seven Saturdays (a total of 42 hours) will be devoted to Surveying field work. Third year students may apply to attend the survey camp of one week's duration to be held in the third week of third term in lieu of Saturday work.

Fourth Year.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
5.12D	Mechanical Engineering Design	0 — 2	0 — 2	0 — 0
8.113	Structures	1 — 1½	1 — 1½	1 — 1½
8.23D	Materials of Construction ...	1 — 1½	1 — 1½	1 — 1½
8.53	Fluid Mechanics	1 — 0	1 — 0	0 — 1½
8.63A	Engineering Construction ...	1 — 0	1 — 0	0 — 0
8.73D	Soil Mechanics	1 — 0	1 — 0	0 — 3
10.43	Mathematics	1 — 0	1 — 0	1 — 0(½term)
		6 — 5	6 — 5	2-3 — 7½

Fifth Year.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
6.83D	Electrical Engineering	1 — 1½	1 — 1½	1 — 1½
8.63B	Hydrology	1½— 0	0 — 0	0 — 0
8.64C	Public Health Engineering ...	0 — 0	1 — 0	1 — 0
8.64D	Road Engineering	0 — 0	1 — 0	1 — 0
8.64E	Railway Engineering	1 — 0	0 — 0	0 — 0
8.64F	Harbours and Rivers Engineering	1 — 0	0 — 0	0 — 0
8.64G	Irrigation Engineering	0 — 0	0 — 0	1 — 0
8.64H	Hydro-Electric Engineering	1 — 0	0 — 0	0 — 0
8.64I	Engineering Administration ...	0 — 0	1 — 0	0 — 0
8.84	Town and Country Planning ...	2 — 0	0 — 2	0 — 0
8.94	Properties of Materials	0 — 0	0 — 0	1 — 2
	Seminar	1 — 0	1 — 0	1 — 0
		8½— 1½	5 — 3½	6 —3½

SIXTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut
1.42D	Physics	1½— 1½	2½— 1½	2½— 1½
7.673	Engineering Geology	1 — 0	0 — 0	0 — 0
8.44D	Surveying	1½— 0	1½— 0	1½— 0
8.54	Applied Hydraulics	1½— 0	1 — 1*	1 — 0
10.12	Mathematics, Part II	1 — ½*	1 — ½*	1 — ½*
	Major Elective (Humanities) ...	2 — 0	2 — 0	2 — 0
		8½— 2	8 — 3	8 — 2

* Tutorial.

NOTE—Seven Saturdays (a total of 42 hours) will be devoted to Surveying field work. In addition, the survey camp of one week's duration to be held in the third week of third term must be attended.

SEVENTH YEAR.

(34 weeks part-time course.)

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
8.114	Structures	2 — 1½	2 — 1½	2 — 1½
8.33	Engineering Computations	1 — 0	1 — 0	1 — 0
8.64J	Engineering Construction.........	1 — 0	1 — 0	0 — 0
	Professional Elective A	1 — 2	1 — 2	1 — 2
	Professional Elective B	1 — 2	1 — 2	1 — 2
	Thesis	0 — 3	0 — 3	0 — 3
		6 — 8½	6 — 8½	5 — 8½

CONVERSION COURSE VIIIc—CIVIL ENGINEERING.

Holders of the diploma in Civil Engineering granted by the N.S.W. Department of Technical Education, who wish to proceed to the degree of Bachelor of Engineering may qualify upon satisfactory completion of the following conversion course.

First Year.

(34 weeks evening course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.42D	Physics	$1\frac{1}{2}$— $1\frac{1}{2}$	$2\frac{1}{2}$— $1\frac{1}{2}$	$2\frac{1}{2}$— $1\frac{1}{2}$
	† Conversion Theory of Structures	1 — 0	1 — 0	1 — 0
	Conversion Soil Mechanics	0 — 3	0 — 0	0 — 0
	Conversion Materials of Construction	0 — 0	0 — 2	0 — 2
10.12	Mathematics	3 — 0	3 — 0	3 — 0
	Conversion Humanities (English, History *or* Philosophy)	2 — 0	2 — 0	2 — 0
		$6\frac{1}{2}$–$7\frac{1}{2}$—$4\frac{1}{2}$	$7\frac{1}{2}$–$8\frac{1}{2}$—$3\frac{1}{2}$	$7\frac{1}{2}$–$8\frac{1}{2}$—$3\frac{1}{2}$

† This subject need only be taken by students who took Materials and Structures in their Diploma course, students who completed Materials I and II being exempt. Students may also be exempted on the basis of their performance in the subject of Engineering Design, provided such subject was taken under the revised syllabus (1947 and subsequently).

Second Year.

(34 weeks evening course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
	Engineering Computations	1 — 0	1 — 0	1 — 0
	Applied Hydraulics	1 — 0	1 — 0	1 — 0
	Railways, Irrigation and Harbours and Rivers	$1\frac{1}{2}$— 0	$1\frac{1}{2}$— 0	$1\frac{1}{2}$— 0
	Public Health Engineering and Hydrology*	$1\frac{1}{2}$— 0	$1\frac{1}{2}$— 0	$1\frac{1}{2}$— 0
	Road Engineering*	$1\frac{1}{2}$— 0	$1\frac{1}{2}$— 0	$1\frac{1}{2}$— 0
	Town Planning*	2 — 0	0 — 2	0 — 0
	Hydro-Electric Engineering	0 — 0	1 — 0	0 — 0
	Engineering Administration	1 — 0	0 — 0	0 — 0
10.43	Mathematics	1 — 0	1 — 0	1 — 0
	Conversion Humanities (Psychology, Economics *or* Government)	2 — 0	2 — 0	2 — 0
		9 — 0	9	8 — 0

* Students may be exempted from corresponding subjects completed in the diploma course. The total of hours shown is based upon 50 per cent. exemption. In addition to the above, students will be required to attend certain lectures and carry out certain assignments in 8.44 Surveying and 8.114 Structures.

THIRD YEAR.

(34 weeks evening course.)

	Hours per week.		
	Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
Properties of Materials	1 — 2	0 — 0	0 — 0
Elective A	1 — 2	1 — 2	1 — 2
Elective B	1 — 2	1 — 2	1 — 2
Thesis	0 — 3	0 — 3	0 — 3
	3 — 9	2 — 7	2 — 7

NOTE—Students who have completed the first year of the evening conversion course may attend for 34 weeks full-time in the following year and complete in one year of day study the work of the second and third years of the evening conversion course.

GRADUATE COURSES.

The School of Civil Engineering proposes to offer in 1956 a number of graduate courses in individual topics.

The courses are designed for qualified Civil Engineers desiring instruction beyond the level of the Bachelor's degree in one or more fields of study. Completion of such courses may constitute partial fulfilment of requirements for an advanced degree of this University.

The proposed courses are listed below. Further details can be obtained from the Professor of Civil Engineering.

8.115 Structural Analysis.
8.116 Structural Computation.
8.117 Use of Models in Structural Analysis.
8.118 Analysis of Concrete Shell Roofs.
8.119 Prestressed Concrete Design.
8.215 Concrete Technology.
8.415 Advanced Surveying, Astronomy and Geodesy.
8.416 Photogrammetry.
8.515 Hydrodynamics.
8.516 Advanced Hydraulics.
8.517 Hydraulic Design.
8.518 Hydro-Electric Engineering.
8.519 Hydrology
8.915 Experimental Stress Analysis.
8.916 Advanced Mechanics of Materials.

SCHOOL OF WOOL TECHNOLOGY.

To meet a potential threat from cheaply produced man-made fibres, wool producers, by the implementation of the Wool Use Promotion Act of 1945 and subsequent legislation, have taken decisive action to change from the empirical development of Australia's pastoral resources. A programme of planned improvement of efficiency through research, increased extension services, and adequate publicity for wool is already under way. The full development of this plan will require specialist personnel trained to give service to the pastoral industry.

In the past, research workers, teachers, extension workers, agricultural journalists, valuers, managers of estates and other professional workers for the pastoral industry, have been in part drawn from university courses in traditional subjects such as Pure Science, Engineering, Agriculture and Veterinary Science. More often, their training has been at Diploma and Certificate level in agricultural and technical colleges without matriculation standard of entry. In far too many cases senior workers have had no opportunity for tertiary education, and their knowledge, usually highly specialised, comes from long practical experience and from personal contacts in the industry. This is especially true in the field of wool commerce, where men aspiring to the highest positions in wool broking and wool buying must get a substantial part of their training outside of formal instruction, or spend a year or more in an overseas wool centre such as Bradford, Leeds or Boston.

The course aims to provide a pool of graduates in whom has been inculcated a liberal scientific outlook, and the habit of exact and logical thought. These men will be familiar with the latest developments in fields relating to wool production, wool commerce, and wool utilisation. They will also be good practical wool men, capable of handling wool and recognising its technical characteristics, through facility in the use of subjective appraisal on which the whole wool trade is based. A report prepared by an expert of the Australian Wool Realisation Commission has emphasised the lack of sufficient liaison between experts in wool growing, the selling of wool and wool manufacture, and personnel of scientific organisations. One broad aim of this course is to link producers, buyers and users of wool. Trainees, for example, will be given opportunity, on machines of the Textile Department, of following particular lots of wool through all processing operations, and observing for themselves the effect in manufacture of characteristics apparent in the raw material.

The course consists of four years full-time study, but the second and third years each provide for a period of approximately six months approved work in the industry to gain practical experience.

The first year of the course consists of a basic training in general science; vocational subjects essential to all branches of the wool industry are given in the second and third years, and in the final year provision is made for students who wish to specialise in either wool production or wool commerce. The fourth year work will include a project which will give each student opportunity to express initiative and originality. By association with lecturers and teachers who are engaged in research already under way in this School, we aim to provoke both curiosity and interest in students who will themselves spend effort in contributing to the advance of efficiency. The greater part of the first and second year work will be common to the degree in Textile Technology when this is established.

Requirements for Industrial Training.

Each student is required to complete satisfactorily twelve months' practical work on approved sheep properties. The twelve months need not necessarily be consecutive, and in the case of a student who has done practical work before entering the course this may be taken into consideration in determining any further time required.

In order to obtain recognition of practical work carried out, students shall:—

1. Make application for the approval of the properties where they intend to carry out the required practical work, such application to contain a brief description of the property and to be in the hands of the Head of the School at the earliest possible date. Students should endeavour to obtain experience on extensive, marginal and intensive properties.

2. At the conclusion of the work, produce certificates from employers stating periods of employment and reporting on the quality of the student's work.

3. Supply reports as hereunder:

(i) On work carried out in the long vacation—

(*a*) Monthly interim reports setting out briefly the nature of work engaged in, with any notes of topical interest. The first interim report shall include a description of the property, including details of farm buildings, dip and yards, plant and equipment, stock numbers (in age and sex groups), and such features as water supplies, improved pastures, crops, etc. A sketch plan of the property should also be included.

(*b*) A final report to be submitted within a month of resumption of lectures. The final report should embody a report on a district basis in general and the property on which the student has worked in particular. The development of farming practices, the salient features of management in relation to the environment, pasturage, rainfall and distribution, water supplies, types of stock and breeding policies, statistics, etc., should receive consideration. The size and capacity of the farm buildings should be given particular note, and sketch plans with the principal measurements will be of value. Photographs will also be of value in illustrating features. Where applicable, details of pasture mixtures, rate of sowing for crops and manurial treatment should be recorded, as should also labour performances (both manual and with machines) and costs.

(ii) On work carried out in short vacations—A brief report to be submitted within one week of the resumption of the term.

(iii) By students who carry out twelve consecutive months on a property or properties—

(*a*) Interim reports to be submitted every two months.

(*b*) Final reports to be submitted by 31st March in the year of resumption of studies. The nature of the interim and final reports shall be as required for work carried out in the long vacation.

NOTE: Students will find that a loose-leaf notebook suitably indexed will be of great value for recording factual material, costs, material requirements for various jobs, etc.

Students are also encouraged to submit questions relating to any problems they may meet with in the course of their practical work.

COURSE IX—WOOL TECHNOLOGY.

FIRST YEAR.

(34 weeks day course.)

		Hours per week. Terms 1 and 2 lec. lab./tut.	Term 3 lec. lab./tut.
1.91	Physics	2 — 2	0 — 0
2.41B	General Chemistry	3 — 6	3 — 6
2.911	Biology	2 — 3	2 — 3
2.91	Biochemistry	0 — 0	2 — 4
10.91	Mathematics	4 — 2*	2 — 2*
G10	English	2 — 0	0 — 0
G20.1	History	1 — 0	0 — 0
		14 —13	9 —15

* Tutorial.

SECOND YEAR.

(24 weeks day course.)

		Hours per week. Terms 1 and 2 lec. lab./tut.	
2.912	Biology (Physiology)	2 — 3	
2.92	Biochemistry	2 — 3	
9.12	Livestock Production I	3 — 0	
9.22	Agronomy	3 — 0	
9.42	General Textiles (Yarns)	1 — 2	
9.52	Wool	1 — 6	
10.92	Mathematics	1 — 1*	
G20.2	History	2 — 0	(Term 1)
G1	Logic	2 — 0	(Term 2)
		15 —15	

* Tutorial.

21 weeks for remainder of year to be spent in activites concerned with wool production.

THIRD YEAR.

(24 weeks day course.)

		Hours per week. Terms 1 and 2 lec. lab./tut.	
2.913	Physiology	2 — 3	
9.13	Livestock Production IIa	3 — 0	
9.13	Livestock Production IIb	3 — 0	
9.33	Economics	2 — 0	
9.43	General Textiles (Fabrics)	1 — 3	
9.53	Wool	0 — 9	
G2	Philosophy	2 — 0	(Term 1)
	Minor Elective (Humanities)	2 — 0	(Term 2)
		13 —15	

21 weeks for remainder of year to be spent in activities concerned with wool production.

Fourth Year.

(34 weeks day course.)

		Hours per week. Terms 1, 2 and 3 lec. lab./tut.	
9.74	Fibre Science	2 — 2	
9.84	Project	0 — 5	
	Major Elective (Humanities)	3 — 0	(Terms 1 and 2
		2-5 — 7	

Plus elective subjects of either Option I or Option II.

Option I.—Wool Production.

9.94	Genetics	2 — 1
9.104	Nutrition	3 — 2
9.124	Farm Management and Mechanisation	3 — 0
9.14	Livestock Production III	2 — 0
9.24	Pastoral Agronomy	2 — 2
		12 — 5

Option II.—Wool Commerce.

9.134	Introductory Accounting	2
9.144	Commercial Law	1½
9.154	Synthetic Fibres	1
9.34	Banking, Currency, Foreign Exchange	1½
9.44	Yarn Manufacture (Wool)	6
9.54	Wool	5
		17

SCHOOL OF ARCHITECTURE AND BUILDING.

The architect is occupying an increasingly important position in the development of Australia. His contribution to society is primarily that of a planner; it includes understanding of the building needs of communities and individuals, skill in the effective and orderly disposition of interior space and communication, and the design of economic and durable structures. In this he is concerned with research into functional needs and the best methods of construction. His main work as an artist is to fuse functional planning and scientific structure into an aesthetic unity which gives lasting pleasure. In architecture, science and art are one: they are absolutely inter-dependent and complementary. These ideas have been kept in mind in planning the syllabus of work.

The special feature of this course is that the three main essentials—architecture as an art, architecture as a science, and architecture as a practical profession—are all given prominence.

The early stages provide a fundamental training in the basic sciences underlying building technology. This is a feature of the course which is most important for modern architects who are called upon to use new materials and new building methods and express new ideas in the present scientific age. Instruction in the principles of chemistry and physics as they affect the architect is included as a foundation to the studies in building science. All students receive and undertake a certain amount of theoretical and practical training in the building trades and crafts. A further feature of the course is a basic training in modern structures—with the relevant amount of mathematics—followed by further optional study in advanced structures in the later years for those students who wish to concentrate more on structural design in steel and reinforced concrete.

Concurrently with these scientific and structural subjects, the aesthetic sensibilities and creative abilities of the student are developed from the beginning with visual design and colour (included in Architectural Studies and Design) and later with more advanced work on architectural design and construction, civic design, etc.

Further, two principles established by the University of Technology as relating to all courses have been applied, viz., that practical experience in employment of a planned nature is to be a feature of all courses, and secondly that social and cultural needs must be catered for if a professional man is to take his rightful place in the community. Practical employment is included during the third term of first year, and throughout all the subsequent years, and before the degree is conferred the student must provide evidence of at least four years' approved practical experience. The lectures in the Humanities and the Fine Arts are also an integral part of the course.

COURSE XI—ARCHITECTURE.

The course in Architecture was revised as from 1952, and the revised course as set out below replaced the original course year by year commencing with the first year in 1952. Details of the original course may be found in the 1951 Calendar.

First Year.

(24 weeks full-time course covering first and second terms and 10 weeks part-time course of two half days and two or three evenings per week covering third term.)

		Hours per week. Term 1 Lect. Pract.	Term 2 Lect. Pract.	Term 3 Lect. Pract.
11.81	A series of lectures by the Professor of Architecture entitled "Introduction to Architecture and Building."			
1.91	Physics	2 — 2	2 — 2	0 — 0
10.51	Mathematics	2 — 0	2 — 0	0 — 0
11.101	Theory of Structures I	1 — 0	1 — 0	1 — 0
11.11	Descriptive Geometry	0 — 2	0 — 2	0 — 2
11.21	Freehand Drawing and Presentation I	0 — 5½	0 — 5½	0 — 2½
11.31	Architectural Studies and Design I	0 — 1½	0 — 0	0 — 1½
11.41	History of Architecture I	1 — 0	1 — 0	1 — 0
11.61	Building Trades and Crafts (Equiv. time)	0 — 1½	1 — 1½	0 — 1½
11.71	Building Construction I	1 — 4	1 — 3	1 — 2
11.91	Building Science	2 — 2	2 — 2	0 — 0
G10	English	2 — 0	2 — 0	0 — 0
G20.1	History	1 — 0	1 — 0	0 — 0
		12 — 18½	13 — 16	3 — 9½

For the subject 11.61 Building Trades and Crafts, groups of students will be formed, studying for the equivalent time stated.

Second Year.

(34 weeks part-time course over three terms requiring attendance for two half days or one full day and three evenings per week.)

		Hours per week. Term 1 Lect. Pract.	Term 2 Lect. Pract.	Term 3 Lect. Pract.
8.22	Materials of Construction (Equivalent time)	0 — 1	1 — 1	1 — 3
8.42	Land Surveying (Equiv. time)	1 — 0	0 — 1	0 — 1
11.102	Theory of Structures II	1 — 0	1 — 0	1 — 0
11.22	Freehand Drawing and Presentation II	0 — 2½	0 — 2½	0 — 2½
11.32	Architectural Studies and Design II	½— 1	½— 1	½— 1
11.42	History of Architecture II	1 — 0	1 — 0	1 — 0
11.52	Building Science	1 — 0	0 — 0	0 — 0
11.72	Building Construction II	1 — 1	1 — 2	1 — 2
11.82	Theory of Architecture A	1 — 0	1 — 0	1 — 0
G1	Logic	0 — 0	2 — 0	0 — 0
G20.2	History	2 — 0	0 — 0	0 — 0
		8½— 5½	7½— 7½	5½— 9½

For the subject 8.42 Land Surveying, groups of students will be formed, studying for 12 hours theory in the school and 24 hours practical outdoor on Saturday mornings. Time stated is equivalent time per week.

Third Year.

(34 weeks part-time course requiring attendance for two half days or one full day and three evenings per week.)

		Term 1 Lect. Pract.	Term 2 Lect. Pract.	Term 3 Lect. Pract.
7.703	Geology	1 — 0	1 — 0	0 — 4
11.103	Theory of Structures III	1 — 0	1 — 0	1 — 0
11.203	Building Services and Equipment A	1 — 0	1 — 0	1 — 0
11.43	History of Architecture III	1 — 0	1 — 0	1 — 0
11.73	Building Construction III	1 — 1	1 — 1	1 — 1
11.83	Theory of Architecture B	1 — 0	1 — 0	1 — 0
11.93	Architectural Design and Construction A	0 — 5	0 — 5	0 — 5
G2	Philosophy	2 — 0	0 — 0	0 — 0
G60	Painting, Sculpture and Allied Arts	1 — 0	1 — 0	0 — 0
		9 — 6	7 — 6	5 —10

Fourth Year.

(34 weeks part-time course requiring attendance for one half day and three evenings per week in terms 1 and 2 and three evenings per week in term 3.)

		Hours per week.		
		Term 1 Lect. Pract.	Term 2 Lect. Pract.	Term 3 Lect. Pract.
11.104	Structures A	1 — 0	1 — 0	1 — 0
11.164	Acoustics and Sound Insulation	1 — 0	0 — 0	0 — 0
11.204	Building Services and Equipment B	2 — 0	2 — 0	2 — 0
11.94	Architectural Design and Construction B	0 — 3	0 — 3	0 — 3
	Major Elective (Humanities) ...	3 — 0	3 — 0	0 — 0
		7 — 3	6 — 3	3 — 3

Fifth Year.

(34 weeks part-time course requiring attendance for three evenings per week.)

		Hours per week.		
		Term 1 Lect. Pract.	Term 2 Lect. Pract.	Term 3 Lect. Pract.
11.105	Structures B .... *or*	1 — 1	1 — 1	1 — 1
11.115	Planning Research			
11.125	Professional Practice	1 — 0	1 — 0	1 — 0
11.135	Specifications	1 — 0	1 — 0	1 — 0
11.145	Building Research Review ...	0 — 0	1 — 0	0 — 0
11.215	Estimating	1 — 0	1 — 0	1 — 0
11.95	Architectural Design and Construction C	0 — 3	0 — 3	0 — 3
		4 — 4	5 — 4	4 — 4

Sixth Year.

(34 weeks course requiring attendance for twelve weeks full-time for one term, and part-time attendance for two evenings for two terms. The hours given are for regular attendance at the school, and do not give the total hours involved on the research or design projects.)

		Hours per week. Term 1 Lect. Pract.	Term 2 Lect. Pract.	Term 3 Lect. Pract.
11.126	Professional Practice (Advanced)	0 — 0	0 — 0	2 — 0
11.176	Architectural Science and Research Thesis	1 —24	0 — 0	0 — 0
11.186	Civic Architecture	0 — 0	0 — 3	0 — 0
11.196	Town Planning	2 — 0	0 — 2	0 — 0
11.96	Architectural Design and Construction D	0 — 3	0 — 0	0 — 0
		3 —27	0 — 5	2 — 0

CONVERSION COURSE XIc—ARCHITECTURE.

Holders of the diploma in Architecture are required to complete the following additional work in order to qualify for the degree of Bachelor of Architecture.

	Hours per week.	
1. Conversion Humanities— English, History *or* Philosophy..............	2	
and		
Psychology, Economics *or* Government......	2	
2. 11.176 Architectural Science and Research Thesis*	24	(Term 1)
3. Any two of the following :—		
1.91 Physics	4	(Terms 1 and 2)
2.131 Chemistry	4	(Terms 1 and 2)
10.51 Mathematics	2	(Terms 1 and 2)
8.22 Materials of Construction	2	
7.502 Geology	1	(Terms 1 and 2)
	4	(Term 3)

* In special circumstances a student may apply to complete this subject by part-time study over three terms. The holder of a diploma with Credit or Honours of three or more years' standing may apply to be exempted from this subject, provided that—

(*a*) he gained a Credit or Distinction for the research or design thesis in the diploma course;

(*b*) he provides evidence to the Faculty that in his professional career he has pursued some aspect of study in Architectural Science and Research which, together with the diploma thesis, is regarded as equivalent to the subject of 11.176 Architectural Science and Research thesis.

SCHOOL OF APPLIED PSYCHOLOGY.

It has become a platitude that modern civilisation can command the technical power to produce all that is needed to destroy hunger, want, and fear, but it has failed to develop the social organisation and skills needed to use this power satisfyingly and effectively. There is a lag in knowledge of how to create and control a social structure which can maintain stability and its highest values whilst adapting its form to the ceaseless advance of material invention. To make an industrial society work, we must understand its human as well as technical aspects. Applied Psychology is one of the technologies concerned with such a study of human behaviour. It seeks principles to explain, understand and predict human action. It deals with practical situations but it is based on, and makes its own contributions to, a solid theoretical framework which it shares with academic psychology. It is thus both a technology and a social science.

There are increasing demands for professional psychologists in the fields of industrial psychology, personnel management, "human" engineering (the design of machines and processes allowing for the qualities of the human operator), educational and vocational guidance, clinical psychology, child development, selection and placement in the Armed Services, and teaching and research.

The first two years of the course are aimed at giving the student a firm background of psychological theory, such other sciences as he will need in further studies (i.e., Mathematics, Biology and Physics) and a leavening of arts subjects such as English, History and Philosophy. In the third year, the subjects are basic to the courses included in the fourth and fifth years in which the student specialises in either Industrial Psychology or Counselling.

The elective in Industrial Psychology is intended to meet the demand for students who will engage in personnel work in industry. It involves a study of the individual worker and the organisations in which he works. It is concerned with the study of job success and failure, job satisfaction and dissatisfaction, industrial motivation, employer-employee relations, acquisition of job skill, conditions affecting job efficiency and the like. These will be the subject of both theory and practical work.

The elective in Counselling provides training for people engaged in counselling activities, employed in business and industry, guidance bureaux, colleges and universities. The main emphasis is on counselling principles and techniques. Lectures are also given in individual assessment, occupational information, professional relations, and the counsellor and society. Again, practical work requirements must be fulfilled.

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The courses will be part-time, of five years' duration and lead to the degree of Bachelor of Science in Psychology. Lectures will be held in the evenings for 10-12 hours per week. Students wishing to qualify for an Honours degree are required to take an extra year's study.

COURSE XII—APPLIED PSYCHOLOGY.

First Year.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
10.91	Mathematics I (by special arrangement more advanced Mathematics may be substituted)	3 — 0	3 — 0	3 — 0
12.01	Psychology I	2 — 1	2 — 1	3 — 0
G13c	English	2 — 0	2 — 0	2 — 0
		7 — 1	7 — 1	8 — 0

Second Year.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
	General Biology (by special arrangement Physics I or advanced Mathematics may be substituted)	2 — 4	2 — 4	2 — 4
12.02	Psychology II	2 — 2	2 — 2	2 — 2
G22	History	2 — 0	2 — 0	2 — 0
		6 — 6	6 — 6	6 — 6

Third Year.

(34 weeks part-time course.)

		Hours per week. Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
12.03	Psychology III	3 — 1	3 — 1	3 — 1
12.10	Psychological Assessment I......	1 — 2	1 — 2	1 — 2
G7c	Philosophy	2 — 0	2 — 0	2 — 0
	Organisation of Australian Industry	1 — 0	1 — 0	1 — 0
		7 — 3	7 — 3	7 — 3

Fourth Year.

(34 weeks part-time course.)

Industrial Course Elective.

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
12.20	Psychology IV (Social)	3 — 0	3 — 0	3 — 0
12.30	Industrial Psychology	2 — 0	2 — 0	2 — 0
12.11	Psychological Assessment II (Industry)	1 — 2	1 — 2	1 — 2
	Industrial and Labour Relations	3 — 0	3 — 0	3 — 0
		9 — 2	9 — 2	9 — 2

Counselling Course Elective.

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
12.20	Psychology IV (Social)	3 — 0	3 — 0	3 — 0
12.70	Psychology IVb (Principles of Counselling)	2 — 2	2 — 2	2 — 2
12.11A	Psychological Assessment IIa (Counselling)	1 — 2	1 — 2	1 — 2
		6 — 4	6 — 4	6 — 4

Fifth Year.

(34 weeks part-time course.)

Industrial Course Elective.

		Hours per week.		
		Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
12.21	Psychology V (Applied Social)...	2 — 2	2 — 2	2 — 2
12.40	Personnel Techniques (including Field Work)	1 — 3	1 — 3	1 — 3
12.50	Research Seminar.....................	1 — 0	1 — 0	1 — 0
		4 — 5	4 — 5	4 — 5

Counselling Course Elective.

	Hours per week.		
	Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
12.40A Psychology Vb (Counselling Techniques including Field Work)	2 — 4	2 — 4	2 — 4
12.43 Professional Relations	1 — 0	1 — 0	1 — 0
12.44 Occupational Information	1 — 0	1 — 0	1 — 0
12.50 Research Seminar	1 — 0	1 — 0	1 — 0
	5 — 4	5 — 4	5 — 4

Sixth Year (Honours).

(34 weeks part-time course.)

(*Industrial or Counselling.*)

	Hours per week.		
	Term 1 lec. lab./tut.	Term 2 lec. lab./tut.	Term 3 lec. lab./tut.
12.31 Psychology VI—Current Issues in Applied Psychology	3 — 0	3 — 0	3 — 0
12.60 History of Psychology	1 — 0	1 — 0	1 — 0
12.51 Research Seminar	1 — 0	1 — 0	1 — 0
	5 — 0	5 — 0	5 — 0

SCHOOL OF TEXTILE TECHNOLOGY.

There is a demand in many branches of the textile industry and in establishments engaged in textile research for trained textile scientists and technologists. Both in industry and in research there is a growing need for students who have acquired a basic training in the fundamental sciences and a comprehensive knowledge of the manufacture and properties of textile products. In order to fulfil this need, courses leading to the degree of Bachelor of Science (Pass or Honours) in Textile Technology are in preparation, and will commence in February, 1957. In addition, there will be opportunities for graduates in science and engineering to undertake fundamental and applied research in the textile field leading to the award of higher degrees.

FACULTY OF COMMERCE.

The Council of the University has approved of the establishment of a Faculty of Commerce to provide courses leading to the degree of Bachelor of Commerce (B.Com.) in the fields of General Commerce, Accountancy, and Wool Commerce.

Plans are now being made for the introduction in 1957 of the undergraduate courses in Commerce. The courses are designed to provide facilities for higher specialized instruction and advanced training in the various fields of Commerce, as well as aiding by research and other suitable means the advancement and development of particular branches in these fields.

The basis of the teaching and research in the Faculty will be economic theory and the three fields of specialization will be built upon a firm foundation of this nature, whilst retaining the practical and applied interest characteristic of the University. Briefly, the content of the proposed courses will be as follows:—

1. *General Commerce.*—This course will have economics as the basic theoretical subject, together with courses in introductory accounting, business finance, management, control in industry and commerce, production and marketing, commercial law, and personnel and industrial relations.

2. *Accountancy.*—This course, for those specializing in accounancy, is intended to meet the demand for studies that will both equip a student to obtain a professional qualification and introduce him to other studies such as finance, management, economic development, production and marketing, personnel and industrial relations, which will give him the broader and more liberal attitude nécessary in the financial executive.

3. *Wool Commerce.*—This course will bring the theory and practice of economics to bear on problems associated with the wool industry. A graduate will have sufficient grounding in wool technology to ensure his acceptance by the trade, and at the same time sufficient grounding in the principles underlying the production, use, and international marketing of wool.

The research envisaged will cover most important fields at present largely untouched in Australia. Examples of these are the economic bases of the heavy industries; history and organization of business, government departments, and public authorities; the economic policy of governments with regard to such matters as communications, tariffs and public finance; wool marketing, the rationale of wool classing, social accounting, reconciliation of economic and accounting concepts.

FACULTY OF HUMANITIES AND SOCIAL SCIENCES.

1.—SCHOOL OF HUMANITIES AND SOCIAL SCIENCES.

All undergraduates of the University must take several courses in the fields of Humanities and Social Sciences. Courses in English, History and Philosophy are required to be taken by all undergraduates; in addition, there is offered a range of elective subjects which includes those just mentioned, together with Government, Economics and Psychology. Progression by undergraduates from year to year of their courses, and the final award of a degree, depends upon successful completion of the subjects prescribed in this field.

The detailed requirements for students in the several Schools are set out hereunder; fuller descriptions of the several courses will be found on page 323 and the succeeding pages. The programme in the different years of the respective courses is as follows:—

Group A—Day Degree Courses.

(i) *Applied Physics; Engineering (Mechanical, Electrical, Mining Civil); Applied Geology; Wool Technology; Architecture.*

		Hours per week. Term 1.	Term 2.	Term 3.
	First Year.			
G10	English	2	2	0
G20.1	History	1	1	0
	Second Year.			
G20.2	History	2	0	0
G1	Logic	0	2	0
	Third Year.			
G2	Philosophy	2	0	0
	Minor Elective*	0	2	0
	Fourth Year.			
	Major Elective	3	3	0

(ii) *Applied Chemistry; Chemical Engineering; Food Technology; Metallurgy.*

		Hours per week. Term 1.	Term 2.	Term 3.
	First Year.			
G10	English	2	2	0
G20	History	1	1	2
	Second Year.			
G1	Logic	0	2	0
G2	Philosophy	0	0	2
	Third Year.			
	Minor Elective	1	1	0
	Fourth Year.			
	Major Elective	3	3	0

* In the third year of Course XI Architecture, G60 Painting, Sculpture and Allied Art is taken in lieu of Humanities Minor Elective.

(iii) *General Science.*

		Hours per week. Term 1.	Term 2.	Term 3.
	FIRST YEAR.			
G10	English	2	2	0
G20	History	1	1	2
	SECOND YEAR.			
G1	Logic	2	0	0
G2	Philosophy	0	1	1
	Minor Elective	0	1	1
	THIRD YEAR.			
	Major Elective	3	3	0

GROUP B—PART-TIME COURSES.

(i) *Faculty of Science*—

Students (*except* those in Applied Psychology or General Science) will take Humanities in the final, or final two stages of a part-time course; *two* courses of three hours per week for three terms, *one* to be chosen from the following subjects:—

English, History, Philosophy;

and *one* from—

Economics, Psychology, Government.

Students in Applied Psychology will take the following Humanities subjects:—

G13C English.
G22 History.
G7C Philosophy.

Students in General Science will take the Humanities subjects shown hereunder in the following order:—

G10 English.
G20 History.
G1 Logic.
G2 Philosophy.

One Minor Elective and one Major Elective from English, History, Philosophy, Economies, Psychology, Government.

(ii) *Faculty of Engineering*—

Students will take *four* courses of Humanities in a part-time course in engineering. The pattern varies somewhat between Schools, but all the Schools will take the courses in the following order:

G10 English.
G20B History.
G8 Philosophy.

One Major Elective from English, History, Philosophy, Economics, Psychology, Government.

Group C—Conversion Courses.

Students must take *two* courses, *one* to be chosen from the following three:—

		Hours per week. Term 1.	Term 2.	Term 3.
G7c	Philosophy	2	2	2
G13c	English	2	2	2
G22c	History	2	2	2

and *one* to be chosen from the following three:—

		Term 1.	Term 2.	Term 3.
G31c	Government	2	2	2
G42c	Psychology	2	2	2
G51c	Economics	2	2	2

The two courses chosen may be taken concurrently or in different years.

Humanities Elective Subjects.

The full range of Minor Electives is:—

G3	Philosophy of Science.	G21.4	History.
G11	English.	G30	Government.
G21.1	History.	G40	Psychology.
G21.2	History.	G41	Psychology.
G21.3	History.	G50	Economics.

The full range of Major Electives is:—

G6	Philosophy.	G31	Government.
G12	English.	G42	Psychology.
G22	History.	G51	Economics.

2.—DEPARTMENT OF ARTS, NEWCASTLE.

Arts courses leading to the degree of Bachelor of Arts of the University of New England are offered at Newcastle University College. The courses are given by the Department of Arts of the Faculty of Humanities and Social Sciences, in conjunction with the University of New England.

A degree of Bachelor of Arts (B.A.) is awarded in two grades (Pass and Honours) and what is required of Honours students differs substantially after the first year from what is required of Pass students. The option to undertake a Pass or an Honours course is exercised by the student generally at the beginning of the second academic year. The present regulations require that to secure a Pass B.A. students must have to their credit nine "qualifying courses" obtained in not less than three years; to secure a B.A. with Honours students are required to qualify in eight courses normally taken over a four-year period. A "qualifying course" is a course in which a student has passed and which meets certain requirements regarding "groups" and "sequences". Attendance at lectures is compulsory and satisfactory completion of class work (essays, exercises, etc.), is a pre-requisite for candidature at the annual examinations.

Selection of Courses.

In 1956 the following courses preparatory to a degree in Arts will be offered at Newcastle if students are forthcoming:—

Group I.

Language and Literature.

English I, II and III.
French I, II and III.
German I, II and III.
Latin I and II.
Greek I.

Elementary courses in German and in Greek may also be offered if suitably qualified students are forthcoming. These courses only count as "qualifying courses" for degrees if in each case they form the first of a sequence of three.

Group II.

Historical, Mental and Social Sciences.

History I, II and III.
Philosophy I, II and III.
Psychology I, II and III.
Economics I, II and III.
Education I and II.

Group III.

Mathematics I, II and III.
Geography I, II and III.

To qualify for a degree, courses must be chosen from at least two of the three groups and the nine courses selected by a Pass candidate must include:—

(i) A sequence of three courses in each of three subjects; *or*

(ii) a sequence of three courses in each of two subjects, a sequence of two courses in a third subject and one single course; *or*

(iii) a sequence of three courses in one subject and a sequence of two courses in each of three others.

Candidates are not permitted to take the courses in Education until they have completed two other qualifying courses including either Philosophy I or Psychology I. Education I may be counted as the second of a sequence of two courses of which the first is either Philosophy I or Psychology I.

Graduates in other Faculties who desire to obtain the degree of Bachelor of Arts (either Pass or Honours) must complete at least seven courses in Arts chosen in accordance with the regulations after special approval has been granted in each individual case.

Candidates desiring to graduate with Honours are subject to slightly different regulations as to the choice of the eight qualifying courses, which are to be taken in a minimum period of four years.

The by-laws regarding graduation in Arts, whether at Pass or Honours level, are determined by the University of New England, and any changes or final decisions in matters of interpretation are the prerogative of the New England authorities.

The Annual Examinations (both Pass and Honours) are held in Newcastle during November and December each year. Notice of intention to sit must be given on the prescribed form and accompanied by the examination fee of £3 during the month of July.

DESCRIPTION OF SUBJECTS OF INSTRUCTION.

The description of subjects given below is meant to indicate the nature of the work dealt with in the individual subjects comprising the various courses.

The list as given below is subject to change without notice.

PHYSICS.

Subjects 1.00 to 1.92
and Physics (General Science).

The scope of instruction in Physics given in various courses is summarised in the table below. The various numbered subjects appearing in the curricula of these courses comprise sections or groups of sections as indicated in the table. The topics covered in these sections are set out following the table.

Subject Designation	Comprises sections—	Appears in Course(s)—
1.11	ABCF	I, II, III, IIIA, IV.
1.11 Part I	A	IIB1, IIB3, IIB4, IIIB1, IIIB2, IIIB3, IVB.
1.11 Part II	BCF	
1.12	DEGH	I.
1.12A	CDEF*	VI.
1.13	I	I.
1.14	J	I.
1.41	AB	V, VI, VII, VIIA, VIII.
1.42	DEF	
1.41D	A	VB, VIB, VIIB, VIIIB.
1.42D	BDEF	VB, VC, VIB, VIC2, VIIB, VIIIB, VIIIC.
1.91	N	IX, XI.
1.92	DEG	II, IIB1, III, IIIB1, IIIB2, IV, IVB, IVC1.
Physics I (General Science)	ABCF	IIS.
Physics I Part I	A	IISB.
Physics I Part II	BCF	
Physics II (General Science)	DEGHK	IIS.
Physics II Part I	DEGH	IISB.
Physics II Part II	K	
Physics III (General Science)	LM	IIS.
Physics III Part I	L	IISB.
Physics III Part II	M	

* Additional lectures on Atomic and Nuclear Physics are given in 1.12A as compared with other subjects where Section F is specified.

Section A.

Mechanics.

Kinematics. Vectors. Projectiles. Newton's laws. Power. Pressure. Flotation. Friction. Simple harmonic motion. Composition of S.H.M.'s. Lissajous' figures. Motion about a fixed axis. Pendulums. Gravitation. Motion in circular orbit.

Light

Huyghens' principle. Reflection and refraction. Minimum deviation. Thin lenses. Spherical mirrors. Combination of lenses in contact. The eye, telescopes, microscope. Photometry. Interference and diffraction. Velocity of light. Dispersion. Spectral lines from Bohr atom. Photoelectric effect, electrons, X-rays.

Heat

Universal gas law, $PV = \frac{1}{3} mnC^2$. Avogadro's law. Equipartition of energy. Vapour pressure, hygrometry. Conduction, convection and radiation. Prevost's theory of exchanges. Stefan's T^4 law. Properties of materials at high and at very low temperatures. Experimental methods in heat and thermometry.

Electricity and magetism.

Electrostatics. The nuclear atom. Capacity. Magnetism. Magnetometry. Terrestrial magnetism. Magnetic field of current element. Field on axis of circular coil. Mechanical force between currents, and charges-in-motion. Moving-coil galvanometers, motors. Cathode rays. Electric discharge phenomena.

Section B.

Electricity and magetism.

Faraday's laws of electrolysis. Primary and secondary cells. Power in D.C. circuits. D.C. circuits, measurements. Resistivity, resistance thermometer. Faraday's, Lenz's laws of E.M. induction. Self and mutual inductance. Eddy currents. Simple circuits with resistance and inductance or capacity. Free oscillation of L-R-C circuit.

Wave motion and sound.

Equation of plane wave. Stationary waves, nodes. Velocity of wave in string and rod. Energy current. Resonance. Phons and decibels. Doppler effect.

SECTION C.

Properties of matter.

Stress-strain curves. Young's modulus, Poisson's ratio, strain energy. Modulus of rigidity, torsion of cylinder. Bending of beams. Isothermal and adiabatic bulk moduli of a gas. Laminar and turbulent flow. Viscosity, temperature dependence. Poiseuille's law. Stokes' law. Molecular theory of surface tension. Pressure difference across curved surface. Measurement of surface tension.

SECTION D.

Light and radiant heat.

Interference of two light-beams. Visibility of fringes. Interference in thin films. Interferometry. Diffraction by slit. Diffraction grating, resolving power and dispersion. Polarisation by reflection. Double refraction, Nicol prism, polaroid, quarter-wave plate. Circular and elliptic polarisation. Strain birefringence, optical rotation, polarimeter. The black body and its spectral energy distribution. Wien's displacement law, introduction to Planck's law. Radiation pyrometers. Infra-red spectrometers, chopping technique.

SECTION E.

Electricity and magnetism.

Intensity of magnetisation, $B = \mu H + I$. Para- and diamagnetism, Curie's law. Ferromagnetism, domain model, B-H curves, survey of materials. Hysteresis, measurements. Magnetic field of straight conductor and of solenoid. Self and mutual inductances of solenoids. Kelvin ampere balance. Magnetic circuit, M.M.F., reluctance. Ballistic galvanometer and fluxmeter. Kirchhoff's laws. Superposition, Δ -Y, Thevenin's theorem, maximum power theorems. Steady-state A.C. circuit, impedance, reactance. Resonance, power, power factor. Complex algebra applied to parallel circuits. Coupled circuits. Dielectric polarisation, Gauss' theorem. Field due to sphere, cylinder, capacity of simple condensers. Laminated dielectric, stored energy in condenser. Force on conductor surface. Measurement of dielectric constant, dielectric losses and dielectric breakdown.

SECTION F.

Atomic and nuclear physics.

Elementary theory of radiation from accelerated charge. Classification of spectra, electronic structure of atoms. Drude-Sommerfeld metal, Fermi distribution. X-ray emission, radiography, characteristic X-rays. X-ray diffraction by crystals, analysis by powder diffraction patterns. X-ray diffraction and crystal structure. Electrons and holes in crystals, optical properties, semi-conductors. Mass spectra, isotopes, nucleons. Nuclear binding, types of nuclear instability. Beta rays and neutrinos, artificial disintegration. Neutrons, fissions, the uranium pile. Uses of radioisotopes. Radiation protection.

SECTION G.

Electronics.

Thermionic emission, the oxide cathode. Space charge and one-dimensional Poisson equation. Diode, triode. Voltage amplification, cathode follower. Multistage amplifiers, frequency limits. Tuned and band-pass amplifiers. Oscillators, multivibrator. Pentodes and secondary emission. Modulation and demodulation. Power supplies and regulators. Electronic voltmeters, wattmeters, etc. Push-pull and feedback amplifiers. Elementary noise theory.

SECTION H.

Thermodynamics and physics of gases.

Elementary kinetic theory. First law of thermodynamics. Specific heats of gases. Second law: Efficiency of heat engines, thermodynamic scale of temperature, entropy.

SECTION I.

Electric circuit theory and electrical measurements.

Fundamental notions of response. Superposition, operational methods. Transformation theorems. Iterative network, resonance, electro-mechanical circuits. A.C. bridges, transformers, valve circuits. Non-linear elements. Fundamental electrical standards.

Electron optics.

Electron refraction, electrostatic and magnetic electron lenses. Electrolytic and other models. The electron microscope, cyclotron, betatron, linear accelerator. Gas discharge devices.

Advanced wave motion and radiation.

Analytical treatment of plane and spherical waves. Velocity of propagation. Waves in elastic media. Genesis and propagation of electromagetic waves. Reflexion, refraction, dispersion, group velocity.

SECTION J.

Subdivisions marked (E) are electives of which the student will take two only.

Instrumentation and techniques.

Elements of metrology. Strain gauges, photoelastic techniques, elements of stress analysis. Introduction to servo theory. Physico-chemical apparatus. Colorimetry. Radiographic and crystallographic X-ray and gamma-ray techniques. Electron diffraction and microscopy. R.F. heating. Non-destructive testing. Supersonics. Isotope application.

Structure of matter and radiation.

Atomic (electron and nuclear) theory. Spectra, conductivity, super- and semi-conductivity, electron theory of metals. Fission.

Acoustics. (E)

Radiation from point sources, pistons, horns. Theory of transducers. Reciprocity. Measurements in sound field. Reflection and absorption of sound. Acoustics of buildings.

Theory and application of ferromagnetism. (E)

Langevin-Weiss and Heisenberg theories. Gyromagnetic effects, ferromagnetic resonance. Domains. Bloch zones, anisotropy, magnetostriction. Theory of initial permeability, hysteresis and other losses. Ferromagnetics in communication and power engineering. Magnetic measurements.

Rheology.

Classification of visco-elastic materials. Experimental methods, results and analysis thereof. Thixotiopy, dilatancy. Analytical treatment of models of such materials, application to real materials, *e.g.*, concrete, bitumen. Physics of rubber-like and glass-like substances.

Introduction to relativity.

Michelson-Morley experiment. Lorenz transformation and applications. Modified concepts of mass, momentum and energy. Quantum aspects. Applications to optics, astronomy, particle accelerators. Description of general theory of relativity.

Theory and application of dielectrics. (E)

Theories of permittivity and loss. Piezoelectricity, ferroelectrics. Dielectrics in communication and power engineering. Measurements.

The solid state.

Deformation. Slip, fracture, plastic flow. Anelasticity. Dislocation theory. Diffusion.

Physics of h.f. electromagnetic waves. (E)

V.H.F., C.W. and pulse transmission. Pulse shaping, trigger circuits. Magnetron, klystron, transmission lines. Wave guides, receivers. Aerials, aerial arrays. Noise. Ground, tropospheric and ionospheric propagation. Radar, navigation, radio astronomy.

SECTION K.

Two series of lectures covering—

(i) Electronic devices (one term),
Precision electrical measurements (one term),
General mechanics (one term).

(ii) Atomic, nuclear and solid-state physics.

SECTION L.

Two series of lectures covering—

(i) Electromagnetic theory and advanced optics.
(ii) General mechanics and statistical mechanics.

SECTION M.

Two series of lectures covering—

(i) Solid-state physics and advanced thermodynamics.
(ii) Electron dynamics, relativity theory and elementary quantum mechanics.

SECTION N.

Mechanics and properties of matter.

States of matter. Elementary principles of statics and dynamics. Elasticity, simple moduli, bending moments. Periodic motion. Principles of hydrostatics, surface tension.

Heat.

Temperature, thermal expansion of matter. Change of state. Calorimetry. Evaporation and condensation, hygrometry. Transference of heat, convection, conduction, radiation. Mechanical equivalent of heat.

Wave motion.

Progressive, longitudinal and transverse waves. Reflection, refraction and interference of waves.

Sound.

Velocity, pitch, intensity, and quality. Resonance. Measurement of sound intensity. Reflection and absorption. Limits of audibility.

Light.

Nature and sources of light. Effect of radiant energy on the eye. Colour. Photometry. Reflection, refraction and absorption. Application of laws of reflection and refraction in simple optical devices.

Electricity and magnetism.

Qualitative treatment of the following:—

Elements of static electricity. Conductors and insulators. Potential. Discharge from points. Electric shielding, lightning arrestors. Elementary magnetism. Electric currents. Magnetic heating and chemical effects of electric currents. Ohm's law.

PHYSICAL TECHNIQUES.

1.21 Physical Techniques I: Laboratory Glass-blowing.

Physical factors involved in glass working, basic operations, types of glass, graded seals, annealing, devitrification, glass-metal seals.

1.22 Physical Techniques II: High Vacuum Technique.

General survey, pumping systems, gauges, use of glass in high vacuum work, degassing and pretreatment, gas absorbents and getters, miscellaneous techniques.

1.23a Physical Techniques III: Electronic Workshop Practice.

Valve characteristics, power supplies, amplifiers, oscillators. Valve voltmeters, mixing circuits, CRO.

1.23b Physical Techniques IV: Optical Design and Workshop Practice.

Paraxial theory of optical instruments. Stops and photometry of optical instruments, aberrations (chromatic, spherical and off-axis) and tests for same. Design of simple optical instruments. Theory and practice of making lenses, flats and prisms. Cementing, blooming, and assembly. Testing of finished optical components.

1.23c Physical Techniques V: Photometry, Photography and Colorimetry.

Light sources, the photographic spectrum, visual, photographic and photoelectric detection of radiation. Photometry, spectrophotometry and colorimetry. Description and theory of photographic processes and materials. Colour photography.

1.23d Physical Techniques VI: Instrument Design.

Difference between instruments and machines. Accuracy, errors, kinematic principles of design. Degrees of freedom and constraint. Semi-kinematical and non-kinematical design. Practical design problems.

Optometrical Science Conversion Course Subjects.

Advanced Visual Physiology and Physiological Optics.

This course will be divided into two sections, each comprising 2½ hours of lectures and demonstrations per week for one year. The two sections may be taken concurrently in one year or in any sequence in different years.

Section I.

A. *Visual Physiology.*

A study of the advanced literature on—The anatomy and physiology of the retina and visual pathways. The retinal image and visual acuity. The dioptric constants of the eye and the aetiology of refractive errors. The perception of light and brightness. The electro-physiology of vision. Dark- and light-adaptation, night vision. Accommodation. Mechanisms of the pupil. The ocular circulation and intra-ocular pressure. The applications of visual physiology to visual problems in industry, aviation, etc.

B. *Photometry and Colorimetry.*

(For this section, given during Second Term, students will join the class in Laboratory Arts IV conducted by the School of Applied Physics.)

Photometric concepts. Visual photometric measurements. Photo-electric photometry. Spectrophotometry. Principles of colour measurements. C.I.E. colour system, colour atlases.

C. *Colour and Colour Vision.*

A study of the advanced literature on—Physics and chemistry of colour. Physiology of colour vision. Psychology of colour vision. Colour vision theories. Defective colour vision. Colour vision tests.

Section II.

Ocular Motility and Binocular Vision.

A study of the advanced literature on—The physiology and control of ocular movements. Retinal correspondence, Horopter studies, Binocular coordination. Fusion. Stereopsis. Ocular dominance. Aniseikonia. The analysis and perception of three-dimensional visual space. Theories of space perception. Heterophoria and squint. Orthoptic diagnosis and treatment. Visual training.

Advanced Clinical Optometry.

Advanced clinical work in—Industrial Optometry. Contact lens fitting. Remedial reading training. Orthoptics and visual training. Aniseikonia.

Students taking this course will partake in research projects and the preparation of research reports.

Mathematics and Statistics.

Elementary analytical geometry. Elementary differentiation and integration. The elements of statistical theory, including significance tests and an introduction to the analysis of variants.

Throughout this course, examples of the application of these topics to optometric and allied problems will be given wherever possible.

CHEMISTRY.

Subjects 2.00 to 2.97, Leather Chemistry and General Science.

2.111 Chemistry.

The aim of this subject is to give students in Engineering courses a general understanding of the fundamentals of chemistry from the viewpoint of modern theories.

General Elementary Chemistry.

Physical and chemical changes, elements, compounds and mixtures; relative abundance of elements; atoms, molecules, formulae, valency. Oxides, acids, bases, salts—their classification, methods of preparation and general properties, solubility rules. Equivalent weights, normal solutions, calculations based on chemical equations, valency change. The atmosphere, oxygen, nitrogen, the inert gases, carbon dioxide, carbon monixide, hydrogen, ammonia, sulphur dioxide, hydrogen sulphide, the halogens. Electrochemical series, action on water and acids on metals. Revision of the gas laws. Chemical calculations involving the use of the gas laws.

Atomic and Molecular Structure.

Structure of the atom, evidence for the existence of protons, electrons and neutrons, nucleus. Atomic number, Moseley's characteristic radiation, mass number, isotopes and atomic weights, mass spectrograph. Atomic structure and electronic configuration of the elements, quantum mechanical concept of the atom as developed from the Rutherford-Bohr picture of the atom. Valency in terms of atomic structure. Electrovalent, covalent and co-ordinate bonds, electronic and structural formulae. Oxidation and reduction from the point of view of electron transfer, applications to volumetric titrations.

Solutions and Chemical Equilibria.

Solutions, Raoult's law, vapour pressure lowering, boiling point elevation and freezing point depression. Brief mention of the crystalline state. Properties and types of colloids, methods of preparation, coagulation and stabilization, industrial applications of colloids and colloidal systems. Theory of ionization, evidence for ionization, electrolytes and non-electrolytes, strength of acids and bases, ionic reactions. Faraday's laws, electrolysis, standard electrode potentials. *p*H and indicators, hydrolysis, brief mention of buffer solutions, water treatment. Chemical equilibria, homogeneous and heterogeneous reactions, factors influencing the rate of a chemical reaction, law of mass action, Le Chatelier's principle, mechanism of reaction, energy of activation, catalysis. Heats of reaction and formation, Hess' law of heat summation, equilibrium constants, with some reference to reactions at high temperature.

The Periodic Table.

Periodicity of the properties of the elements, classification, group valency. General relationships of the periodic table, chemistry of some of the more common metals (Fe, Pb, Cu, Zn, Al.).

Organic Chemistry.

Introduction, quadrivalency of carbon, empirical formulae. Structural and graphic formulae, homologous series, systematic nomenclature, classification of the hydrocarbons, isomerism. Alkanes, fractional distillation and cracking of petroleum. Alkenes, characteristics of $C = C$ bond, alkynes briefly, with reference to acetylene only. Aromatic hydrocarbons, distillation of coal tar. Brief treatment of types of organic compounds with regard to functional groups and their characteristic properties, alkyl halides, alcohols, esters, ethers, phenols, carboxylic acids, aldehydes, ketones, amines and nitro-compounds. Brief treatment of oils, fats, soaps, waxes, carbohydrates, polymerisation reactions, plastics rubber.

2.184 BOTANY.

Submiscroscopic structure of cells—cytology and genetics. Variations in morphology and anatomy in plants, with examples from the local flora. Angiosperm systematics and plant geography.

2.194 ZOOLOGY.

A comparative study of the anatomy, morphology and life histories of the invertebrates. Also a further consideration of the mechanisms of evolution, genetics and ecology.

2.21 CHEMICAL TECHNIQUES.

The course is intended to prepare all students entering the Chemistry Department for the work that lies ahead. Safety and laboratory rules, the handling of reagent bottles and the technique common to most branches of chemistry will be introduced and demonstrated. The student will carry out a series of experiments in order to obtain practice in the techniques illustrated.

2.23 CHEMICAL INSTRUMENTATION.

An introduction to certain aspects of applied physics which will acquaint students with the instruments in common use in chemical laboratories. The subject matter is illustrated by reference to the optical instruments and electrical and electronic devices which a chemist will meet in industrial practice.

Microscopy is dealt with as a separate section within the course.

2.32 AND 2.32A PHYSICAL CHEMISTRY.

An introduction to the interpretation of the physico-chemical properties of systems in terms of intra- and inter-molecular forces, molecular architecture and energy distribution.

Kinetic Theory of Gases.—Real gases, elementary quantum theory, thermal properties of gases.

The Solid State.—Ionic solids, covalent solids, metals, van der Waals solids, heat capacity of solids.

The Liquid State.—Structure of liquids, vapour pressure, surface tension, viscosity.

Chemical Thermodynamics.—The first, second and third laws and their application to physical and chemical equilibria.

2.32D Physical Chemistry.

This course is based on 2.32 Physical Chemistry, with variations in emphasis and content matter to render it more appropriate for students specialising in biological sciences.

2.33 Physical Chemistry.

The application of kinetic and thermodynamic methods wherever possible to the following:—

(i) The phase rule—system of one, two and three components.

(ii) Solution—electrolytes and non-electrolytes.

(iii) Electrode processes.

(iv) Surface chemistry and colloids.

(v) Chemical kinetics.

2.34 and 2.34D Physical Chemistry.

A more detailed study of certain subjects, including the following:—

(i) Surface chemistry and colloidal systems.

(ii) Thermodynamics, with reference to systems which depart from ideal behaviour.

(iii) Chemical spectroscopy; a review of atomic and molecular spectra.

(iv) Chemical kinetics and other rate processes.

Seminars are conducted in the latter part of the year on physico-chemical topics.

2.41, 2.41A AND 2.41B GENERAL CHEMISTRY.

This course of 102 lecture hours is given in first year to full-time students as an integrated whole. For part-time degree courses the subject is divided into Part I (68 lectures in first year) and Part II (34 lectures in second year). The aim of the course is to give the student an appreciation of chemistry as a whole before it is treated in its usual sections. For that reason an introductory rather than a detailed treatment of the theoretical topics is required.

Part I.

States of matter. Classification of substances. General methods, preparation and properties of metals and non-metals. Classification, general methods of preparation and properties of oxides, acids, bases and salts. Formulae, valency, simple calculations of formulae and composition. Equivalent weights, normal solutions, gas laws.

Atomic and molecular structure. Evidence for protons, neutrons and electrons. Nuclear charge and size. Atomic number. Moseley's law and periodic classification. Mass number, isotopes, mass spectrograph. Atomic structure. Energy levels and four quantum numbers. Electrovalent, covalent, and co-ordinate bonds. Fajan's rules, ionisation potentials, ionic radii, covalent radii, electron affinities.

Kinetic theory of matter. Derivation of $PV = \frac{1}{3}$ nmu^2. Experimental gas laws. Properties of ideal gases. Vapour-liquid equibilibrium. Molecular and ionic crystalline solids.

Solutions, equilibria and chemical reactions. Expression of concentration of solutions. Raoult's law. Colligative properties. Molecular weight. Ionisation. Strong and weak electrolytes, electrolysis and hydrolysis. Le Chatelier's principle. Effect of temperature and pressure on equilibrium. Equilibrium constants. Dissociation of constants and solubility products, *p*H and indicators. Buffer solutions.

Periodic table. General introduction—atomic volumes, covalent radii, ionic radii, ionisation potentials, general trends in periodic table, general idea of transition series, rare earth series, etc. Detailed treatment of elements of Periodic Groups IA, IIA, VA, VIA, VIIA.

Organic Chemistry. Alkanes and alkenes, synthesis and physical and chemical properties. Alkynes briefly. Alkanols, ethers, alkyl halides and esters. Aldehydes and ketones. Alkanoic acids. Benzene. Addition and substitution reactions of aromatic compounds. Nitro compounds. Amines, tests for distinguishing. Aniline.

Part II.

Qualitative Analysis; dry tests. Group separation tables. Discussion of individual group separations. Identification of anions.

Valency and molecular structure. Shape of atomic orbitals. Elementary ideas of overlap and the covalent bond. Variable valency. Direction of covalent bonds. Mention of resonance and hydrogen bond. Polarisability and polarising power.

Periodic table. Group III, B and Al; Group IB, Cu, Ag and Au; Group VIII, Fe, Co and Ni.

Complex salts. Co-ordination number. Evidence for complex formation. Isomerism in complex ions and the role of water in complex salts. Co-ordination numbers 2, 3, 4, 5 and 6. Shape of complex ions.

2.42 INORGANIC CHEMISTRY.

Molecular structure. Qualitative idea of way in which physical methods are used to determine structure of molecules. Structure of ionic lattices. Simple examples like Cs, Cl, NaCl, CaF_2. Shape of covalent molecules. A knowledge of various shapes and examples. In simple cases, relationship of shape to atomic orbitals involved.

Periodic table. Group II (Zn, Cd and Hg); Group III (Ga, In and Tl); Group IV (Si, Ge, Sn and Pb; Ti, Zr, Hf and Th); Group V: Further treatment of nitrogen compounds like HN_3, N_2H_4, NH_2OH, nitrogen halides and sulphides. V, Cb and Ta. Group VI: Further treatment of sulphur; sulphur halides, oxyhalides. Se and Te. Cr, Mo and W. Group VII: Interhalogen compounds, oxyacids and peracids. Mn, Tc and Re. Group VIII: General properties and discussion of heavier Group VIII elements.

Rare earth and actinides. Stable valencies and general relationships. Carbonyls, carbonyl hydrides, halides and nitrosyls. Relatively brief discussion of preparation and properties.

2.44 AND 2.44D INORGANIC CHEMISTRY.

Modern valency theory. Elementary wave mechanics. Hydrogen molecule. Covalent bond, valence bond and molecular orbital approach. Hybridisation, multiple and fractional bond orders. Factors affecting bond strength. Overlap integral, electro negativity resonance, etc. Nature of the metal-ligand bond in complex compounds. Physical methods and the structure of complex compounds. A survey of modern methods and of experimental results. Nuclear chemistry: a survey of fundamentals and recent developments. Special topics such as electron deficient compounds, reaction mechanisms in inorganic chemistry, recent chemistry of the hybrides, organo-metal chemistry will be treated as time permits. An essay on some topic in advanced inorganic chemistry will be required.

2.52 and 2.52A Quantitative Analysis.

Laboratory rules. Instruction in the use and maintenance of apparatus. The balance, its care and use. Calibration of weights. Record of results. Notes on sampling and its technique. Solution of sample. The technique of gravimetric analysis. Theoretical considerations in quantitative analysis, the concept of solubility product, mechanism of precipitate formation with discussion of supersaturation, coprecipitation, post-precipitation and adsorption. Washing of precipitate and peptisation. Volumetric analysis. Calibration of apparatus; method of use. Reference to Australian Standards publications. Acidimetry and alkalinity. Hydrogen ion activity and its measurement. Dissociation constants of weak acids and bases and simple calculations of *p*H value in such solutions. Use and range of indicators for various types of acid-base titrations. Titration curves and buffer action. Oxidation and reduction from electronic aspect; simple treatment of oxidation-reduction potentials. Importance of *p*H on these potentials. Redox indicators. Precipitation reactions in quantitative analysis; absorption indicators and their limitations. Specific topics such as water analysis, fuel and gas analysis as time permits.

The theoretical treatment will be accompanied by a course of practical exercises to illustrate the important techniques in quantitative analysis and the use of the reagents discussed.

2.53 Quantitative Analysis.

Amplification of topics such as buffer action, ionic equilibria, redox potentials, electrode potentials, with some mathematical illustrations.

Study of methods of separation used in analytical work including use of organic reagents.

Systematic study of analytical chemistry of a selected number of elements.

The practical work will illustrate these principles

2.54 and 2.54D Quantitative Analysis.

A more advanced treatment of topics selected from the following:—Modern theories of acids; bases and indicators; chromatography and ion exchange; separation of elements by solvent extraction; modern developments in electrolysis, polarography and coulometry; spectrometry.

2.62 Organic Chemistry.

The systematic chemistry of the chief classes of organic compounds, with emphasis on the aliphatic types and a brief discussion of the corresponding aromatic compounds. Alkanes, alkenes, alkynes, aromatic hydro-carbons, cyclo-alkanes, alcohols, alkyl halides, ethers, carbonyl compounds, acids, esters, amides, amines and nitro compounds. An introduction to stereochemistry, carbohydrates, proteins, fats and oils.

2.63 AND 2.63A ORGANIC CHEMISTRY.

A more detailed study following on 2.62 Organic Chemistry, with emphasis on aromatic chemistry. The aromatic hydrocarbons, aromatic substitution; halogenation, nitration, sulphonation. The anyl halides, nitro compounds and sulphonic acids and derivatives. Phenols, aromatic alcohols, amines and other reduction products of aromatic nitro compounds. Diazo reaction and coupling. Aromatic carbonyl compounds, including quinones. Dyestuffs, colour and dyeing. The aromatic acids and derivatives. An introduction to heterocyclic compounds, polymerisation and high polymers (including natural polymers).

In 2.63A special emphasis is placed on carbohydrates, fats and other materials of biological interest.

2.64, 2.64A AND 2.64D ORGANIC CHEMISTRY.

An advanced treatment of specialised topics in organic chemistry. Reaction mechanisms, stereochemistry, structural carbohydrate chemistry and selected topics from carbocyclic chemistry and the oxygen and nitrogen heterocyclic fields (including natural products).

2.65 (2.65A and 2.65B) APPLIED ORGANIC CHEMISTRY.

This subject covers the application of chemical reactions and physical techniques to structural and analytical determinations in organic chemistry.

Emphasis is placed on the correlation of reactivity with structure. Subject matter is selected from *either*—

2.65A The behaviour of fixed oils, essential oils, alkaloids, fine chemicals, vitamins, carbohydrates, natural and synthetic high polymers, etc.

or

2.65B The chemistry of food constituents with particular reference to changes during processing and storage.

2.72 MATHEMATICAL CHEMISTRY.

This course and 2.73 are intended to follow the normal mathematics course given to students in first year, and aim to apply the work done in that year to problems which arise in Applied Chemistry, and, in addition, to introduce some specialised techniques such as dimensional analysis and statistical methods. Consideration is given to the proper presentation, critical examination, and assessment of experimental data, and to the design of experiments.

General Chemical Calculations.—Elementary problems in chemical equilibria, mixtures, etc. The solution of typical transcendental and higher degree algebraic equations encountered in chemistry.

The Handling of Experimental Data.—Non-statistical methods of arranging and handling experimental data.

Dimensional Analysis.—General dimensional methods and their applications.

Differential Equations.—Meaning, significance, use and application in chemical phenomena.

2.73 Mathematical Chemistry.

Partial Differential Quantities.—Typical partial differential functions encountered in statistics and chemical thermodynamics.

Statistical Methods.—Kinds and sources of data. Estimation of parameters, tests of significance and interpretation of data. Correlation and regression, quality control, sampling. Analysis of variance. Design of experiments.

2.91 Biochemistry.

An introduction to the biochemistry of carbohydrates, lipids, amino-acids, proteins and other compounds of biological importance.

2.92 Biochemistry.

An introduction to the following topics:—

A brief treatment of physico-chemical phenomena of biological importance, including the properties of the colloidal state.

The nature of enzymes and their mode of action, the classification of enzymes and the more important enzymic systems.

An introduction to the metabolism of carbohydrates, lipids and proteins.

General Biology.

An introduction to basic biological subjects, dealing with the characteristics of living matter, cytology, reproductive processes, outline of classification, ecology, and the first part of the study of the major groups of plants and animals.

Heterotrophic nutrition. Animal associations (e.g. commensalism, symboisis, parasitism), evolution, heredity, the systematics of the angiosperms and a further study of ecology.

Practical work to illustrate the lecture course with obligatory excursions is also carried out.

2.911 Biology.

An introduction to basic biological principles. Introductory biology, e.g., living and non-living, vital activities, plants and animals, protoplasm, the cell, etc. Outline of classifications: Animal and plant kingdoms. Diversity of living organisms. Evolution and genetics. Heterotrophic nutrition. Ecology.

2.912 Biology.

A continuation of 2.911 Biology in the more specialised fields of mammalian anatomy, vertebrate histology, angiosperms, ecology, systematics (taxonomy).

2.913 Physiology.

An introductory consideration of the following features of the physiology of both plants and animals will be presented. As far as possible experiments to illustrate these will be carried out in the practical work.

Physico-chemical structure of living matter.

Physiological significance of physico-chemical phenomena.

Permeability of plant and animal cells.

Synthetic processes in plants and animals with special reference to photo-synthesis and related processes.

Movement of nutrients and water in plants and animals.

Digestive processes in animals and plants.

Respiration and physiological oxidations in plants and animals.

Animal heat regulation.

Intermediary metabolism of carbohydrates, fats, proteins, etc.

Secretory and accumulatory processes in plants and animals.

Excretory processes and hormones and vitamins in the physiology of plants and animals.

Physiology of growth and reproduction.

Excitation and inhibition of nerve, muscle and other animal and plant tissues.

Function of the nervous system in animals. Reflexes. Receptors, including special senses.

Tropisms in plants and animals.

Physiology of movement.

2.924 Microbiology.

Brief historical outline. Distribution of micro-organisms Morphology and cytology of bacteria. Staining properties of bacteria.

Yeasts and fungi and their importance in certain industrial processes. Pure culture techniques. Classification of bacteria. The effect of physical and chemical agents on bacteria. Physiology of micro-organisms. Nutrition of bacteria. Micro-organisms and their relation to food preservation; disease; resistance of the body to disease.

2.925 Microbiology.

Biochemical activities of bacteria.

Growth and multiplication of bacteria. The bacterial growth cycle.

Bacteriophage. Mode of action of the virus and its importance in the cheese industry.

Antigen-antibody reactions. Fundamental principles of serology.

Microbial variation. Mutation and adaption.

Principles of heat processing.

Mode of action of anti-microbial agents, for example, acridine dyes and their relation to pH and pK_a.

Standardisation of disinfectants and criticism of popular methods, for example, phenol coefficient, etc.

The microbiology of food. Food spoilage and "food poisoning".

The use of micro-organisms in industrial processes.

2.926 Microbiology.

Introduction.—General biology of fungi. Economic importance.

Classification.—General principles involved in classification. The major groups including the Fungi Imperfecti. Identification and the use of keys.

Techniques.—Handling. Media. Preparation of media. Sterilisation. Isolation. Maintenance of stock cultures. Sub-culturing. Inoculation. Methods of culturing. Special precautions. Behaviour on different media. Use of indicators.

Morphology and Life-histories.—A study of selected examples from the major groups, including the Fungi Imperfecti. Species of economic importance to be chosen as examples wherever possible.

Spoilage.—General considerations. Mould counts.

Genetics.—An outline of fungal genetics.

2.94 Biochemistry.

An introduction to the following topics:—

Catalysis in biological systems; the properties of enzymes; types of enzyme-catalysed systems.

The energetics of biological systems.

Physico-chemical phenomena in cells and tissues.

2.95 Biochemistry.

An introduction to the following topics: —

Amino acids, peptides, proteins. Their chemical and physical properties, structure, classification and biological significance. Special attention is paid to the colloidal properties of proteins.

The general properties of enzymes and the nature of the catalytic process. Specificity, activators, inhibitors, coenzymes, prosthetic groups.

Hydrolases, phosphorylases, oxidases, dehydrogenases, adding, transferring and isomerising enzymes.

Alcoholic fermentation and the glycolytic sequence. The tricarboxylic acid cycle.

2.96 Biochemistry.

A more detailed study of the following topics:—

Preparation and purification of enzymes.

Influence of various factors on the course of enzymic reactions.

Enzyme-substrate complexes.

The mathematical theory of enzymatic reactions.

The chromoproteins, with special reference to those possessing catalytic activity.

Biological oxidation processes.

The utilisation of energy in biological systems.

2.97 Biochemistry.

A further study of compounds and materials of biological importance, their chemical and physical properties, and their synthesis and degradation in nature, including the following: the compound lipids, proteolipids, polypeptides, simple and conjugated proteins, nucleic acids and related compounds, nitrogen bases, certain carbohydrates and derivatives, vitamins and hormones.

The nature and properties of viruses.

The biochemical bases of the hereditary mechanisms.

The biochemistry of immunological phenomena.

The intracellular location of enzymic systems.

Experimental Biology.

The experimental investigation of the functions of plants and animals, by the application of methods drawn from the physical sciences.

Entomology I.

A basic introduction to the Class Insecta. Classification and systematics; anatomy and morphology, behaviour, social development and ecology of insects.

Entomology II.

The principles of economic entomology. Details of insect pest species, their structure, classification and life histories. Direct and indirect control measures. Insecticides, fillers, spreaders, solvents and synergists.

Entomology III.

Insect physiology. Digestion and the alimentary canal. Sensory recepters and the nervous system. The circulatory and respiratory systems. Hormones, moulting, diapause; temperature and water relations.

Materials for Leather Manufacture.

A study of tanning materials, heavy chemicals, dye stuffs, oils and finishing materials used in the manufacture of leather. Sources, use and economic importance.

Principles of Light Leather Manufacture.

The processing of shoe upper leathers, finishing leathers, luggage, upholstery leathers, etc.

Principles of Heavy Leather Manufacture.

The tannage and finishing of sole, felt and harness leathers.

Science of Leather Manufacture.

The chemistry and proteins with particular reference to collagene and keratin. The physical chemistry of proteins with particular reference to hydration and swelling phenomena. The reaction of proteins with alkalines. The classification and chemistry of enzymes with particular reference to proteases. Theories of bating. The chemistry of vegetable tanning. The chemistry of chromium salts. Theories of vegetable and chrome tannage. The mechanism of miscellaneous tannages. Surface active phenomena in relation to leather processing. The chemistry of synthetic tannings.

Analytical Chemistry of Leather Manufacture.

Simple routine procedures are not included in this course. Lectures are devoted to research techniques and physical testing of leather.

Bacteriology and Mycology of Leather Manufacture.

The bacteriology of super faction. The behaviour of bacteria towards sole. Bacterial growth in tannery leather. Growth of moulds and yeasts of leather and in liquors. The use of antiseptics and fungicides.

Leather Laboratory.

Students undertake a research project under direction.

Chemistry I (General Science).

As for 2.41 Chemistry.

Chemistry II (General Science).

A course of lectures incorporating the subject matter of 2.32 Physical Chemistry, 2.42 Inorganic Chemistry, 2.52 Quantitative Analysis and 2.62 Organic Chemistry.

Chemistry IIa (General Science).

A course in Chemistry for students majoring in Biological Sciences. The subject matter includes 2.32 Physical Chemistry, 2.62 Organic Chemistry and 2.95 Biochemistry.

In the part-time course the subject is divided into:—

Part I.

As for 2.32 Physical Chemistry and 2.62 Organic Chemistry.

Part II.

2.95 Biochemistry.

Chemistry III (General Science).

A course of four lectures per week based on the subject matter of 2.33 Physical Chemistry, 2.44 Inorganic Chemistry, 2.53 Quantitative Analysis and 2.63 Organic Chemistry.

Biochemistry I (General Science).

This course covers the following topics:—

Part I.

A study of the physical and chemical properties of the compounds of biological importance. A detailed study of the principles of enzymology.

Part II.

A study of advanced enzymology and the principal metabolic systems.

In addition, practical work to illustrate the lecture course is given.

Biochemistry Ia (General Science).

The following topics are dealt with:—

Part I.

More advanced physico-chemical studies on proteins, carbohydrates and lipids. Further studies in enzymology with particular reference to metabolic processes.

Part II.

A treatment of physical and chemical evidence for biological concepts including the evolutionary theory.

Practical work to illustrate the lecture course is also given.

Botany I (General Science).

In this course the following topics are dealt with:

Part I.

A more detailed study of the plant kingdom dealing with the major groups; evolutionary trends; plant anatomy.

A treatment of plant systematics.

Part II.

Elementary plant ecology (e.g. weed ecology); plant geography, an introduction to plant biochemistry; physiology and cytology.

Practical work to illustrate the lecture course with obligatory excursions and the preparation of a herbarium is also conducted.

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Botany II (General Science).

The following topics are covered:

Part I.

An extension of the study of plant biochemistry, plant physiology and plant cytology.

Part II.

An advanced treatment of plant biochemistry, physiology and cytology.

In addition, practical work to illustrate the lecture course with obligatory excursions and the preparation of a herbarium is given.

Zoology I (General Science).

The following topics are dealt with in this course.

Part I.

A comparative study of invertebrate anatomy and morphology demonstrating the main evolutionary trends and the bases of systematics.

Part II.

An introduction to animal physiology, cytology and genetics.

Practical work to illustrate the lecture course with obligatory field work and preparations of a collection is also given.

Zoology II (General Science).

This course will cover the following topics:

Part I.

A comparative study of vertebrate anatomy and morphology; a description of evolutionary mechanism.

Part II.

A study of vertebrate histology and embryology. General treatment of physiology and ecology.

Practical work to illustrate the lecture course with obligatory field work with particular emphasis on ecology is conducted.

CHEMICAL ENGINEERING.

Subjects 3.00 to 3.324.

3.14 AND 3.14A INDUSTRIAL CHEMISTRY.

This course aims at giving the student in Applied Chemistry, Chemical Engineering and Industrial Chemistry a broad introduction to the chemical industry.

The course will deal in general terms with the relationship of chemical industries one to the other, the development of the chemical industry in Australia, services used in industry such as water, steam, power, gas, refrigeration and electricity, fuels used in industry and the principal raw materials upon which the chemical industry in Australia is based.

The following industries will be treated in specific detail: sulphuric acid; lime, cement and plaster; salt and potassium salts; sulphide processes; lime caustic, electrolytic caustic and the mercury cell; ammonia; nitric acid; industrial gases; electric furnace products; phosphates, super-phosphates; aluminium and glass; coal carbonisation; coal tar refining; petroleum refining; petroleum cracking processes; fermentation industries—ethanol, absolute alcohol, acetone and butanol; natural oils, fats and waxes; soaps and detergents; cellulose, wood pulp and paper; acetylene production and chemicals therefrom; chemicals from ethylene and propylene; synthetic methanol and formaldehyde; the Fischer Tropsch process; production of sugar, utilisation of Bagasse.

Laboratory experiments will be carried out illustrating the principles covered in the discussion of the industries in lectures.

A short series of lectures on the principles of the writing of technical reports will be given early in first term and will be followed by a series of factory visits throughout the year. The visits will be made to industries closely connected in some way with the material of the lecture course.

3.15 INDUSTRIAL CHEMISTRY.

This series of lectures over three terms will treat some of the more advanced topics of inorganic and organic process industry and in addition certain special topics will be covered on a seminar basis in the third term. Topics for formal lectures will include: survey of thermodynamics; survey of kinetics; silicone chemistry; ceramics; refractories and cermets; high pressure processes—thermodynamics, chemical equilibrium, compression, preparation of synthesis gas, ammonia synthesis in detail, types of reaction vessels, glands, closures, valves and materials; high vacuum processes; industrial chemistry of uranium and thorium; radioactive chemistry; hydrogen peroxide, per- acids and salts; sodium, calcium and magnesium; titanium, zirconium and tantalum.

Rayon; aromatic intermediates; dyestuffs; synthetic resins; insecticides; biochemical engineering.

Specialised lectures and seminars will be given on various topics such as general principles and economic factors in the chemical industry; factory location; regional development; waste disposal; internal transport, storage and packing; factory layout; the industrial structure—the stock exchange, industrial organisation, functions of various departments and the functions of management.

A number of practical assignments will be given in work in the laboratory, these illustrating as far as possible the principles of the work covered in lectures.

Advanced Industrial Chemistry.

This course, which is for honours students only, carries to a further stage the work undertaken in 3.15 Industrial Chemistry and includes work on problems of management and safety in the chemical industry, problems on plant operation including costing and the general economics of the manufacture of chemical products in various places, together with some studies of advanced process chemistry. The course includes an analysis of the structure of large chemical manufacturing concerns, and a consideration of the importance of the various sections such as research, development, production, engineering, sales and commercial service in the industry.

Industrial Chemistry Project.

This project involves the study of a selected chemical process requiring investigations both in the laboratory and in the literature, and in the production of a thesis on the selected topic.

3.24 and 3.24d Chemical Engineering Unit Operations.

The first term is devoted to a study of the basic concepts of fluid flow and heat transfer. In the second term a fundamental study of the following unit operations is made: solid-liquid extraction, liquid-liquid extraction, gas absorption, distillation and adsorption. Lectures in the third term cover the unit operations of psychrometry, drying, evaporation, flow through porous media and filtration. In the laboratory, students will carry out experiments illustrating the principles of the work covered in lectures.

3.25 Chemical Engineering Unit Operations.

In the first term a detailed treatment of the following unit operations is given; gas absorption, rectification vacuum distillation, steam distillation, molecular distillation, multi-component, azeotropic and extractive rectification, batch rectification, liquid-liquid extraction, adsorption, sublimation and dialysis.

In the second term a detailed treatment of the following unit operations is given: solids handling, flow of solids through liquids, sedimentation, flotation, fluidisation, flow through porous media, crystallisation, centrifugation and cooling towers.

In the third term a series of advanced lectures is given on fluid flow and heat transfer.

Throughout the year students will carry out experiments designed to illustrate selected principles of the work covered in lectures.

3.34 AND 3.34D CHEMICAL ENGINEERING DESIGN.

The course covers the essentially mechanical section of chemical engineering design in the first part of the year and the second part is devoted to elementary design of unit operation equipment. The topics will include:

Stress analysis of simple steel structures, elementary reinforced concrete construction, mechanical equipment (shafting, bearings, drives, agitator mechanisms, etc.), pressure vessels for low and medium pressures, code requirements, reticulation of steam, vacuum, brine and fluid services generally. Safety practices.

Elementary instrumentation, heat exchangers, solid-liquid extraction apparatus, gas absorption and liquid-liquid extraction equipment, fractionating columns, dust and mist collection equipment, evaporators, rotary driers and humidification equipment.

3.35 ADVANCED CHEMICAL ENGINEERING DESIGN.

Advanced lectures will be given on the topics covered in 3.34 Chemical Engineering Design and other selected topics of particular current interest. This programme will be completed early in the year and students will then work on a Major Design Project which will be integrated closely with 3.75 Chemical Engineering Project.

3.44 CHEMICAL ENGINEERING CALCULATIONS.

This course consists of one two-hour lecture per week for one year and embraces the following topics:

Units and dimensional analysis; graphical methods and nomography; empirical formulae and non-periodic curves; some application of differential equations; behaviour of gases and vapour-liquid relationships; conventions, definitions and use of thermodynamic data; materials balances including fuel calculations; energy balances; combined materials and energy balances for a process or chemical works, including the possible use of diagrams made from such data.

3.54 Chemical Engineering Materials.

This course consists of two one-hour lectures per week for one year.

The properties mainly needed in materials for chemical engineering plant construction are strength, and resistance to creep, wear, fatigue, corrosion, and chemical resistance.

These properties and their industrial applications will be considered for the following materials:

A. *Metals.*

Iron and iron alloys, steel and steel alloys, non-ferrous metals and alloys.

Methods and production and heat-treatment effects will be outlined briefly.

Protective coatings, powder metallurgy and an introduction to corrosion are included.

B. *Non-metals.*

Refractories: Types and properties, chemical resistance, furnaces.

Abrasives: Theory of abrasion process, applications.

Glass: Chemical glassware, heat-resistant types, glass-lined vessels.

Insulating Materials: Industrial types.

Organic Plastics: Industrial types and properties, chemical equipment, bondings, coatings.

Rubber: Crude, hard, synthetic, fabrication methods, adhesives, bearings, mountings, chemical conveyors, hose, seatings.

Concrete: Mixes, handling and placing, acid-proof, chemical-tank construction.

3.55 Chemical Engineering Materials.

This course consists of one hour lecture per week and extends the topics of 3.54 Chemical Engineering Materials in a more detailed fashion. In addition, lectures are given on corrosion testing.

3.65 Chemical Engineering Thermodynamics and Kinetics.

Applied Thermodynamics.

Manipulation and use of thermodynamic functions.

Thermodynamics of fluids. Calculation of thermodynamic functions from experimental data and construction of thermodynamic charts and tables. Application of results to chemical reaction equilibria, power cycles and compressible flow.

Heterogeneous equilibria. Relation between free energy, enthalpy and entropy of mixing of liquids and properties of mixtures. Liquid-vapour and liquid-solid equilibria.

Calculation of thermodynamic functions from structure of molecules.

Applied Kinetics.

Homogeneous reactions. Reactions in solution. Stirred reactors.

Heterogeneous reactions. Fixed bed catalytic reactors. Mass and heat transfer in catalyst beds. Fluidised bed reactors.

3.75 AND 3.75D CHEMICAL ENGINEERING PROJECT.

The student will be given an individual project involving literature and experimental investigation, and the final preparation of a flow-sheet and design report on a selected chemical process. This project is a final test of all the earlier work the student has done, and brings together in one exercise the knowledge and experience he has gained.

INDUSTRIAL SAFETY.

Organisation for industrial safety; human factors in accident prevention; physical factors in accident prevention; the contribution of medicine to industry; the functions and applications of the Factories and Shops Act, Workers' Compensation Legislation.

3.814 FOOD TECHNOLOGY I.

Tinplate and Glass Containers—

Methods of manufacture, factors determining the suitability of tin plate, corrosion problems, lacquers, examination of cans, glass containers.

The Technology of Fruit and Vegetable Products—

Raw material quality—horticultural factors, maturation of plant foods, objective methods of determination of maturity and quality control.

Harvesting and handling for processing. Cold storage systems, gas storage. Freezing of fruits and vegetables, juices and purees. Storage and transportation of frozen foods. Microbiology, packaging and quality control of frozen plant foods.

Dehydration and sun-drying of fruits and vegetables, techniques and equipment. Storage and changes occurring during storage. General principles of canning technology, determination of safe processes, procedures and equipment for the heat processing of canned foods, asceptic canning. The canning of fruit and vegetables, production of jams, jellies and juices. Quality control techniques.

3.824 Food Technology II.

Edible Fats and Oils—

Classification, extraction, refining and hardening of fats and oils. Their physical properties as related to their end use, plastic fats, flavour stability and rancidity. Superglycerinated fats. The role of fats in composite foods.

Dairy Products—

Milk, composition and properties, production, transportation and storage; microbiology and pasteurisation. Condensed and dried milk; cream, butter, cheese and ice cream.

Cereals and Starches—

The principal cereals, relations between properties and use. Harvesting, storage; milling technology; laboratory control. Uses of wheat flour and by-products for bread, cake, biscuits, adhesives, fermentation, stockfeed, starch, gluten, amino acid production. Starch industries. Enzyme systems of cereals, nutritional aspects.

Meat, Fish and Eggs—

Principles of the technology of protein foods. Production, storage, handling, transportation. Canning, freezing, chilling, dehydration. Quality control.

Normal Microbial Content of Foods—

Normal microbial content of foods from public health point of view and potential spoilage. Factors affecting microbial load, in processed and unprocessed foods. Principles of diagnosis of food spoilage.

Principles of Plant Sanitation—

Sanitary practices in the food industry. Principles of good industrial house-keeping.

Packages—

Water relations of foods, humidity isotherms, control of equilibrium humidity. Water vapour permeability of packages, mechanism of water transfer; methods of measurement. Calculation and testing of packages. Porosity of containers.

Water Supply and Effluents—

Water sources and significant qualities. Water treatments and purification. Sewerage of food processing plants.

Sugars and Confectionery—

Sucrose and glucose for food industries. Non-crystalline sugar products. Confections, raw materials, chocolate.

ADVANCED FOOD TECHNOLOGY.

Laboratory work, lectures and seminars.

Selected topics in the fields of canning, drying, dehydration, cold storage and freezing of foods. Heat penetration studies, storage of foods in flexible containers, performance data of packaging materials, gas storage of plant foods.

Plasticity and oxidative stability of fats and oils.

METALLURGY.

Subjects 4.00 to 4.912.

4.12 General Metallurgy.

A series of lectures occupying one hour per week for one year. This course gives a general survey of the whole field of metallurgy and is intended to emphasise the relationship existing between the various branches of the subject and the subsidiary subjects studied in other schools.

4.22 Metallurgical Engineering I.

Principles underlying the unit processes by which metals are extracted from ores and other raw materials. Emphasis on those principles common to all metallurgical processes involving chemical reactions or changes in state. Metallurgical stoichiometry, thermochemistry and thermophysics, heat balances, fuels and combustion, fluid flow, heat transfer, refractories, physical and chemical attributes of the solid and liquid phases in metallurgical systems, mass action, reaction rates. Quantitative application to metallurgical engineering problems.

Laboratory work designed to illustrate the above principles will be performed.

4.23 Metallurgical Engineering II.

The unit processes used in extracting metals from ores and other raw materials. Gas solid processes (roasting, calcining and drying), sintering, reduction of metal oxides, smelting, converting, distillation and refining processes studied from the standpoint of the principles introduced in 4.22 Metallurgical Engineering I. Apparatus, design and operation variables and engineering calculations for the important unit processes. Hydrometallurgical and electrometallurgical processes. Laboratory experiments designed to measure important variables in typical metallurgical processes and to illustrate the principles of process equipment on a small scale will be performed.

4.24 Metallurgical Engineering III.

Integrated metallurgical engineering processes. Synthesis of the principles, unit operations and unit processes studied in preceding courses. with emphasis on the development of complete flowsheets for producing metals from ores. Economic and other considerations involved in choice of process. Production metallurgy of iron and steel and of the important non-ferrous metals.

4.32 Physical Metallurgy I.

The nature of alloys; phase equilibria in alloy systems and its relation to the temperature and composition dependence of the free energies of alloy phases. The physical factors determining the phases and phase boundaries in alloy systems. Elementary treatment of the mechanism of phase transformations. Departures from equilibrium, metastable transition phases, principles of heat treatment. Generation of microstructures, influence of surface tension. Relations between structure and properties. Application and further development of these principles by means of a detailed study of the plain carbon steels, cast irons and the light alloys of aluminium magnesium and titanium.

The mechanical behaviour of metals. Criteria governing flow and fracture of polycrystalline metals. The effects of microstructure, temperature rate of straining and complexity of stress state on the resistance to deformation and fracture. Recovery recrystallisation and grain growth. Creep, fatigue, internal stresses. Forming of metals by mechanical deformation.

Laboratory work includes preparation of alloys, mechanical testing of cold worked and heat treated specimens, pyrometry, dilatometry, thermal analysis, macro examination of cast and wrought products, and a study of microstructures of brasses, aluminium bronzes and plain carbon steels in the "as cast" and heat treated conditions.

4.33 Physical Metallurgy II.

A study of the principal alloy steels, cast irons and miscellaneous ferrous alloys, in continuation of the work commenced in 4.32 Physical Metallurgy I; the alloys of aluminium and magnesium; miscellaneous alloys of importance for magnetic, high temperature, etc., properties.

A closer study of the effects of stress and deformation in producing controlled properties, preferred orientation, etc., and in alleviating unwanted effects produced by the limitations of the casting process. (Suitable industrial operations will be chosen for study and lectures, laboratory work and visits to a local industry will be co-ordinated for this purpose). A brief survey of modern theories on the physics of metals and alloys and of advanced methods of investigation.

Laboratory work will include microscopical and physical investigations of more complex alloy systems and projects based upon the metallurgical aspects of the industrial operations studied.

4.34 Physical Metallurgy III.

Modern theories of the metallic state studied in more detail than in 4.33 Physical Metallurgy II, but with constant attention to illustrations drawn from contemporary industrial metallurgical practice. Advanced study of ternary and complex equilibria in metals, slags, refractories, etc., and the effects of out-of-equilibrium conditions upon such systems.

Crystallography and crystal analysis; stereographic projection, pole figures, etc., and their use in investigations.

Laboratory work will include use of advanced methods of physical investigation.

4.44 and 4.44a Industrial Metallurgy.

A choice of several topics from the following (not necessarily complete) list will be available to enable students to gain a more intimate knowledge of particular industrial specialities in the various centres. Where possible, lectures will be given by industrial experts in the various fields—

1. Industrial Relations.
2. Industrial Organisation.
3. Metalliferous Mining.
4. Preparation of Minerals.
5. Iron and Steel Making.
6. Non-ferrous Metal Extraction.
7. Founding.
8. Metal Forming.
9. Welding and Joining.
10. Electroplating.
11. Powder Metallurgy.
12. Advanced Physical Testing.
13. Advanced Metallurgical Analysis.
14. X-Ray Diffraction.
15. Quality Control.

4.54 Metallurgy Seminar.

A series of lectures on all aspects of the presentation of verbal reports and papers will be given. Then each student will deliver a paper on a technical subject chosen by himself. This will be followed by discussion of the paper and its method of presentation.

4.912 AND 4.912D MATERIALS TECHNOLOGY.

For engineering students who do not expect to practice metallurgy as a profession.

Complete and incomplete combustion of carbon, hydrogen, hydrocarbons. Excess air. Heat development. Effect of steam on hot carbon. Producer gas, water gas, blast furnace gas. Coal: origin, rank, impurities. Effect of heat. Carbonization in gas works and coke ovens. Combustion of coal on chain grate stokers. Testing of coal and coke. Proximate and ultimate analysis, calorific value, sulphur. Suitability of coal for various purposes. Petroleum. Origin, distillation, cracking, refining. Properties, uses and testing of various products. Boiling range, specific gravity, viscosity. Flash point, fire point, ignition point. Flame, detonation, octane number.

Lubrication. Solid, fluid and boundary friction. Wedge theory. Adhesion and cohesion. Viscosity. Additives. Testing of lubricants and their suitability for various uses. Refractory materials and ceramics. Lime, silica, alumina. Triangular diagram. Bonding of refractories. Fluxing of refractories. Shrinkage, porosity, thermal and electrical conductivity, behaviour under heat and load. Applications of refractories and ceramics. Lime burning and slaking. Natural cements. Portland cement. Triangular diagram. Manufacture of Portland cement. Setting of Portland cement. Concrete. Size, properties and proportions of aggregate.

Introduction to metallurgy. Relationship between chemistry and metallurgy. Periodic classification from metallurgist's point of view. Space lattices and the structures of metal crystals. Properties of a single crystal. Properties of massive metal. Course and fine grain and the different properties. Control of grain size. Elastic and plastic deformation of crystals. Stress-strain diagram. Slip planes. Recrystallisation and recrystallisation temperatures. Cold work and work hardening. Hot work. The "pure" metal. Melting and freezing of pure metals. The influence of the velocity of cooling on the grain size and properties of a metal. Expansion and contraction during heating-melting-freezing-cooling. Formation of pipes. Segregation and impurities. Rules for the design of castings based on the changes during freezing and cooling. Foundry technology. Principal binary systems, to include complete immiscibility, complete and incomplete miscibility in liquid and solid state. Macro and micro structures formed under stable and metastable conditions.

Properties and typical uses of copper, lead, aluminium, zinc, tin and alloys based on these metals. Iron-carbon. Equilibrium diagram. Structures and properties of carbon steel and cast iron. The heat treatment of steel. S-curve. Surface treatment of steel. Alloy steel. Alloy cast iron. Powder metallurgy. Tungsten carbides. Principles of extractive metallurgy. Ores, furnaces, processes. Methods of production of iron and steel, copper and aluminium, and their influences on the properties of the products. Principal methods of metal fabrication. Casting. Cold working: rolling, drawing, minting. Hot-working: forging, pressing, rolling, extruding. Scaling. Cutting and shaping. Jointing by riveting, soldering, brazing and welding.

Metallurgical aspects of engineering design. Internal stresses. Notch and fatigue effect. Welding defects. Heat embrittlement. Gases in metals. Corrosion. Electro-chemical theory of corrosion. Hydrogen-evolution and oxygen-absorption types. Stray-current corrosion. Stress corrosion. Corrosion protection by alloying, surface coating, electro-chemical methods.

Laboratory.

Pyrometry—limitations and accuracy. Thermometers, thermocouples, optical pyrometers, surface pyrometers. Action of air, carbon dioxide and steam on hot coke. Coking of coal and determination of products. Bomb calorimeter. Gas calorimeter, gas analysis (Orsat). Distillation of petroleum. Testing of lubricants. Viscosity. Flash-point, fire point, ignition point. Porosity, heat conductivity and fluxing of refractories. Burning and slaking of lime. Effect of sizing of density of aggregates. Setting of cement. Heat evolution. Sampling, grinding and sieving. Furnace technique. Formation of metal dendrites. Formation of coarse and fine crystals. Thermal expansion and contraction of metals. Elastic and plastic deformation. Cold working and work-hardening. Recrystallisation. Cooling curves of pure metals and binary alloys. Effect of shape and cooling rate on crystal structure. Metal casting. Segregation and impurities. Polishing, etching and examination of specimens. Use of microscope. Transition points of iron. Heat treatment of steel. Surface treatment of metals. Hardness tests. Powder metallurgy. Roasting and reduction of metals. Goldschmidt method. Refining by electrolysis. Metal fabrication (forging, pressing, rolling, extruding, deep drawing). Riveting, soldering. Sections of good and faulty welding. Notch effect. Relation between micro-structure and the impact test. Non-destructive testing. Corrosion tests and inspection of corroded samples. Bonderizing, hot-dipping, electro-deposition, metal-spraying, painting. Testing of protective layers.

MECHANICAL ENGINEERING.

Subjects 5.00 to 5.74.

5.101 Engineering Drawing and Materials.

This course will consist of lectures on the elements of drawing office practice, and engineering materials and practice.

Drawing.—Use of instruments. Lettering and printing. Standard sheets scales. Projections of simple solids. Freehand and sectional sketching.

Plane Geometry.—Parabola; ellipse; hyperbola; involute; evolute; cycloidal and trochoidal curves.

Descriptive Geometry.—Projections; sections; oblique views; development of surfaces.

5.11 and 5.11d Engineering Drawing.

Instruction in the correct use of drawing instruments and the application of drawing standards. Measurements and dimensioning. Orthographic, isometric and dimetric projections. Lectures on engineering materials and practice, properties and uses of the common engineering materials. In the drawing office the student will be required to do a reproduction on white paper to a scale of full size and to a reduced scale in orthographic projection of a machine part or simple assembly given to the student in isometric projection, and to do a tracing of this in ink on tracing paper. He will also be required to make fully dimensioned freehand drawings of five of the machine parts enumerated below and to make accurate detail drawings and/or assembly drawings from the freehand sketches as a basis.

Machine parts and elements—

- Valves (stop, check, safety, gate).
- Cocks (water, gauge, glass assembly, etc.).
- Bearings (plummer block, oil ring, ball bearing, etc.).
- Couplings (rigid, flexible, Oldham, Universal Joint).
- Clutches (cone, disc, dog).
- Pumps (gear type, semi-rotary, small piston pump).
- Pistons (I.C. piston and piston rod assembly).

5.12 and 5.12d Mechanical Engineering Design.

Design procedures, loadings and factors of safety standards. Stresses in bolts. Design examples involving simple stresses. Design of shafts and bearings, belt drives and pulleys (leather, V pivot drives), friction clutches, springs and screws (for power applications).

Design work associated with the above will be carried out in the drawing office.

5.13 AND 5.13D MECHANICAL ENGINEERING DESIGN.

As for 5.12 and 5.12D together with the following:—

Design of gears (spur, worm), friction brakes (band, shoe), and load lifting appliances.

Design in the drawing office of a complete crane trolley.

5.14 AND 5.14D MECHANICAL ENGINEERING DESIGN.

Design of machine elements with due consideration to acceleration effects. Design of reciprocating mechanisms.

Students will work in groups of two or three in the drawing office on one of the following assignments:—

Air Compressor.
Internal Combustion Engine.
Steam Engine.

5.21 AND 5.21D MECHANICAL TECHNOLOGY.

Properties of Materials and their Principal Uses.

Classification, definitions of properties.

Ferrous metals and alloys, heat treatment, non-ferrous metals and alloys, plastics, thermo-setting, thermo-plastics.

Tolerances and allowances, gauges, inspection, quality control, factory layout.

Machine Elements.

Screw threads and screw fastenings, riveted joints, welded joints, keys and cotters, couplings, bearings, belt drives, chain drives, terminology in gear drives.

5.211 AND 5.211A WORKSHOP PROCESSES AND PRACTICE.

An introduction to some of the basic processes and practices of engineering workshops, to prepare students for the industrial training they must undergo as part of their courses. Students will attend lectures and demonstrations in some of the following fields, according to the courses in which they are enrolled. Instruction is given by the trade sections of the Department of Technical Education.

Fitting and machining, blacksmithing, heat treatment, founding and patternmaking, welding (oxy and electric), boilermaking, automotive mechanics.

5.22 AND 5.22D MECHANICAL TECHNOLOGY.

Material Forming, Hot and Cold.

Cold forming in presses: The structure of metals, punching and shearing, bending, bulging, necking, curling, deep drawing, extrusion, wire drawing.

Spinning, thread-rolling, cold heading and upsetting, wire-forming, die casting.

Hot rolling, forging, welding and flame cutting, technology of plastics, sand castings.

Single and multi-point tool theory, introduction to 5.23 Mechanical Technology.

5.23 AND 5.23D MECHANICAL TECHNOLOGY.

Machine Tools.

Lathes, centre-lathes, turret-lathes, singles and multi-spindle, copying lathes.

Drilling machines, single and multi-spindle, tapping machines, boring mills, jig borers.

Planer, shaper, slotter.

Milling.

Broaching.

Sawing and filing.

Hobbing.

Gear generating.

Grinding, boxing and lapping.

5.32 AND 5.32D ENGINEERING MECHANICS.

A. *Kinematics of the plane motion of a particle.*

1. Rectilinear motion.
2. Curvilinear motion.
3. Graphic methods of solution.
4. Moment of velocity and acceleration.
5. Central motion.

B. *Kinematics of the plane motion of a rigid body.*

1. Translation.
2. Rotation.
3. Instantaneous centres—centrodes.
4. Superposition of motions.
5. Velocity and acceleration in the plane motion.

C. *Dynamics of the plane motion of a particle.*
1. Newton's laws.
2. Energy law.
3. Kepler's laws.
4. Inertia forces—D'Alembert's principle.

D. *Kinematics and dynamics of the relative motion.*
1. Relative motion of points.
2. Motion of points relative to a body.

E. *Dynamics of the plane motion of a system of particles.*
1. Fundamental laws.
2. Corollaries.

F. *Dynamics of the plane motion of a rigid body.*
1. Fundamental laws.
2. Energy law.
3. Conservation of momentum.
4. The central impact of bodies.
5. The eccentric impact.
6. Replacement of bodies by equivalent two or three point masses.
7. Inertia forces—D'Alembert's principle.

G. *The gyroscope.*

H. *Kinematics of mechanisms.*
1. Instantaneous centres.
2. Velocities by means of instantaneous centres.
3. Vector velocity and/or orthogonal velocity diagrams.
4. Vector acceleration diagrams.
5. Coriolis component.

5.33 and 5.33D Theory of Machines.

A. *Velocity and Acceleration.*
Diagrams of mechanisms with triple-paired links.

B. *Cams.*
1. Determination of cam profiles to satisfy given conditions.
2. Analysis of given profiles.

C. *Flywheels for reciprocating machines.*

D. *Engine governors.*

E. *Balancing.*

1. Rotating masses.
2. Reciprocating masses.

F. *Toothed gearing.*

1. Conditions for constant velocity ratio.
2. Involute gearing—standard and corrected gears.

G. *Gear trains.*

Simple, compound, epicyclic.

5.33A THEORY OF MACHINES.

A. *Vibrations.*

Periodic motions, Fourier analysis (mention only). S.H. motion. Equations of motion of "one degree of freedom" system. Free undamped vibrations. Energy method. Free damped vibrations. Forced undamped vibrations. Forced damped vibrations. Some vibration measuring instruments. Vibration isolation. Equations of motion of "two degree of freedom" system. Undamped vibration absorber. Whirling (critical, speeds of shafts. Torsional vibrations of shafts.

B. *Balancing of Rotating Masses.*

C. *Gearing.*

Friction drives; velocity ratios of gear-trains. Condition for constant velocity ratio-conjugate profiles. Involute of circle as gear profile. Involute function; tooth thicknesses at different radii; cutter settings, gears at non-standard centres.

D. *Cams.*

5.34 AND 5.34D THEORY OF MACHINES.

A. *Inertia effects in mechanisms.*

Bending of members, pressures in joints.

B. *Mechanical vibrations.*

1. One degree of freedom, vibration measuring instruments, vibration isolation.
2. Two degrees of freedom, undamped vibration absorbers.
3. Critical speeds of shafts.
4. Torsional vibration of shafts.

5.41 and 5.41D Descriptive Geometry.

Plane geometry; ellipse, parabola, hyperbola, involute, cycloid and other curves.

Fundamental concepts of descriptive geometry, including reference systems, representation of point, line and plane; fundamental problems of position, of perpendicularity and of measurement. Construction of curves from plane geometry. Various surfaces and solids, their sections, developments and intersections in solid geometry. Application of descriptive geometry to certain problems arising in engineering practice. Special emphasis on ability to visualise problems and processes involved in their solution.

5.52 Fluid Mechanics.

Historical development and present day scope of subject. Physical properties of fluids.

Fluid statics. Pressure-density-height relations. Manometry. Forces on plane and curved surfaces. Statics of moving systems. Equilibrium of bodies wholly or partly submerged in a fluid.

Flow of an ideal incompressible fluid. Pathlines and streamlines. Steady flow. Equation of continuity; one dimensional. Equation of motion along a streamline.

Flow of a real fluid. Viscosity. Friction force and energy loss. Velocity distribution and its significance. Laminar and turbulent flow. Reynolds number. Laminar flow through circular tubes and between parallel plates. Stoke's law.

Fluid measuring instruments. Measurement of fluid properties, static and stagnation pressures. Rate meters. Venturi meters. Orifices. Nozzles. Flow bends. Rotameter. Anemometers and current meters. Pitot-tube. Weirs. Dilution methods. Float measurements.

Momentum equation. Forces on bends, fixed and moving vanes. Impulse turbine. Moment of momentum equation and its application of reaction turbines, centrifugal pumps and fans.

Steady flow in closed conduits. Pipe-flow relationships. Friction-factor charts. Minor losses. Hydraulic and energy lines. Syphons. Non-circular sections. Branching pipes.

Elementary problems of unsteady flow. Orifice discharging under falling head. Discharge of reservoir through pipeline.

Flow of liquids in open channels. Classification of flow. Steady uniform flow. Hydraulic jump.

5.53 AND 5.53D FLUID MECHANICS.

Dynamics of ideal fluid. Acceleration—local, convective. General case of equation of continuity. Euler's equations of motion in three dimensions. Curved streamlines. Variation of Bernoulli constant across streamlines. Irrotational motion. Potential vortex. Vorticity. Rotational motion.

Dimensional analysis and similitude. The general form of physical equations. Raleigh method. Buckingham's theorem. Formulation of one set of π's. Formulation of other sets of π's. Geometric, kinematic, dynamic similarity. Theory of models and prediction equations. Types of models. Scale effects. Froude, Reynolds modelling.

Drag. Pressure drag and friction drag. Drag at small and large Reynolds numbers and in a non-separating flow. Boundary-layer mechanics. Separation. Skin friction drag of a thin plate (*a*) laminar, (*b*) turbulent, (*c*) transition from laminar to turbulent boundary layers. Resistance of, and pressure variations around bodies of revolution. Influence of a free surface.

Elementary dynamics of compressible fluids. Velocity of pressure propagation. Energy equation for compressible flow. Pressure and temperature at a stagnation point. Critical flow nozzle. Compressible flow through a Venturi tube. The expansion factor. Isentropic channel flow equations.

Radial-flow and axial-flow machinery. Types of centrifugal pumps and fans. Velocity triangles. Theoretical relationships. Theoretical characteristic curves. Efficiencies. Actual characteristic curves. Flow through impeller. Similarity relations. Specific speed and its relation to design of rotodynamic runners. Scale effect and model laws. Design constants. Cavitation. Design procedure for a radial-flow pump or fan according to the one dimensional theory. Aerofoil theory applied to axial flow machinery. Characteristics of axial flow machinery. Design procedure for an axial flow impeller. Some particular problems of installation and operation of rotodynamic machines.

5.54 AND 5.54D FLUID MECHANICS.

Further study of incompressible flow in closed conduits. Turbulence. Apparent shearing stress. Zones of flow in a pipe. Wall-velocity law. Velocity defect law. Resistance laws for smooth and rough pipes. Turbulent velocity distribution. Mechanism of turbulence in pipes.

Hydraulic turbines. Classification. Elements of the hydraulic design of inward radial-flow, axial-flow and radial-flow turbines. Similarity relations. Cavitation. Draft tubes. Characteristic proportions. Selection of type and speed of turbine for a new plant.

Surges and water hammer. Fundamental equations. Graphical solution.

Gas dynamics. Energy equation of steady flow, fundamental properties of flow through ducts. One dimensional flow, isentropic flow through nozzles, flow through ducts. The Fanno and Raleigh equations. Theory of shock waves.

Propellers and jets. Momentum theory of propeller. Jet propulsion. Ideal efficiency of a jet. Engine-propeller system turbojets, ram jets. Rocket mechanics.

Centrifugal compressors. Energy considerations. The impeller. Slip factor. Effect of prewhirl. The diffuser system. Characteristics of a centrifugal compressor. Surging.

Axial-flow compressors. Energy considerations. Aerofoil theory. Degree of reaction. Cascades of blades. Performance of cascades. Blade form. Free vortex blading. Constant reaction blading. Effect of high velocity. Axial compressor characteristics.

Lubrication. Properties of lubricants. Perfect lubrication. Reynold's pressure distribution. Frictional force. Journal bearings. Petroff equation. Michell thrust bearing. Slipper bearings.

5.72 AND 5.72D THERMODYNAMICS.

Introduction and Gas Laws.

Heat engines; working substance; perfect gas; measurement of pressure volume and temperature; gas laws; characteristic equation; the lb.-mole.

Forms of Energy, Power.

Measurement; internal energy; work; heat and modes of transfer; first law of thermodynamics; Joule's equivalent; power; I.H.P.; B.H.P.; common units of work and power.

Simple Energy Equation.

Heat calculations; specific heats of a gas; simple energy equation; work done in change of state ($\int$ PdV). Joule's law; internal energy of a perfect gas; relation between C_P, C_V and R (char.—const.).

Enthalpy and Entropy of Gases.

Definitions; reversibility; T — ϕ diagrams; change of entropy in terms of P, V and T.

Gaseous Mixtures.

Partial pressures of constituents; equivalent gas constant, molecular weight, and specific heats of a mixture; conversion from volumetric to gravimetric analysis.

Thermodynamic Processes.

Constant volume, constant pressure and isothermal operations for a gas. Isentropic and polytropic operations for a gas. Effect of varying "n" in polytropic equation $PV^n = K$.

Compressed Air.

Uses of compressed air; power transmission by compressed air; types of compressors; work done in reciprocating compressors. Clearance volume; volumetric efficiency; multi-stage compression; conditions for minimum work; compressor efficiencies; air motors.

Heat Engine Cycles.

Essentials of a heat engine; definition of a cycle; ideal and actual cycles; Carnot cycle for a gas; second law of thermodynamics.

Internal Combustion Engine.

Classification; air standard cycles (in terms of temperature only); effect of compression ratio on A.S.E. Two stroke and four stroke cycles; typical indicator diagrams for all types; carburation, ignition and fuel injection (briefly). Comparison of petrol and compression ignition engines. Performance figures. I.C. engine fuels and their properties (briefly).

Formation and Properties of Steam.

Definition of a vapour; formation of steam at constant pressure; properties of liquid, wet, dry and S/H steam. Use of steam tables; determination of dryness fraction; entropy of water-steam; $T - \phi$ diagram for water-steam.

Steam Boilers.

Purpose; classification; examples and application of water-tube and fire-tube boilers; essential fittings.

Boiler Auxiliaries.

Economizer; air pre-heater; draft equipment; superheater; firing methods.

Boiler Performance.

Equivalent evaporation; boiler efficiency; boiler heat losses (briefly); heat accounts.

Steam Engine Cycles.

Carnot cycle for a vapour; Rankine cycle of operations; Rankine cycle using dry steam on $T - \phi$ diagram; Rankine efficiency in terms of (*a*) areas, (*b*) enthalpies.

Steam Engine Plant.

Essentials of a steam plant; simple reciprocating engine-construction and operation; valve gear (briefly); indicator diagrams.

Steam Condensers.

Purpose; surface and jet types; auxiliaries; cooling water calculations; effect of air; partial pressures of air.

Steam Turbines.

Principles; advantages; turbine nozzles; calculation of velocity; work done on blading; impulse and reaction turbine.

Gas Turbines.

Principles; ideal cycle of operation; layout of simple open cycle plant (showing typical pressures and temperatures); performance and application.

Laboratory.

Engine Testing and Performance.

Measurement of I.H.P. Measurement of B.H.P. Fuel and steam measurements. Various efficiencies—mechanical, thermal, relative, overall, ideal. Specific consumption curves. Willans lines.

5.73 AND 5.73D THERMODYNAMICS.

I.C. Engines—General.

Review of air standard cycles and efficiencies. Effect of compression ratio and maximum permissible pressure on A.S.E. Effects of dissociation and variable specific heat. Calculation of cycle temperatures and efficiencies; use of Hottel charts.

I.C. Engines—Gas and Petrol Engines.

Two and four stroke cycles; ignition; governing; process of combustion; detonation. Effects of ignition timing; valve timing; mixture strength (fuel consumption loops).

I.C. Engines.

Supercharging; high compression ratio; carburettors. Various efficiencies; performance curves; heat accounts.

I.C. Engine—Oil Engine.

Hot bulb type; semi-Diesel; two and four stroke Diesels; air blast and solid injection; governing; process of combustion; effect of mixture strength and compression ratio.

Heat Transfer.

Mean temperature difference for counter-flow and parallel-flow heat exchangers. Mean temperature difference for evaporators; condensers; thermal resistance and overall co-efficient of heat transfer.

Boiler Auxiliaries.

Economizers; superheaters; air preheaters; combustion equipment.

Boiler Performance.

Heat losses; heat accounts; equivalent evaporation; thermal efficiency.

Steam.

Entropy of water-steam; T— ϕ and P-V diagrams for water-steam; adiabatic equation. Expansions of a vapour; Mollier diagram for water-steam.

Steam Cycles.

Carnot cycle; Clapeyron's equation; Rankine cycle of operations. Rankine efficiency for wet, dry and S/H steam; feed pump term. Ideal regenerative cycle; use of regenerative methods with compound reciprocators and steam turbines.

Steam Nozzles.

Purpose; types; steam flow through nozzles; critical pressure; determination of steam velocity and weight of discharge. Determination of nozzle dimensions; effects of friction and super-saturation.

Steam Turbines.

Principles of operation; reduction of steam velocity; types of turbine. Velocity compounding; pressure compounding; pressure velocity compounding; reaction turbines; combination turbines. Velocity diagrams for single stage only; calculation of tangential force, work and horsepower; stage efficiency.

5.74 AND 5.74D THERMODYNAMICS.

Gas Turbines.

Gas nozzles; development of gas turbines; constant volume and constant pressure cycles; ideal thermal efficiency; conditions for maximum work; ideal thermal efficiency using heat recovery; adiabatic efficiency; polytropic efficiency; effect of turbine and compressor losses on efficiency; methods of improving efficiency.

Actual cycles; burner efficiency; mechanical efficiency; pressure drops in system; description of components; application and performance of gas turbines.

Steam Turbines.

Steam nozzles; types of turbines; methods of compounding; simple velocity diagrams; calculation of tangential force, work and horsepower; stage efficiency; blade friction; re-heat factor; internal efficiency; multi-stage velocity diagrams; drum and blading dimensions; methods of improving efficiency; application and performance of steam turbines.

Steam Power Plant.

Components; plant layout; plant heat balances; evaporators; feed water treatment (briefly).

Refrigeration and Psychrometry.

Principles and definitions; reversed Carnot cycle; cold air machines; vapour compression refrigeration; effects of superheating and under-cooling; conditions for maximum coefficient of performance. Nature and use of total heat—entropy and pressure—total heat diagrams: absorption refrigeration (commercial and domestic). Properties of refrigerants; application, testing of refrigeration plants; heat accounts. Elements of air-conditioning; use of psychrometric charts.

Binary-fluid Cycles.

Methods of extending temperature range in engines—mercury/steam; internal combustion/steam; diphenyl/steam; practical applications and performance.

ELECTRICAL ENGINEERING.

Subjects 6.00 to 6.95.

6.104 Electrical Engineering.

A course of lectures, laboratory and design work in electrical engineering which is common to Options 1, 2 and 3 and including a study of measurements, electron physics, illumination, servo-mechanisms, electric circuit and field theory and electronics.

6.12 and 6.12D Electric Circuit Theory.

Simple primary and secondary cells. Units of current e.m.f. and resistance. Rationalised M.K.S. system of units. C.G.S. systems. Ohm's law, resistivity. Temperature coefficient. Kirchhoff's law. Wheatstone and Kelvin bridges. Simple a.c. and d.c. potentiometers. Node and mesh equations. Circuit theorems—superposition, Thevenin's theorem, star-delta equivalents. Units of energy and power. D.c. meters.

Electrostatic and Electromagnetic.

Fundamental field concepts. Charge and capacitance, parallel plate capacitance. Capacitors in series and parallel. Electric force, flux density and permittivity. Capacitance of simple conductor systems. Properties of dielectrics—composite dielectrics. Charging and discharging. R and C series circuits. Energy stored in the electric fields. Electrostatic meters. Magnetic field and lines of force. Force on conductor carrying current in magnetic field. Force between long parallel conductors. B-H curves, m.m.f. and permeability. Magnetic properties of iron and steel. Hysteresis. Computation of ampere turns for composite magnetic circuits—permanent magnets. Faraday's laws of electro-magnetic induction. Self and mutual inductance. Inductance in d.c. circuits. Energy stores in magnetic fields, pull of an electromagnet.

Alternating Current.

Simple alternator: i, I*ave*, I*rms*, v, V*ave*, V*rms*—meters and measurement. Vector representation of sinusoidal voltages and currents. Simple RLC circuits. Power, power factor, measurement of power, wattmeter, etc. Symbolic a.c. circuit solutions. Additional circuit theorems. Bridge networks. Inductively coupled circuits. Resonance, series-parallel and coupled circuits. Q factor, bandwidth. Complex waves, r.m.s. and mean values, total power. Response of network to non-sinusoidal voltages and currents (meter readings). Transients in RLC circuits.

6.13 (6.13A AND 6.13B) ELECTRIC CIRCUIT THEORY.

Three-Phase Circuit Analysis.—Symmetrical and unsymmetrical sources, balanced and unbalanced loads. Three-phase power measurement. Harmonics in three-phase systems.

General Network Theory.—General n mesh network, general star-mesh transformation.

Transient Responses of circuits with lumped parameters (Laplace Transform treatment).

Four Terminal Network Theory.—Transfer impedance and admittance equations.

Transmission Line equations, transient solution, surges on transmission system, reflection, non-resistive and non-linear terminations. Principles of surge protection, steady state solution—travelling waves, reflection, distortionless propagation, standing waves. Line charts for r.f. lines. Power lines, four terminal network equivalents or approximations. Typical long line chart.

Calculation of Transmission Line Parameters.—Eddy current loss, skin effect, proximity effect.

Maximum Power Transfer.—Impedance matching.

Wave Filters.—Constant K, m derived.

6.214 POWER SYSTEMS.

A course of lectures, laboratory and design work relating to the performance of power systems under steady load and fault conditions.

6.224 ELECTRICAL MACHINES.

A course of lectures, laboratory and design work covering the aspects of machines and transformers necessary for the study of such equipment as components of power systems.

6.23 (6.23A AND 6.23B) ELECTRIC POWER ENGINEERING.

This subject is an introduction to the principles of operation of transformers and rotating machines used for the conversion of mechanical to electrical energy and vice versa and the transmission of energy between the points of conversion.

The emphasis will be on the principles involved in the steady state operation of the equipment.

D.C. Machines.

Generation of e.m.f. Simple lap and wave windings. Armature reaction and commutation qualitatively. Equivalent circuits. Generator load characteristic curves. Motor torque-speed characteristics. Speed control and starting. Elementary theory of metadynes.

Transformers.

A.C. magnetisation of iron. Ideal transformer. Polarity. Winding resistance. Leakage reactance of two concentrated coils. Equivalent circuits. Three-phase transformer connections. Instrument transformers.

A.C. Machines.

General—Generation of three-phase e.m.fs. with distributed conductors and sinusoidal space distribution of field flux.

Rotating m.m.f. with assumption of sinusoidal space distribution of coil m.m.f.

Synchronous Machines.

Armature reaction and synchronous reactance. Relation between excitation and power factor in generators and motors. Power angle and torque. Starting and synchronising.

Induction Machines.

Production of torque. Equivalent circuit and circle diagram. Effect of rotor circuit parameters on speed control and starting characteristics. Induction generator.

Single-Phase Motors.

Induction type: Theory of operation, construction, methods of starting, split phase, capacitor motors.

Commutator type: Theory of operation, construction, compensating windings, interpoles. Motor with series and shunt characteristics, applications.

Rating of Equipment.

Losses and efficiency. Cooling of electrical equipment.

Protection and Control Devices.

Transmission.

Introduction to transmission of power neglecting shunt impedance, regulation and efficiency.

6.234 Utilization and Control of Electrical Plant.

A course of lectures, laboratory and design work relating to the utilization and control of electrical equipment. It includes a study of transformers and induction, synchronous and commutator machines with particular reference to industrial equipment and machines and apparatus used for automatic control.

6.303 (6.303A AND 6.303B) ELECTRONICS.

Escape of electrons, work function, properties of common cathode materials, temperature-limited and space-charge-limited current flow. The static characteristics of a diode and triode, the construction and use of a loadline. The equivalent circuits of a triode.

Gas discharges, gas-filled diodes, thyratrons, description of mercury arc rectifier.

Single-phase rectifiers, smoothing.

Class A amplifiers, distortion, frequency response with R-C coupling, Miller effect, other types of interstage coupling network.

Secondary emission, tetrode and pentode.

Class A power output stages, optimum load, efficiency, frequency response. Class AB and Class B output stages, optimum load, efficiency, distortion.

Feedback negative and positive; effect on gain, distortion, frequency response, input and output impedances.

Conditions for oscillation, R-C oscillators, L-C oscillators, Piezo-electric effect, crystal oscillators. Method of operation of U.H.F. oscillators. Multivibrators, astable, monostable and bistable types.

Class C amplifiers, calculations, neutralising.

Semi-conductors, semi-conductor diodes, types of transistor, static characteristics, equivalent circuits, grounded base, grounded emitter and grounded collector amplifiers, transistor oscillators, biassing arrangements.

Amplitude modulation, bandwidth requirements, methods of amplitude modulation, power relationships. Diode detective, T.R.F. receivers, mixing, superheterodyne receivers, tuned circuits and coupled tuned circuits, A.G.C. Frequency modulation, comparison with amplitude modulation.

Propagation of radio waves, ionospheric reflection.

6.304 (6.304A AND 6.304B) INDUSTRIAL ELECTRONICS AND CONTROL.

A course designed to link electronic and electric power in engineering and various other branches of engineering and science in the minds of students, and to give advanced students composite projects involving many aspects of what they have learnt together with economic and practical aspects.

Section A.—Regulators and servomechanisms, dynamics of closed systems, industrial control problems.

Section B.—Induction heating, dielectric heating.

Section C.—Selection of topics such as—

Polyphase rectifiers;
Electronic control of motors and generators;
Basic timing circuits;
Ignitions and thyratrons as line switches;
Resistance-welder controls;
Industrial X-rays;
Photoelectric devices, electronic lamps;
Electrostatic precipitation;
Power line carrier.

6.314 Radio Communications.

A course in the theory, design and operation of equipment and materials used in radio transmission and reception for communications and entertainment, and of the characteristics of the medium through which transmission takes place.

6.334 Line Communications.

A course in the theory, operation and design of equipment and materials used in the transmission of information over lines and cables, and of the characteristics and composition of the various types of transmission lines which are used. Subject matter common to that in Radio Communications will normally be dealt with in the latter course.

6.344 Applied Electronics.

A course of lectures, laboratory and design work covering the principles of electronic engineering relative to automatic control and industrial processes.

6.83 and 6.83d Electrical Engineering.

A special course for engineers not intending to follow electrical engineering as a profession. Presentation of the fundamental principles of electric and magnetic circuits and the application of these principles to the theory and performance of direct and alternating current machines.

Lighting systems and illumination, wiring code, safety precautions.

6.84 and 6.84d Electrical Engineering.

More advanced work following 6.83 on the operating characteristics of motors. Controller design and application, including types, methods of acceleration and retardation, protective devices. Essentials of connecting motor to load. Principles of moving fluids and solids. The application of motors, electron tubes and photo-electric cells.

6.94 Electrical Engineering.

This course consists of one hour lecture and two hours laboratory per week for an entire year. Half of the course is devoted to detailed mathematical and descriptive study of electric and magnetic circuits. The other half of the course will provide an introductory course on transformers, motors, generators and electronics.

6.95 Electrical Engineering.

This course consists of two one-hour lectures and three hours laboratory per week for an entire year. Half of the course is devoted to detailed mathematical and descriptive study of transformers, motors, generators, wiring practice and electrical measurement. The other half of the course is devoted to electronics and special applications of electrical engineering to chemical plant. This section of the course will be given by various specialists. The following subjects are examples of its coverage:—

> Thermionic tubes; conduction of electricity through gases; rectifiers; rheostats; magnets; electric furnaces and electroplating; power generation and distribution.

MINING ENGINEERING AND APPLIED GEOLOGY.

Subjects 7.00 to 7.703 and Geology (General Science).

7.001 Mining Processes.

An introductory course on coal mining with reference to methods of working; access to deposits; elementary treatment of mining science, mine atmospheres, gases, dust, lighting.

7.002 Coal Mining.

Methods of Working Coal.

Open-cut methods; proving the deposit; general outline of development; equipment used. Shaft mountings and insets; location; factors affecting location; structure. Pit bottom; excavation; support; layout. Development of coal seams; order of extraction; methods employed; horizon mining. Bord and pillar workings; suitable conditions; size of pillars; typical layouts and machines used; pillar extraction. Longwall working; suitable conditions; layouts and machines used. Methods of working in special cases; steep seams; thick seams; seams in close proximity; seams subject to spontaneous combustion. Roof supports; at the face and on roadways. Hand, hydraulic, pneumatic and mechanical stowage. Caving. Withdrawal of supports. Preservation of timber supports.

7.004 Advanced Mining Techniques.

A special series of lectures on the most recent advances in mining methods, and discussions on current mining engineering problems.

7.013 Metalliferous Mining.

Drilling.—Type of drills, hammer drills, power drills, rotary, hydraulic rotary drills, churn drills. Method of mounting and the operation of the drilling machine, wet drilling and dry drilling. Drill steel and drill bits, method of sharpening drill bits, drill shop organisation and drill steel distribution. Drill rounds, depth of hole, selection of drilling method to be used, comparisons of efficiency and cost.

Boring.—Reasons for boring, methods used, limitations. Hand auger, churn drills, diamond drill, hydraulic rotary, jetting method. Sampling coring and non-coring holes. Lining drill holes. Cost of diamond drilling compared with other methods. Surveying boreholes, deflection of holes.

Explosives and Blasting.—Action of explosives; types of explosives, composition and classification of explosives. Permitted explosives; tests of explosives; choice of explosives; sheathed explosives; storage of explosives. Detonators; charging and firing shots; gases due to shot firing; multiple shot firing. Exploders; arrangements of shot-holes in coal and stone. Substitutes for explosives.

Methods of Working.

Open-cut Mining.—Features of surface mining methods. Classification of suitable deposits. Advantages and disadvantages. Equipment used for excavation, loading, transport. Removal of overburden. Pit layout and organisation. Costs. Glory holing.

Alluvial Mining.—Classification of suitable deposits. Sampling the deposit. Selection of method. Advantages and disadvantages. Hydraulicking, sluicing, dredging, dragline dredging. Operating dry deposits. Reclaiming land. Methods of mineral concentration used in conjunction with alluvial mining processes; portable plants. Recoveries. Drift mining.

Underground Methods of Mining—Definition of mining terms. Types of mineral deposits. Factors influencing selection of methods. Development. Methods of support. Open stopes; underhand stoping; overhand stoping; shrinkage stoping; square set stoping; cut and fill stoping, horizontal and inclined; sub-level stoping; top slicing; sub-level caving; block caving. Combinations of various methods. Underground leaching. Transfer of broken ore from stopes to shutes and cars. Underground haulage. Ventilation. Drainage. Mine fires. Timber preservation. Reference to Australian methods of mining.

Practical.

Examination and operation of all mining machinery available.

7.023 Mining Engineering.

Shaft Sinking.—Preliminary considerations; selection of site, determination of number, size and shape of shafts; ordinary methods of sinking and lining shafts; appliances and accessories required.

Shaft sinking in difficult conditions; special methods of sinking, enlarging, repairing and deepening shafts. Surveying shafts. Large diameter boreholes. Development of shaft stations.

Ventilations and lighting of shafts; dealing with water from shafts.

Construction of head frames.

Tunnelling.—Driving of stone drifts or adits. Construction of large tunnels for transport. Surveying of tunnels. Organisation of method of working. Equipment required, drilling, drill patterns, explosives, method of firing, mucking, transport, ventilation, support and lining of tunnels

Mine Ventilation.—Quantity of air required for ventilation; measurement of quantity and pressure of air; resistance to flow of air.

Ventilation laws; their evolution and application; equivalent orifice; motive column; evasee chimney; air distribution in mines; splitting air currents; regulators. Methods of producing ventilation; brief historical review; natural ventilation; description and characteristics of centrifugal and axial flow fans. Main and auxiliary ventilation; ventilation surveys.

Transport.—Rails; tracks; skips. Manual haulage. Horse haulage. Rope haulage. Locomotive haulage. Safety devices. Signalling systems. Haulage calculations.

Practical.—Fan testing. Ventilation plans. Ventilation surveys. Design of mining machinery.

7.024 Mining Engineering.

Power Supply and Transmission—Fundamental principles of electric and magnetic circuits and the application of these principles to the theory and performance of direct and alternating current machines.

Surface Installations at Mines—Distribution of power; substations; electric winding engines; straight a.c. system, converter equalizer system, Ward Leonard system, Ilgner system, C.M.B. system, Cascade motor system; ventilation fan motors; other surface plant; bare overhead transmission lines; rectifiers; surface lighting. Lamp room equipment.

Underground Plant.—Underground distribution; typical examples. Shaft cables. Pit bottom sub-stations. Roadway cables. Transformers. Calculations of size of cables. Joint boxes. Underground equipment. Motors; control, switchgear and protective devices. Flame-proof equipment. Trailing cables; connection for trailing cables; care, treatment and repair of trailing cables. Haulage locomotives.

Switchgear and accessories for coal face equipment. Earth continuity protection. Remote control devices. Intrinsically safe equipment. Signalling.

Compressed Air.—Air compression, types of compressors; receivers; transmission lines; pressure drop in lines; air meters; application and air consumption of various types of air motors.

Drainage.—Adit levels. Siphons. Ram pumps. Piston pumps. Multi-throw pumps. Differential pumps. Duplex pumps. Centrifugal and multistage centrifugal pumps. Mono pumps. Megator pumps. Sumps and standages. Drainage of flooded workings.

Winding.—Guides—rigid and flexible. Cages, cage-chains, detaching hooks, capels. Headframes, keps. Decking arrangements. Winding engines, drums, brakes, reversing gear, overwind and slow banking gear. Koepe and other winding systems. Characteristic winding curves. Balances winding. Skip winding. Signalling systems. Ropes.

Laboratory.—Electricity in mines; mining machinery.

7.034 and 7.034D Mineral Dressing.

Object, scope and economics of coal preparation and mineral dressing.

Size Reduction: jaw, gyratory, cone and roll crushers, Bradford breakers, hammer mills, stamps. Grinding, ball mills, rod mills, tube mills.

Liberation: theory and effect on concentration procedures.

Sizing: laboratory sizing and industrial screens.

Theory of Classification: classifiers; coal washing machines which operate on classification principles.

Coal Preparation: distribution of ash in coal; float and sink tests; washability curves; jig and trough washers; float and sink separators; cyclone separators; spiral concentrators; froth flotation; pneumatic separators.

Mineral Dressing: sink and float; jigging; flowing film concentration; flotation and agglomeration; spiral concentrators; magnetic separators; electrostatic separators; amalgamation; cyanidation; recovery of metal from ores.

Storage: conveyors, weighing; sampling; feeding; thickening; drying; filtering; pumping; tailings disposal; centrifuges; dust collection.

Marketing: sale of products; smelter schedules.

Flowsheets: mill design; pilot plants.

Laboratory: Principally work on—

(*a*) Sampling.

(*b*) Size reduction, crushing, grinding and screening.

(*c*) Separation.

(i) Coal preparation.

(ii) Mineral concentration.

7.042 Mining Science.

Mine Atmospheres. Mining Hygiene. Dust Control. Mine Lighting. Gas Testing.

Mine Atmospheres.

Atmospheric conditions in mines. Sources of pollution of mine air; mine gases; properties and physiological effect of various gases; sampling of mine air; air analysis; detection of gases, gas detectors.

Temperature and humidity; their causes; geothermic gradient; physiological effect of temperature and humidity; kata thermometer; effective temperature; conditioning of mine air; hot and deep mines. Environmental surveys.

Mining Hygiene and Dust Control.

Miners' diseases; silicosis; pneumoconiosis; nystagmus; sporotrichosis; ankylostomiasis; dermatitis. Compensation and treatment.

Dust formation. Dust prevention:—Boring; cutting; loading; travelling roads; ore bins and chutes; screens. Air cleaning. Dust extraction. Dust measurement, sampling and analysis.

Mine Lighting and Gas Testing.

Brief historical development of safety lamp; principle and construction of wire gauze. Conditions to be fulfilled in efficient safety lamp; types of flame safety lamps; electric hand lamps and cap lamps; M.L. lamps; mains lighting; discharge lighting; aids to illumination.

Lamp fuels; tests on lamp fuels; illuminating power; design and equipment of lamp rooms; safety lamp tests.

Gas detection. Flame safety lamps; special methane detectors.

Practical.

Inspection and use of equipment discussed in lectures.

7.044 Mining.

Subsidence and Strata Control.

Subsidence; early theories, angles of draw, surface movements, influence of thickness of seam, depth, inclination of strata, nature of strata, methods of working, etc. Shaft pillars and pillars for other surface supports.

Properties of coal measure rocks.

State of stress at mining depths; the stress conditions in the vicinity of single and multiple roadways and their effects.

Stress conditions along pillar extraction lines in bord and pillar mining.

Principal stress conditions in longwall mining and their effects; means of modifying excessive stress conditions.

Rock bursts in mines; theories; classification; conditions conducive to bursts; examples of rock bursts; preventative measures.

Spontaneous Combusion, Fires and Inundations.

Oxidation of coal; historical review of theories of cause of spontaneous combustion; factors influencing self-heating; observation and organisation in seams liable to spontaneous combustion; detection of incipient heating.

Methods of dealing with heatings and gob fires; removal of fires; construction of seals.

Layout of workings in seams liable to spontaneous combustion. Re-opening of sealed-off areas.

Other causes of underground fires; precautions and methods of dealing with fires.

Sources of water under pressure; precautionary measures when working under or approaching water; water blast; dams.

Explosions, Rescue and Recovery Work.

Ignition of gas and coal dust; explosive properties of coal dust; factors affecting explosibility; nature and characteristics of gas and coal dust explosions; causes, effects and precautionary measures; research work on gas and coal dust explosions.

Rescue work; respiration; self-contained breathing apparatus; smoke helmets and respirators; organisation and operation of rescue work; rescue stations and brigades; mine accidents; ambulance stations and organisation.

Laboratory.

Analysis of dusts. Explosion tests on coal dust and methane. Rescue apparatus.

7.052 Mining Engineering Practice.

Introduction. A general review of mining practices and methods. Mining viewed as a link between geology and different industries. Proving the mineral by boring from the surface. Methods of deep boring. Tunnelling. Organisation and equipment. Drilling and loading. Explosives and blasting. General considerations of breaking ground with explosives. Some details of principal methods of shaft sinking and lining. Underground methods of working metalliferous deposits. Underground methods of working coal deposits. Strata control. Subsidence. Methods of supporting roadways and workings—general principles and description. Special methods of support—stowing. Underground transport. Shaft winding. Some details of winding. Power. Steam. Compressed air. Electricity. Drainage—general considerations. Some details of principal types of pumps. Mine lighting. Mine ventilating. General principles concerning the production and distribution of the air current. Mine atmospheres. Heat and humidity. Gases—properties and physiological effects. Gas testing. Dusts and their control. Health and hygiene. Safety—general considerations. Fires and fire-fighting. Mine explosions. Rescue and recovery work. Underground organisation. Surface organisation. Surface installations. Overall control and management. Surface methods of working metalliferous and coal deposits. Mining—its problems and future.

7.054 and 7.054d Assaying.

Fire Assaying.

Chemical Analysis.

Exercises on the analysis of coal, calorific values of gas and fuels, gas analysis by Orsat.

Standard methods of analysis of metals and ores—carbon in steel, lead, zinc, chromium in ores.

Use of spectrophotometer, polarograph; chromatography in suitable applications.

7.064 Mineral Economics.

Sampling: Preliminary examination and classification of mineral deposits. Equipment necessary for sampling. Techniques for sampling, reduction of samples and despatch. Errors in sampling; salting; reliability. Assay plans. Minable ore limits. Computation for determinations of ore reserves.

Mine Valuation: Appraisal of ore reserves. Mining costs. Mineral beneficiation, extractive metallurgy. Smelter schedules. Marketing of minerals, prices, points of sale, effect of impurities, mineral resources. Estimation of mine revenue, life, annual and present value. Inspection of operating or potential mines. Preparation of mine reports.

Mining Law: N.S.W. Mining Act, 1906-1952.

Mine Organisation: Company formation, types of companies, company law, methods of finance, capital, shares, company expansion, absorption or amalgamations.

Mine accounting, classes of accounts, bookkeeping, mine stores and store keeping, profit and loss accounts, balance sheet. Annual report. Equipment costs, general surface arrangements, location of plant, workshop and surface buildings. Underground equipment organisation. Servicing. Materials and stores. Estimates. Overhead costs.

Mine Management: Management organisation, duties, function and responsibility of officials, reports, returns, notices.

Labour control, time keeping, measurement of work, efficiency engineering studies, systems of payment, labour turnover.

Industrial relationships, trade unions and associations. Economics of New South Wales coalfields.

7.502 Geology.

Introduction, the scope and applications of geology; cosmology and structure of the earth; agents of denudation, weathering, river action, glaciology, wind action, the sea and its action, lakes; underground water, diastrophism, vulcanism and earthquakes; igneous sedimentary and metamorphic rocks, coal and petroleum.

Laboratory.

Examination and identification of common minerals and rocks in hand specimen; interpretation and preparation of geological maps and sections.

Field Work.

Six excursions to be held on Saturdays during the year.

7.503 (7.503A and 7.503B) Petrology.

Forms and structures of igneous rocks; physical chemistry of rock forming minerals; consolidation of magmas; variation in igneous rocks; classification of igneous rocks; petrographic methods; alkaline rocks and their origin; petrographic provinces; ultramafic rocks, origin and mode of emplacement of bathyliths.

Thermal, regional and plutonic metamorphism; facies concept in metamorphism; metasomatism.

Composition and classification of sedimentary rocks; sedimentary environments; physical properties of sedimentary rocks; facies concept in sedimentation; tectonism and sedimentation; palaeogeographic mapping.

Laboratory.

Microscopic examination of minerals and rocks. Introduction to petrographic methods.

7.504 Advanced Petrology.

A specialised study of petrology, designed to include important current developments, and covering the following:

Instruction in the use of the universal stage; introduction to the study of petrofabrics.

Application of petrological methods to the study of industrial raw materials; mineralogy of artificial minerals, cements, slags, ceramics and refractories; optical determination of artificial minerals.

Laboratory.

Practice in the use of the universal stage, petrofabric investigations; thin section examination of artificial minerals found in ceramics, refractories, slags and cements; differential thermal analysis and its applications.

7.511 Mineralogy.

Fundamental laws of crystallography, elements of symmetry, crystal system and classes, descriptive mineralogy and the mode of deposition of the more important economic minerals.

7.512 Mineralogy and Crystallography.

Review of the thirty-two crystal classes in the Hermann-Mauguin classification. Stereographic and gnomonic projection. Crystal goniometry and drawing from projections. Regular and irregular attachment of crystals, twinning, etc. Crystal growth and its anomalies. Hemihedrism, holohedrism.

Introduction to the atomic structure of crystals with examples of the atomic structure of some common minerals. Introduction to chemical crystallography; isomorphism, polymorphism, etc. Physical properties of crystals; cleavage, gliding, secondary twinning. Introduction to crystal optics in polarised light; the index and Fresnel ellipsoids. Theory of crystal growth; vicinal pyramids etching and corrosion figures. Hardness and specific gravity of minerals and their accurate determination. Classification of minerals. Descriptive mineralogy of the more common minerals, especially economic minerals.

Laboratory.

Exercises in crystal symmetry; optical goniometry. Crystal drawing from projections. Crystallographical calculations. Examinations of crystal sections by means of the polarising microscope in incident and reflected light, both parallel and convergent. Determination of the refractive indices of minerals by various methods. Determination of specific gravity. Macroscopic examination of the more common minerals, including simple physical, optical, chemical, etc., tests. Study of the paragenesis and mode of occurrence of minerals. Blowpipe analysis of minerals.

7.513 Advanced Mineralogy.

Advanced sections of crystal optics; the universal stage; physical properties of crystals (elasticity, electrical, thermal) with a view to their technical applications.

Atomic structure of crystals; point groups, space groups. Introduction to the principal methods of X-ray investigation of crystalline materials.

Selected chapters of descriptive mineralogy (radio-active minerals, rare-metal minerals, clay minerals, etc.).

The principles of determinative mineralogy; introduction to qualitative microchemical analysis of minerals, including spot tests of minerals and ores.

Laboratory.

Advanced methods of investigation of crystals in polarised light, both parallel and convergent. Methods of the universal stage. Double variation method for the determination of the refractive index in oriented grains.

X-ray analyses of crystalline matter by means of the powder method. Selected problems of determinative mineralogy, including microchemical methods; differential thermal analysis of minerals.

7.523 (7.523A and 7.523B) Stratigraphy and Palaeontology.

The geological evolution of the Australian Continent from the Pre-Cambrian to the Recent times and other important world localities.

Invertebrate palaeontology; systematic classification of the various phyla and detailed morphological study of the important subdivisions of the phyla; an outline of historical geology. Regional palaeontology; stratigraphical significance of fossil assemblages. Stratigraphical correlation of sedimentary strata; palaeontological environment and its relationship to sedimentology, ecology, evolutionary trends; statistical palaeontology.

Practical.

Examination and description of representative fossils from the various phyla; study of fossil assemblages.

Structure contour exercises, interpretation of structure and history from geological maps.

7.533 (7.533A and 7.533B) Economic Geology.

Nature and origin of ore deposits, orthomagmatic process—pegmatitic and hydrothermal stages. Neomagmatic processes—granitization and ore genus. Contact metamorphic and pyrometasomatic deposits. Sedimentary and alluvial deposits.

Structural control of ore deposition—local and regional.

Paragenesis, oxidation, enrichment.

Macro and micro textures of the ore mineral. Metallogenetic epochs of Australia. Study of selected paragenetic mineral groups—metals in industry.

Study of principal Australian and overseas ore deposits.

Laboratory.

Study of a wide range of ore types. Vein structures, wall rock alteration phenomena. Microscopy of the opaque and non-opaque ore minerals. Examination of suites of ores and country rocks from important Australian and overseas localities. Spectrographic studies of the ore minerals.

7.534 Mining Geology.

The economics of mining, ores, protores, and penalties. Prospecting and regional surveys. The work of a geologist in a large mine. Mine plans, mine mapping and the solution of structural problems by various methods. Assessment of the potential of a new mining field. Geological factors governing the re-working of an old mine or mining field—deductive and inductive methods. Geological report writing.

Practical.

Mapping problems, study of mine plans and mine models. Literature survey concerning old workings and the assessment of possible further production using specific examples. Preparation of geological reports based on actual field studies.

7.542 Geophysics.

An introduction to the underlying principle, methods and applications of geophysical prospecting, viz., gravity, magnetic, electrical, seismic, radioactive and miscellaneous. Various physical properties of rocks with particular reference to stress-strain concepts, mechanics of deformation and rupture in rocks, behaviour of rock types under differing stress conditions.

Description and analyses of folds, cleavage, joints, faults, salt domes and slump structures.

7.553 Geology of Fuels.

Petroleum: Nature and origin, theories on mode of accumulation. Stratigraphic structural and correlation aspects. Subsurface laboratory methods and subsurface logging. Secondary recovery, controlled directional drilling. Subsurface maps and graphical representations. Study of world's major oil fields.

Coal: Nature and origin, stratigraphic considerations. Coal seam structures—splits, washouts, rolls, rock dykes, igneous intrusions.

Coal seam dislocation—concealed coalfield.

Coal measure flora. Type and rank variation.

Petrology of coal. Chemical constitution of coal and its relations to type and rank. Study of principal Australian and overseas coal fields.

Laboratory.

Problems in correlation—lithological and palaeontological.

Chemical and fluorimetric analyses. Study of petraliferous sediments. Visits to oil refineries.

Micropetrology of coal. Analyses of coal.

Determination of trace elements in coals.

7.564 Photogrammetry and Photogeology.

Study of aerial photographic surveying and the theory of photogrammetry. Use and principle of stereographic mapping instruments.

Application of photogrammetry in determination of geological structures.

7.574 Engineering Geology.

Geological exploratory work in engineering projects; inter-relation of soil mechanics and geology; testing of the physical properties of rocks.

Geological aspects of quarrying and tunnelling, geology of dam sites and reservoirs, bridge and building foundations; rock creep and landslides; protection of river banks against scour; transportation of sediments, siltation of rivers; soil erosion and its control.

Building stones, concrete aggregates, road materials and railway ballast.

7.602 Geology.

Introduction to geology, cosmology and structure of the earth: agents of denudation, weathering, river action, glaciology, wind action, the sea and its action, lakes, subsurface water, diastrophism, vulcanism and earthquakes; igneous, sedimentary and metamorphic rocks, coal and petroleum.

Crystallography: the laws, symmetry elements, crystal systems and classes. Miller indices. Physical properties of minerals.

Laboratory.

Examination and identification of common minerals and rocks in hand specimen. Interpretation and preparation of geological maps and sections.

Examination of crystals and crystal models. Macroscopic examination of some common mineral groups.

7.612 AND 7.612A MINERALOGY.

A course in mineralogy for students in Metallurgy.

The crystalline state of minerals; fundamental laws of crystallography, symmetry elements and symmetry operations; crystal systems and classes; Miller indices; stereographic and gnomic projection of crystals. Examples of the more common crystal classes. Regular and irregular attachment of crystals, twinning, etc.; crystal growth and its anomalies.

Fundamentals of the atomic structure of crystals, with examples of the atomic structure of some common minerals.

Physical properties of crystals; cleavage, gliding, secondary twinning elasticity. Elements of crystal optics in polarised light.

Mode of formation of minerals and ores in the igneous sedimentary and metamorphic cycles; introduction to petrology. Principal type of economic mineral deposits. Elements of fuel geology; construction and refractory materials.

Classification of minerals. Descriptive mineralogy of common minerals, especially economic minerals.

Laboratory.

Crystallography: Examination of crystals and crystal models for symmetry; perspective drawing of crystal models. Crystal goniometry; stereographic projection of crystals.

Optical Mineralogy: Examination of minerals by means of the polarising microscope in incident of reflected light. Determination of the refractive indices of crystal fragments by means of the immersion method.

Descriptive and Determinative Mineralogy: Macroscopic examination of common minerals, especially economic minerals, including simple physical, optical, chemical methods, study of the paragenesis and mode of occurrence of common mineral groups. Study of principal rock types in which they occur. Blowpipe analysis of minerals.

7.633 GEOLOGY.

Forms and structures of the igneous rocks; consolidation of magmas; classification of igneous rocks. Thermal, regional and plutonic metamorphism. Composition and classification of sedimentary rocks; sedimentary environments.

Nature and origin of ore deposits, orthomagmatic processes, neomagmatic processes. Contact metamorphic and pyrometasomatic deposits. Sedimentary and alluvial deposits. Structural control of ore deposition. Secondary enrichment.

Nature and origin of petroleum and coal. Coal seam structures. Coal measure fauna and flora. Type and rank variation. Petrology of coal. Study of Australian and overseas coalfields.

Geological evolution of the Australian Continent from Pre-Cambrian to Recent.

Laboratory.

Microscopic examination of minerals and rocks.

Study of a wide range of ore minerals—vein structures. Wall rock alteration. Examination of suites of ores.

Examination of petraliferous sediments. Micropetrology of coal. An introduction to palaeontology.

7.644 Geophysics and Geotectonics.

This subject follows on from 7.542 Geophysics.

A more detailed treatment of the various geophysical methods of exploration with special reference to mining and engineering. An outline of geotectonic concepts, orogenesis, isostasy, geo-magnetism, age determinations, and mining tectonics.

7.673 Geology.

Geological exploratory work, surface and underground, in relation to civil engineering. Rock types and their structural features in relation to engineering practice—quarries and cuttings, tunnels, dams, etc. Geology of dam sites and reservoirs. Roads and road materials. Rivers—delta and river mouth problems, bank erosion. Introductory geophysics and relation to civil engineering. Elasto-plastic properties of rocks.

7.703 Geology.

A course in geology for Architecture students.

Introduction to geology. Agents of denudation, weathering, river action, glaciology, wind action, marine erosion, sub-surface water, diastrophism, vulcanism. Igneous, sedimentary, and metamorphic rocks.

Geological aspects of foundations, building stones, materials of construction.

Laboratory.

Examination and identification of common minerals and rocks in hand specimens. Interpretation and preparation of geological maps and sections.

Field Work.

Six excursions to be held on Saturdays during the year.

Geology I (General Science).

This subject covers the following topics (divided into Part I and Part II for the part-time course) :—

Part I.

7.602 Geology.

Part II.

7.512 Mineralogy and Crystallography.

Geology II (General Science).

This course of approximately 136 lectures and associated practical work consists of a treatment of the following subjects:.

Part I.

7.503A Petrology, 7.523A Stratigraphy and Palaeontology and 7.533A Economic Geology.

Part II.

7.503B Petrology, 7.523B Stratigraphy and Palaeontology, 7.533B Economic Geology and 7.553 Geology of Fuels.

Geology III (General Science).

The subjects which constitute this course of approximately 170 lectures and associated practical work are as follows (divided into Part I and Part II in the part-time course):

7.524 Palaeontology.—Systematic classification of the various phyla and detailed study of the various subdivisions of the phyla. Species and introspecific categories; phylogeny and ontogeny, evolutionary trends and the theories of evolution. Palaeontological environments and their relations to sedimontology; ecology. Statistical methods in palaeontology.

Laboratory.—Examination and description of a wide range of fossil animals and plants (including vertebrates). Laboratory techniques in palaeontology. Comparative studies of species and sub-species; study of morphological variations through time.

Together with—

7.504 Advanced Petrology.

7.513 Advanced Mineralogy.

7.542 Geophysics.

7.564 Photogrammetry and Photogeology.

Students are required to submit a thesis on an approved topic.

CIVIL ENGINEERING.

Subjects 8.00 to 8.94.

8.11 AND 8.11D ENGINEERING MECHANICS.

Graph drawing, graphs of two variables, use of functional graph paper, graphs of three variables. Graphical differentiation and integration. Simple machines, velocity, ratio, mechanical advantage, efficiency, etc. Graphical statics, solution of simple framed structures by graphical and analytical methods. Introduction to the concepts of shear force, bending moment, axial force.

8.112 AND 8.112D THEORY OF STRUCTURES.

Stress, strain, elasticity. Riveted and welded joints, thin shells. Compound stresses. Bending moment and shear force. Theory of bending of beams, bending stresses, shear stresses; deflection of beams. Torsion, springs. Combined bending and twisting, combined bending and direct stress. Strain energy, resilience, impact loads.

8.113 STRUCTURES.

Influence Lines.—For statically determinate structures including three-hinged arch.

Three-moment Equations.—Applied to beams with non-deflecting supports. Indication of how the equations may be extended to continuous beams on deflecting supports.

Strain Energy.—Strain energy methods used for the solution of one-fold statically indeterminate rigid frame and pin-jointed truss problems. Determination of deflection using unit load method and Castigliano's Theorem. Use of Williot Mohr diagrams for deflections of trusses.

Plate Web Girder Design.—Design of plate web girders and crane runway girders—flanges, web, stiffeners, splices, etc.

Reinforced Concrete.—Simple reinforced beams and slabs. Tee-beam design. Doubly reinforced beams. Axially loaded columns. Eccentrically loaded columns. Circular columns. Column roofings.

Drawing Office.—

1. Problems on statically determinate beams, trusses, three-hinged arched frames and three-hinged arch trusses.
2. Problems on three-moment equations.
3. Complete design of a plate web girder, either riveted or welded.
4. Complete design of a reinforced concrete warehouse floor, including slab; two-span continuous beam, an edge tee-beam and axially loaded column.

8.114 Structures.

(*a*) Tension coefficients. Space frames. Relaxation methods and analysis of indeterminate structures. Elementary treatment of arches. Experimental model analysis. Moment distribution methods.

(*b*) Design of retaining walls, weirs, small dams, timber design, strength, joints, beams and joists, columns and struts. Reinforced concrete columns. Plastic theories applied to reinforced concrete. Prestressed concrete design. Limit design of continuous beams.

(*c*) Associated drawing office work..

8.122 Structures.

Reveting design of all types of joints. Welding design of all types of joints. Tension member design—both centrally and eccentrically loaded. Compression member design—both centrally and eccentrically loaded. Beam design—including design of built up standard rolled steel sections. Plate web girder. Roof truss and bent design.

Drawing Office.—

1. Each student designs a complete riveted roof bent.
2. Each student designs a complete welded frame consisting of one battened column.
3. Each student designs a complete welded frame consisting of one latticed column.
4. Each student designs a complete welded frame consisting of one plated R.S.J. beam.
5. Calculation of elements of plate web girder.

8.123 and 8.123d Structures (Theory and Design).

For students in Mechanical Engineering.

(*a*) Influence lines for statically determinate beams and trusses. Impact maximum moments and shears. Continuous beams. Three-moment theorem and applications.

(*b*) Design of steel structures—columns with bracket loads, plate web girders, mill buildings, steel-frame buildings.

(*c*) Associated drawing office work.

8.132 Theory of Structures.

For students in Chemical Engineering and Electrical Engineering (part-time) courses.

This course runs for two terms at three hours per week, and consists of one term of fundamental work, and one term on materials technology and practice. The early sections of the theoretical work will be treated in detail, but with the more advanced work emphasis will be placed on applications rather than derivations.

Fundamental Work.

Stress-strain theories for thin and thick cylinders, particularly in the creep range for the latter. Dished heads of all types, internal and external pressures. Welded joints.

Bending moment and shear force in cantilevers and beams; eccentric loading; three-moment theorem applied to supports.

Torsion of circular and tubular shafts, combined torsion and bending; power transmission (multiplane graphical solution). Stresses and deflections of close-coiled springs. Simple strut theory.

Materials Technology.

An introductory course in the mechanics of materials. Lecture work includes types of tests and investigations, treatment of errors, and the behaviour of engineering materials when subjected to tension, compression, hardness impact, bending, fatigue, and creep tests.

Mention will also be made of some non-destructive testing techniques.

The laboratory work will include four selected experiments from the following: tension, compression, impact, hardness, flexure, torsion, overstraining, calibration of wires and springs.

3.22 Materials of Construction.

A materials technology course for students in Architecture.

Section 1. *General Materials Technology.*

This section consists of 15 hours of lecture work and 33 hours of laboratory work as follows:—

Principles of engineering laboratory practice, introduction to the precision of measurements and the calculation of errors. The behaviour of constructional materials is considered, with special emphasis on standard tests and material characteristics in tension, compression, shear, impact, hardness, fatigue, and creep. Some non-destructive test methods will be given, with special mention of their application to building practice. Efficient utilisation of materials with reference to durability, appearance and economy.

Laboratory work will consist of tension behaviour of common metals, compression, behaviour of common timbers, shear, impact, and cleavage tests on these timbers, compression and bending tests on clay bricks, tiles, etc., demonstration of other experimental and testing techniques.

Section 2. Concrete Technology.

This section consists of 8 hours of lectures and 20 hours of laboratory work serving as an introduction to Concrete Technology, as follows:

Principal types of cements, their properties and simple testing; cement handling and storage. Concrete aggregates, characteristics, grading, and testing. Admixtures. Factors affecting concrete properties. Basic concrete mix requirements and mix design methods. The manufacture of concrete and job control.

Laboratory work includes the testing of cement, aggregate, and concrete, and the examination of concrete mix design techniques, workability, yield, and air entrainment.

8.23 AND 8.23D MATERIALS OF CONSTRUCTION.

Concrete.—Materials used in modern concretes; manufacture, physical and chemical properties of cements; production, testing, and selection of aggregates; pozzolans; admixtures. Strength, durability, workability, elastic and other properties of concretes. The design and proportioning of mixes. Manufacture and field control, mixing, transporting, placing, curing, formwork, testing. Special types of mortars, concretes, and special techniques.

Timber.—Types, properties and structure of timber. Defects, tests, and selection of structural timber. Attack and preservation. Manufactured units.

Steel.—Brief summary of manufacture, testing, selection, and tolerances of structural grades.

Aluminium.—Brief summary of manufacture, properties and use of structural aluminium and aluminium alloys.

Building Stone and Structural Clay Products.—Production, types, application to engineering construction.

8.33 ENGINEERING COMPUTATIONS.

The emphasis in this course is placed on the actual solution of engineering problems rather than on the mathematical aspects, and the latter is given only in so far as is necessary to the carrying out of the work. The following topics will be treated:

Construction of intercept charts for three or more variables. Construction of nomographic charts by use of determinants. Curve fitting by method of least squares. Solution of algebraic and transcendental equations by simple iteration methods—horizontal iteration, Newton—Raphson method. Brief introduction of Matrices—multiplication, inversion. Solution of linear simultaneous equations—(a) by Cholesky (Crout) method (b) by relaxation. Introduction to finite differences—the difference table, mention of control differences, forward and backward differences, correlation between finite differences and infinitesimal derivatives. The difference equation. Solution of differential equations and partial differential equations. Relaxation methods applied to solution of problems involving differential equations such as Poisson's Equation using the previous work.

Student work is essential, and about half the total course consists of tutorials. The tutorial work includes problems which require electrical desk calculators for their solution.

8.41 SURVEYING.

A course on surveying as applied to electrical engineering.

Instruments and Equipment.

Chaining; types of bands and tapes; methods of measurements; corrections to be applied to measured lengths; chain surveys. Theodolite; various types; description of theodolite; method of reading angles, horizontal and vertical; precautions to be taken to eliminate instrumental errors. Minor instruments; prismatic compass; abney clinometer optical square; prism square; box sextant; methods of use of each.

Field Procedure.

Bearings; true; magnetic; grid; assumed; calculation of bearings from angles. Traverses; closed and open; field notes; field methods; compass traverse; theodolite traverse; checking angular close; latitudes and departures; checking linear close. Detail surveys; control traverse; radiations; offsets.

Levelling.

Definitions of terms. Methods of levelling; differential; barometric; trigonometrical. Instruments used in differential levelling; surveyor's level; tilting and non-tilting type; checking and adjusting level; use of level; staff Sopwith pattern. Field procedure; field practice; method of booking; reduction of staff readings; checking reduction; precautions to be taken when levelling. Tacheometry; stadia system; formulae for horizontal and inclined sights; instrumental constants; determination of constants; method of field procedure; booking; reductions; horizontal and vertical components; tacheometer traverse; accuracy; direct reading tacheometers. Contours; definitions; setting out a contour; contour survey; various methods of field procedure; plotting. Transmission line surveys; information required; location survey; field procedure; plotting longitudinal section; fixing position of poles; templates; marking out pole positions; easements. Setting out; methods of setting out buildings, machinery, etc.

Practical Work.

One week at Survey Camp.

Chaining; plumbing; step chaining; slope chaining. Theodolite; reading horizontal and vertical angles; azimuth traverse. Traverse; detail survey; control traverse; radiations and offsets to locate features; plotting. Levelling; checking level; closed level circuit; levelling for plotting profile. Tacheometry; checking constants; reading staff; closed tacheometer traverse; reductions. Transmission line survey; tacheometer traverse for a proposed transmission line; plotting longitudinal section; fixing pole positions.

8.42 and 8.42A Land Surveying.

The principles of the theodolite and dummy-level; use of level in taking longitudinal and cross-sectional profiles and in setting out works for construction; simple applications of the use of the theodolite in building construction work; simple traverses; setting out; contouring on a grid; simple earth-work problems.

8.43 and 8.43D Surveying.

Chaining; instruments and their use; basic survey methods and principles; tacheometers and tacheometry; procedure for azimuth determination by extra-meridian sun observation; barometric instruments and surveys; barometric survey methods; plane tabling; estimation of errors; areas and volumes; setting out works; legal aspects.

Survey Camp of one week's duration (attendance is compulsory for third year Civil Engineering and Mining Engineering students, second year Applied Geology students). In the case of the fourth year Mechanical Engineering students, attendance at this camp is optional, unless the student desires to gain a credit or distinction pass.

8.44 and 8.44D Surveying.

Instruments—modern developments; theory of errors and adjustments; precise surveys; elements of geodesyl mine surveying; aerial surveying and photogrammetry; elementary field astronomy; computations; elements of map projections; engineering applications of surveying.

Survey Camp of one week's duration (compulsory for fourth year Civil Engineering and Mining Engineering students).

8.45 Mine Surveying.

This subject for students in the Mining Engineering course is designed to follow on from 8.44 Surveying, and consists of lectures on the application of surveying principles to mining problems.

8.53 Fluid Mechanics.

More advanced treatment of topics introduced in 5.52 Fluid Mechanics, dimensional analysis and theory of models, surface and form resistance, open channel flow, unsteady flow in pipes, hydraulic machinery.

8.54 Applied Hydraulics.

Non-uniform flow in open channels, channel transitions, hydraulic jump, waves, surges. Discharge measurements.

Potential flow, application to hydraulic structures. Weirs, spillways, energy dissipation.

Pipe flow, networks; unsteady flow, surge, water hammer. Sedimentation.

8.63 Civil Engineering.

This subject is divided into sections designed to cover the following specialised fields:

8.63A *Engineering Construction.*

Construction plant and equipment. Compressed air. Tunnelling. Explosives. Excavations, piling, coffer dams, caissons, dams and weirs, foundation piers and abutments, scaffolding, job programming and economy.

8.63B *Hydrology.*

Elements of hydrology. Precipitation. The run-off process. Infiltration. Water losses. Determination of available flow. Flood flows. Movement of surface water.

8.64 Civil Engineering.

This subject is divided into sections designed to cover the following specialised fields:

8.64C *Public Health Engineering.*

Elements of biology and bio-chemistry, decomposition. Basic Public Health treatment processes (mechanical, physical, chemical, biological, hydraulic). Sedimentation. Sterilisation, filtration. Measure of pollution.

Practical application of basic processes to design and operation of treatment works. Planning and construction of water supply and sewerage schemes. Refuse disposal and treatment. Swimming pools. Minor Public Health Engineering problems.

8.64D *Road Engineering.*

Elements of road design. Factors affecting design. Economics. Drainage. Road pavements, concrete, bituminous and non-bituminous. Road bridges and ferries. Subsidiary works and facilities. Elements of aerodrome design and construction.

8.64E *Railway Engineering.*

Main features of railway engineering. Economics and special features of layout. Permanent way, ballasting of track, sleepers, rails, rail fastenings, points and crossings. Signalling. Special structures. Rolling stock.

8.64F *Harbours and Rivers Engineering.*

Natural and artificial harbours. Training of river estuaries by groynes, training walls, breakwaters, etc. Effect of tides, wave action. Docks, wharves, slipways. Road and rail access. Construction plant, dredging. Sea-bed exploration. Hydrographic surveying.

8.64G *Irrigation Engineering.*

Natural and artificial irrigation. Soil deterioration and prevention. Water requirements. Sources of water. Methods of application to land. Investigation and design of irrigation system.

Special structures and appurtenances. Water metering. Operation and maintenance of system.

8.64H *Hydro-electric Engineering.*

Associated works and equipment. Preliminary surveys and investigation. Economic factors. Water available, drought characteristics, storage regulation. Emergency precautions, maintenance.

8.64I *Engineering Administration.*

General conditions of contract, principles to be observed in drawing up contract documents including specifications, with practical assignments. Quantity surveying applied to civil engineering works, practical assignments in taking out quantities and preparing estimates. Costing systems, cost statements, economics of projects, sinking funds, capitalised cost, depreciation.

8.64J *Engineering Construction.*

Advanced earthworks methods, tunnel mechanisation, major bridge foundations, reinforced concrete and pre-stressed concrete construction, steel fabrication and erection, river and coastal control works, works organisation, major project planning. Soil exploration, stability problems in soils, soil stabilisation, moisture movement in subgrades.

8.73 AND 8.73D SOIL MECHANICS.

Physical and mechanical properties affecting soil action in engineering problems; coefficient of permeability, capillarity and compressibility and their application in practical problems relative to seepage, uplift, liquefaction and the settlement of buildings located above buried compressible soil strata; shearing strength and bearing capacity and their application to engineering problems.

8.73H Soil Mechanics and Hydrology.

Soil Mechanics.—Physical and mechanical properties affecting soil action in engineering problems; coefficient of permeability, capillarity and compressibility and their application in practical problems relative to seepage, uplift, liquefaction and the settlement of buildings located above buried compressible soil strata.

Hydrology.—Elements of meteorology and climatology, analysis of precipitation for engineering purposes, soil physics, the run-off process, interception, infiltration, evapotranspiration, estimations of future floods, long-term yield of surface streams, application of hydrologic principles to civil engineering projects with special reference to Australian conditions.

8.84 Town and Country Planning.

Principles of regional and town planning. Inter-relationship of various civil engineering and planning problems. Evolution of the modern town and city and relationships of architecture and engineering to problems of development and civic design. Street systems. Transportation. Public buildings and utilities. Parks and playgrounds. Housing. Zoning. Methods of financing city improvements.

8.912 Properties of Materials.

A course for students in Metallurgy.

This course has been designed as a complete course in materials technology and the mechanics of materials. The lecture work is as follows:—

(a) Principles of material laboratory practice, types of testing machines used and their characteristics. Precision of measurements, and introduction to the theory of errors, calculation of maximum and standard errors. The stress-strain behaviour of metals and alloys is considered with special reference to the results of standard tests in tension, compression, hardness, micro-hardness, impact, shear, torsion, creep and fatigue. Non-destructive test techniques. Theories of failure, inelasticity, plasticity lost.

(b) Mechanics and materials. Stress, strain and elasticity. Bending moments, axial and shear forces. Theory of bending of beams, bending and shear stresses. Torsion—combined stresses, complex stress arrangements, principal stresses and strain. Strain energy, resilience, impact loads.

Laboratory.

Includes tension, compression, hardness, impact, torsion and bending tests; also investigations in over-straining and inelastic behaviour, creep and fatigue.

8.92 and 8.92D Properties of Materials.

The lecture work deals with the principles of engineering laboratory practice, types of testing machine used, precision of measurement, introduction to the theory of errors, and calculation of maximum errors. The load-deformation behaviour of engineering materials is considered, particularly with regard to the results of tension, compression, shear, impact, hardness, fatigue, and creep tests.

Laboratory work includes tension, compression, hardness, and impact tests with metals, and experiments on flexure and torsion.

8.92M Properties of Materials.

A course for students in Chemical Engineering or Electrical Engineering.

An introductory course in the mechanics of materials. Lecture work includes types of tests and investigations, treatment of errors, and the behaviour of engineering materials when subjected to tension, compression, hardness impact, bending, fatigue, and creep tests.

Mention will also be made of some non-destructive testing techniques.

The laboratory work will include four selected experiments from the following: Tension, compression, impact, hardness, flexure, torsion, overstraining, calibration of wires and springs.

8.94 Properties of Materials.

Detailed treatment of material properties and uses; elastic and inelastic behaviour; methods of failure and various theories related therewith; design factors; non-destructive test procedures; experimental stress-analysis methods.

Laboratory work includes tests on timbers and wires, creep experiments and work with wire resistance strain gauges.

PROFESSIONAL ELECTIVES.

Two elective subjects are to be selected from the chosen "Option".

Option 1. Civil Engineering Design.

(*a*) *Theory and Design of Structures.*

Study of design aspects of civil engineering by further work on influence lines for statiscally indeterminate structure, relaxation theories and the mathematical theory of elasticity together with topics such as arches, columns, prestressed concrete, column analogy, limit design of steel structures and model analysis.

(*b*) *Soil Mechanics and Foundation Engineering.*

Advanced studies of theoretical and applied sections of soil mechanics, including foundations, mass soil behaviour, tunnels and arching, stability of slopes, earth dams, soil testing and stabilisation work.

(*c*) *Hydrology.*

Further studies of a selection of topics such as catchment characteristics, infiltration, sediment transportation by streams, river flow and flood routing. Flood flow estimation, long term water-supply yield.

(*d*) *Hydraulics*.

Further work in hydrodynamics; the theory and practical applications of hydraulic models; sediment transportation; miscellaneous advanced topics as time permits.

(*e*) *Advanced Mathematics.*

Students whose interests are along the lines of advanced mathematics may study application of such work to specialised engineering problems.

(*f*) *Modern Foreign Language.*

Students with a leaning towards modern foreign languages may elect to master a language and review recent engineering literature of the country concerned.

OPTION 2. CIVIL ENGINEERING CONSTRUCTION AND ADMINISTRATION.

This option is for the student intending to work mainly upon construction work, local government work, and in similar spheres where general supervision of a field organisation is an important factor. Appropriate subjects are:—

(*a*) *Construction Equipment and Methods.*

Analysis of construction procedure and selection and use of equipment for various tasks. Cost estimating, job planning, production capacity, operating costs for different equipment, scheduling of materials and methods applicable to specific kinds of construction.

(*b*) *Geology.*

Role of geology in civil engineering—functions of the geologist and the engineer. Rock materials of construction. Pozzolanic materials. Mineral substances deleterious to cement; occurrence, properties and identification. Further details of rock types and their structural features in relation to engineering practice. Studies of case histories of successes and failures in engineering works of geological interest.

An introduction to crystallography, the use of X-ray diffraction, petrological microscope and differential thermal methods for identification of materials.

A short course on the distribution of materials of construction in New South Wales. An introduction to the elasto-plastic properties of rocks. Geophysical techniques as applied to civil engineering.

Practical work to include more advanced mapping problems, megascopic examination of crystal models, micropetrological examination of rock materials, the use of X-ray diffraction and differential thermal methods, the use of geophysical apparatus.

(c) *Management.*

Purposes of management. Leadership. Personnel control. Applications to construction. Management in practice. Financial aspects. Sales engineering.

(d) *Road Engineering.*

Fundamental principles of road engineering. Detailed study of design and construction practice for various types of traffic and other conditions. Maintenance techniques.

(e) *Public Health Engineering.*

Review of fundamentals of public health engineering—followed by relatively detailed and comprehensive study of the application of such principles to design, construction and operation of water supply and sewerage system, treatment work, etc., with special reference to modern developments. Review of associated work such as refuse disposal, industrial hygiene, etc.

OPTION 3. SURVEYS AND INVESTIGATIONS.

(a) *Astronomy and Geodesy.*

Fundamentals of geodesy and astronomy and a study of the application of these sciences to national projects.

(b) *Topographical and Aerial Surveying and Photogrammetry.*

A specialised study of all aspects of topographical surveying and its application to major civil engineering projects.

Study of terrestrial and aerial photographic surveying and the theory of photogrammetry. Use and principles of stereoscopic mapping instruments.

Specifications for aerial photography.

Application of aerial photography to civil engineering projects and geology.

(c) *Soil Mechanics.*

See section (*b*) of Civil Engineering Design Option.

(*d*) *Hydrology.*

See Section (*c*) of Civil Engineering Design Option.

(*e*) *Hydraulics.*

See Section (*d*) of Civil Engineering Design Option.

(*f*) *Geology.*

See Section (*b*) of Civil Engineering Construction Option.

OPTION 4. MATERIALS.

(*a*) *Soil Mechanics.*

See Section (*b*) of Civil Engineering Design Option.

(*b*) *Concrete Technology.*

Further studies in basis behaviour of concrete materials. Introductory cement chemistry and micromeritics, testing and characteristics of additive and replacement compounds. Aggregate gradings, workability, mix design methods.

The physical behaviour of set concretes, including elastic properties, creep and introductory rheology, durability, permeability, failure theories, etc. Concrete control and special techniques.

(*c*) *Advanced Mechanics of Materials.*

Theories of elasticity and plasticity. Investigation of failure theories. Complex stress failure. The structure of matter as related to stress distribution. Structural theories of deformation. Inelastic behaviour. Selected experimental work in the materials field. Description of strain gauges and significance of test results.

(*d*) *Photoelasticity and Experimental Stress Analysis.**

The theory and practice of two dimensional photoelasticity, including appropriate investigations with simple models. Structural similitude, analogies. The wire resistance strain gauge. Static and dynamic strain gauge circuits. Selected experimental investigations to illustrate the subject matter.

(*e*) *Advanced Mathematics.*

To be arranged to suit advanced study of materials behaviour.

(*f*) *Modern Foreign Language.*

See Section (*f*) of Civil Engineering Design Option.

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*This combination constitutes a double elective. Certain lectures in subject (*c*) are also required.

WOOL TECHNOLOGY.

Subjects 9.00 to 9.94.

9.104 Nutrition.

Composition of the animal body. Composition and classification of foodstuffs and pastures. Digestion, absorption and metabolism of carbohydrates, proteins, fats, minerals and vitamins. Digestibility of foodstuffs. Nutrient and energy balances and requirements of livestock. Feeding standards and the quantitative application of nutritional data with particular reference to Australian conditions. Fodder conservation, pasture improvement (strains and ecotypes, top-dressing, pasture management and rotational grazing). Hay, silage. Supplementary feeding—grain, hay, crops and cropping. Rates of stocking.

While particular emphasis will be given to nutritional requirements of sheep, those of other farm livestock will be dealt with in this section.

9.12 Livestock Production I.

The livestock industry of Australia and its place in the economic life of the Commonwealth.

Production of livestock products and trends.

The livestock areas of Australia, the inter-relationships of the various classes of stock and the natural economic and artificial conditions determining the stratification of types.

Introduction to the breeds of livestock of importance to the pastoral industry and aids to judging.

The anatomy and physiology of the domestic animals.

Breeds of sheep, their uses and economic relationships.

Sheep management and calendar of operations.

Classing of ewes and rams, culling.

The purchase, care and management of rams. Mating.

The purchase, care and management of the breeding ewe.

Crutching and wigging. Lambing.

Docking, marking and castration. Shearing.

Weaning, drenching and the management of weaners. Dipping, mulesing, etc. Flock composition.

Principal sources of loss and their control.

9.124 Farm Management and Mechanisation.

Business and practice of farming on various types of holding. Conditions governing class of farming in a district. Bookkeeping and valuation. Purchase and running of properties. Budgets. Economics of farm management. Inspection visits and comparative compilation of detailed reports of properties inspected or visited during practical work. Farm buildings, dips and yards. Tractors and modern developments, use and influence in farming organisation implements. Pumps and sprays. Electricity on the farm—motors, lighting plants. Engines and power transmission—care and maintenance. Shearing machinery—installation and servicing. Experting. Elementary plumbing and draining.

9.13 Livestock Production II.

(*a*) Crossbreeding and fat lamb production. The more important breeds of beef cattle, dairy cattle, horses, pigs, sheep and cattle dogs and their management. Beef, veal, pork and bacon, dairy beef, milk and milk products, production. Quality concepts of meat, milk and milk by-products. Preparation for market of hides and skins. Stud breeding—record keeping.

(*b*) Livestock husbandry in relation to diseases. The Stock Diseases Act. Types of disease, immunity. Bacteriology and pathology: Parasitology—external parasites (lice, mite, foot louse, blowfly—myiasis); internal parasites (worms, fluke and black disease, hydatids). Diseases of the fleece—fleece rot, canary stain, pink rot. Deficiency diseases. Poison plants. Specific diseases—anthrax, balanitis, black leg, caseous lymphadenitis, dystocia, entero-toxaemia, foot rot, foot abscess and scale, mycotic dermatitis, photo-sensitisation, pregnancy toxaemia and hypo-calcaemia, swelled head, subterranean clover disease, tetanus malignantoedema, toxaemic jaundice, urinary calculi, etc. Commoner diseases of cattle, horses, pigs, and dogs. Veterinary first-aid. Common drugs.

9.134 Introductory Accounting.

This course is intended for students whose major interest is in fields other than accounting. Its purpose is to give students an appreciation of the scope and functions of accounting and of the uses which can be made of accounting data, particularly as a means of control.

A general survey of accounting principles and their application in modern business—the functions and purpose of accounting—use of accounting data for information and control—the basic accounting doctrines and conventions—the theory of double-entry and the mechanics of bookkeeping—the books of account—control accounts —the determination and measurement of profit—matching costs and revenues—presentation of financial and operating statements—the trading and profit and loss accounts—the balance sheet—valuation of assets—depreciation—plant register—provisions and reserves— the funds statement—analysis of simple financial and operating statements—accounting reports for partnerships and companies.

Special applications of accounting principles to the particular industry.

9.14 Livestock Production III.

Principles of livestock production and their application in animal industry.

Reproduction and fertility. Growth and development.

Milk secretion. Nutrition. Breeding.

Crossbreeding—sheep, cattle and pigs.

Factors affecting livestock production—pasture improvement, fodder conservation, water conservation, irrigation, supplementary and drought feeding, etc.

9.144 Commercial Law.

The elements of jurisprudence—the sources of law—principles of constitutional law—the administration of the law.

The law of contract, law relating to sale of goods and principal and agent—bailment—common carriers—insurance—partnership—bills of exchange—arbitration and awards—personal property—liens, bills of sale—mortgages—guarantees.

9.154 Synthetic Fibres.

Study of the origin, identification and use of synthetic fibres used on wool processing machinery.

9.22 Agronomy.

Economic and environmental factors affecting agricultural development and utilisation of land.

Climate.—Rainfall; moisture relationships. Temperature. Light responses. Classification of climate. Homoclimes. Application of climatological data to land utilisation.

Soil.—Soil formation and soil types. Work of the soil surveyor. Requirements of a fertile soil. Physical properties in relation to crop production and land management. The supply of nutrients to plants; organic matter and the biological condition of soil; the nitrogen economy of soils.

Topography.—Effect on climate, soil, erosion rate and utilisation of machinery.

Classification and naming of plants.

Vegetative cover.—Types. Clearing and developmental costs.

Proximity to markets.—Transport of livestock, wool, wheat and perishable products.

Modification of environment.—Irrigation and drainage; electricity supply. Scientific discoveries and developments.

Soil erosion.—Principles of wind and water erosion. Effect of land utilisation. Prevention and control.

Agro-climatological associations in the chief divisions of New South Wales.

Principles of crop production.—Tillage, rotation of crops, fertilisers and manuring. *p*H of soil and its modification.

Sheep and irrigation agriculture.—Economic combination; prospects for expansion. The place of sheep in wheat belt.

Trees on the farm.—Suitable types for windbreaks and shade; fodder trees; establishment and after-care; direct practical values and incidental advantages.

9.24 Pastoral Agronomy.

Climatic, vegetal, and topographic characteristics of the major agricultural and pastoral divisions of New South Wales, with special reference to suitability for stock raising and mixed farming.

Principles of agrostology. Pasture plants; gramineous, leguminous and other species. Indigenous and exotic types. Advantages and disadvantages of native pasture for the pastoralist. Pasture establishment and management for different regions of New South Wales. Irrigated pastures.

Weeds in relation to the pastoral industry; harmful effects, factors in the control of weeds, methods of combating weeds, weedicides and hormone-type herbicides. Some useful points of weeds.

Principles of crop rotation. Rotations suitable for tablelands and Western areas. Ley farming.

Detailed treatment of crop plants utilised in sheep raising. Fodder conservation; principles; economics of conservation; cereal and meadow hay, silage, grain.

9.33 Economics.

Nature, scope and methods of economics. Economic laws and terms. Economic systems. Price and marketing—controlled marketing. Price control. Supply and demand. International trade and theory of comparative costs; balance of trade; tariffs and trade policies. National income. Foreign payments. The state and national income. Index numbers.

Economics of the wool industry:

(*a*) Production—the key importance of the wool industry in the Australian economy; climatic and other physical controls over the wool industry; trends in breeding—crossbreds and fat lambs; the long-term trend of production; the importance of research; the problem of drought; water and fodder conservation; the nature of costs.

(*b*) Demand—the nature and direction of demand; the dependence of the wool market on external trade—possibilities of developing the domestic market and the export market.

(*c*) Substitutes—the history and present organisation of wool marketing; BAWRA and J.O.; the attitude of the wool industry to stabilisation programmes.

9.34 Banking Currency and Exchange.

Financial Institutions.

Money: definitions, functions, and kinds of money.

Trading Banks: functions and objectives. The assets and liabilities of a trading bank.

Creation of credit by trading banks; factors determining demand for bank loans. Mechanism of credit creation and factors limiting credit creation by a bank. Bank deposits and voluntary savings. The theory of forced savings.

Central banks: the functions of central banks. Credit policy of central banks. The central banking powers of the Commonwealth of Australia and their evolution.

Domestic Monetary Theory and Policy.

The value of money; meaning of the value of money and techniques for measuring changes in it. Index numbers: their nature, construction, uses and limitations.

Economic effects of changes in the value of money; variation in general price levels and price dispersion. Effects of marked instability of prices on the distribution of incomes and the nature of production.

Determinants of the value of money; the quantity theory, its nature, applications and limitations. The savings-investment theory; relationship between savings, investment and income; applications to explain changes in price levels. The effect of overseas lending and borrowing on internal price levels.

Monetary policy and economic fluctuation; the characteristics and causes of the trade cycle. Appropriate monetary and fiscal policy.

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Exchange Rate Theory and Policy.

Exchange rates and the balance of payments; meaning of exchange rates and methods of quoting. Forward exchange and arbitrage. A country's balance of payments; meaning and composition.

Free exchange rates; effects of changes in the balance of payments on free exchange rates and the influence of changes in exchange rates on the items in the balance of payments. Favourable and unfavourable exchange rates and methods of adjusting them. The purchasing power parity theory; its nature, applications and limitations. Modern ideas of an equilibrium rate of exchange.

The gold standard; types of gold standard, objectives and rules for its maintenance. Mechanisms for the maintenance of the gold standard in England and in Australia. Evolution of the gold standard, its modification and its subsequent breakdown.

Exchange control; purpose and methods of exchange control, exchange adjustment and the International Monetary Fund.

World Monetary Conditions in the Twentieth Century.

The characteristic features of world monetary conditions in the present century. The World War I period, post-war inflation, return to the gold standard, depression and recovery. World War II, and post-war periods.

The Australian Monetary System in the Twentieth Century.

Characteristics of the Australian monetary system—(*a*) from Federation to World War I; (*b*) in the inter-war period; (*c*) in the World War II period; (*d*) since World War II.

9.42 General Textiles (Yarns).

Brief introduction to the history and structure of the textile industries. Yarn count systems. Textile mathematics relating to yarns. Theories of spinning by draft V. twist and roller-drafting methods. The effect of fibre length, fibre diameter and twist on the properties of yarn. The origin, properties, uses and identification of natural and synthetic textile fibres. Remanufactured fibres, their processing and uses. Twisting processes. The preparation of yarn for fabric manufacture. Sizes and sizing. The production of fancy yarns. Recent developments in yarn manufacturing processes.

At the end of this course the student must present a series of plain and fancy yarns which he has prepared to exemplify the subject matter of the lectures.

9.43 General Textiles (Fabrics).

Felts and non-woven fabrics. Woven fabrics and their production. Introduction to textile design as a preparation for more detailed study later. Mathematics of cloth setting. Simple and compound cloth structure. Methods of ornamenting fabrics, by yarn, colour, weave, colour and weave, colour printing, flock printing and cloth finishing. Complex textiles, including gauzes, pile fabrics, and tapestries. Survey of knitted structures and knitting mechanisms. Standard fabrics and their identification. Scaffolding threads and their applications. The appreciation of good design in textiles. New development in textile manufacture. Textile literature and research associations, their interests and utility.

In this course students must produce a range of hand or power woven fabrics, the construction of which should be based upon the principles of fabric structure discussed during the term. It is most important that the textile student should note changes in the dimensions of these fabrics' weaving state to finishing. Data recorded in this way is of inestimable value in later years as there is no way of making precise calculations of grey particulars from the finished fabrics.

9.44 Yarn Manufacture (Wool).

A functional and detailed study of the machinery used to produce worsted and woollen yarns. The various systems of spinning will be described and the latest developments aimed at economies in production. Consideration will also be given to the structures of the wool textile industry, its research activities and problems. Method of wool cleaning and drying. Worsted—functional aspects of worsted machinery. Details of worsted carding, preparing, combing and drawing on English, French, and Anglo-Continental systems. Spinning by flyer, cap and ring and later developments. Twisting and fancy yarn manufacture. Woollen—raw materials; the functional aspects and mechanisms of carbonising and blending; carding and ring and mule spinning; remanufactured fibres, their types and sources of supply; grinding, carding and spinning yarn calculation; yarn conditioning and testing; warping and winding; a résumé of problems in the processing of rayon on woollen and worsted machinery.

9.52 Wool.

Place of wool in world trade and in the economic life of Australia. Elementary wool science. Wool quality—fleece defects. Principles of wool processing in relation to preparation of the clip. Wool areas of the Commonwealth. Wool terms. Types. Woolclassing—principles and special clips, responsibilities of the classer. Marketing. Costs to grower, selling procedure. Methods of selling. Fellmongering, scouring and carbonising. Wool research. Wool improvement. Wool publicity.

9.53 Wool.

Preparation of wool, from various types of flocks, for marketing. Recognition of wool types and assessment of wool quality number. Wool pressing and branding. Sorting Merino and Crossbred wool to spinning quality and length. Classing various types of clips—large and small Merino, large and small Crossbred, large and small Tablelands Merino clips, Comeback clips. Special treatment of clips from North-west, Central-west, Riverina and Far-west districts. Wool appraisal in terms of type, quality, number and yield. Wool judging.

9.54 Wool (Wool Store Study).

This subject will consist of practical exercises in the estimation of wool types and their values, using existing trade procedure (A.W.R.C. types). Instruction will cover style grades; burr, seed and dust percentages; washing—carbo, and top and noil yields; skin wools, slipes and scoured wools; wastes and shippers' lines; oddments such as overgrown, dead, black, etc.

9.74 Fibre Science.

Biology of fibre growth—histology, fibre arrangement, morphology and fleece genetics. Fibre physics. Microscopic and sub-microscopic structures. Fine structure investigations. Fibre chemistry. Principles of protein chemistry and special reactions of keratin. Moisture relationships. Carbonising. Finishing processes. Chemistry of skin secretions. Wool wax recovery and utilisation. Wool metrology. Conditioning house procedure.

9.94 Genetics.

Applied genetics in relation to sheep and other farm livestock. Mendelian theory. Chromosomes and the physical basis of heredity. Mechanisms of crossing over. Genetics of sex differentiation. Sex linkage. Multi-factor inheritance. Principles of statistical genetics. Strength of inheritance. Selection—phenotypic, family lines, progeny test. Relation of genetics to sheep improvement. In-breeding and line breeding.

MATHEMATICS.

Subjects 10.00 to 10.92.*

10.11 Mathematics.

Review and extension of matriculation algebra and trigonometry. Determinants, partial fractions, limits, convergence of infinite series, approximations.

The circular, exponential and hyperbolic functions and their inverses. Equations and limits involving these functions.

Derivatives and their applications. Indefinite and definite integrals. Approximation to the numerical value of a definite integral by Simpson's rule.

Quadrature, rectification, determination of volumes, means, moments, centroids and quadratic moments.

Partial derivatives, total differential and applications.

Taylor's and Maclaurin's expansions and their uses.

The co-ordinate geometry of the straight line and of such curves as are of technical importance, using Cartesian and polar systems of reference. Determination of linear laws and reduction of other laws to linear form. Use of logarithmic and other forms of graph paper.

First order differential equations of "variables separable" type and of "exact" type. Second order equations of the type $y'' + ay' + by = 0$.

Introduction to complex algebra.

10.11 Mathematics, Part I and Part II.

In part-time courses offered in the Faculty of Engineering the subject 10.11 Mathematics is presented in two approximately equal courses over two years, the courses being designated 10.11 Mathematics Part I and 10.11 Mathematics Part II.

10.11B Mathematics.

A special course in statics and dynamics integrated with the work in advanced mechanics and properties of matter which is taken in third term of first year Course I (Applied Physics), Course II (Applied Chemistry), Course III (Chemical Engineering), Course IIIA (Food Technology) and Course IV (Metallurgy).

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*For Mathematics (General Science) subjects see pages 297 and 298.

10.11-B Mathematics, Part I and Part II.

In part-time courses offered in the Faculty of Science the subjects 10.11 Mathematics and 10.11B Mathematics are combined and presented in two approximately equal courses over two years, the courses being designated 10.11-B Mathematics Part I and 10.11-B Mathematics Part II.

10.12 Mathematics.

A fuller treatment of 10.11 Mathematics with special reference to functions of more than one variable. Multiple integrals.

The Laplace transform and its use in solving linear differential equations. Introduction to partial differential equations.

Revision of work on complex numbers covered in 10.11. De Moivre's theorem, *n*th roots. Complex circular and hyperbolic functions.

Introduction to three-dimensional co-ordinate geometry. Lines, planes and surfaces.

Vector analysis. Differential calculus of vectors. The vector differential operators. Stokes' theorem and the divergence theorem.

Introduction to Fourier series and harmonic analysis.

The general principles of dynamics and their applications.

10.12 Mathematics, Part I and Part II.

In part-time and conversion courses offered in the Faculty of Engineering the subject 10.12 Mathematics is presented in two approximately equal courses over two years, the courses being designated 10.12 Mathematics Part I and 10.12 Mathematics Part II.

10.13 Mathematics.

A course for students in Applied Physics.

Statistical theory and its application to experimentation. Some special functions relevant to mathematical physics. Matrix algebra.

10.14 Mathematics.

Selected topics in mathematical physics including some of the following: tensors, elasticity, boundary value problems, hydrodynamics, calculus of variations, numerical methods.

10.22 Mathematics.

A course for students in Chemical Engineering.

Functions of two or more variables. Partial derivatives. Multiple integrals, centroids, moments of inertia, centre of pressure. Linear differential equations (solved by conventional and Laplace methods). Partial differential equations.

10.23 Mathematics.

A course for students in Chemical Engineering. Application of partial differential equations to problems in Chemical Engineering fluid mechanics. Theory of complex variable.

10.33 Mathematics.

A course of advanced mathematics for students in Electrical Engineering courses. Complex variable theory and contour integration inversion theorem. Solution of differential equations met in electrical engineering. Potential theory, electromagnetic theory.

Laplace and wave equations.

10.43 Mathematics.

A course in mathematical statistics for Civil Engineers.

Beta and gamma functions—the normal distribution function.

Fundamental statistical ideas (randomness, etc.). Probability and elementary theories relating to it.

Variates and distribution functions (binomial, Poisson, normal, t, χ^2, F, etc.) and applications, largely to hydrological questions.

10.51 Mathematics.

A course for students in Architecture.

Revision and elementary mathematics needed in costing. Revision of algebraic processes.

Plane and solid geometry. Conic sections. Trigonometry.

Co-ordinate geometry: location of points by co-ordinate systems, plane and solid; graphs in Cartesian co-ordinates.

Calculus: differentiation, integration.

Centroids and moments of inertia.

10.62 Applied Mathematics.

A course in dynamics for students in Electrical Engineering.

Kinematics of a Particle.

Time rate of change of vectors. Relative velocity and acceleration.

Dynamics of a Particle.

General laws; range of applicability of Newtonian mechanics. Absolute and gravitational units. Work and power. Kinetic and potential energy; line integral and gradient of a vector. Simple harmonic motion; effect of dissipative forces; superposition of simple motions. Orbits under the inverse square law of attraction. Kepler's laws and Newton's deduction of the law of gravitation.

Plane Statics of a Rigid Body.

General introduction to statical principles. Stresses in beams. Catenaries. Virtual work and potential energy. Equilibrium and stability.

Plane Kinematics of a Rigid Body.

Translations and rotation, centre of rotation. Instantaneous centre, angular velocity. Space- and body-centrodes. The rolling of one lamina on another.

Dynamics of Material Systems.

Momentum and moment of momentum. D'Alembert's principle of any mass-distribution. Second moments; momental ellipse and ellipsoid. Plane dynamics of rigid body. Equation of energy.

Elementary Hydrostatics.

Use of Elementary Dimensional Theory.

10.63 STATISTICS.

A course in statistics for Electrical Engineering students.

Basic probability theory.

Standard univariate distributions: binomial, Poisson and normal.

Sampling distributions derived from the normal: χ^2, t and F. Auto-correlation. Estimation—point (maximum likelihood) and interval (confidence interval). Regression (including least squares theory).

Elementary bivariate distribution theory.

Applications of the above at appropriate points through the course.

10.91 MATHEMATICS.

A course in mathematics preparing students for work in statistics.

Simple probability theory. Determinants; solution of linear equations. Least squares method of fitting linear forms, and extensions.

Rectangular Cartesian and polar co-ordinate systems, with applications.

Elementary differential and integral calculus, up to and including a treatment of circular, exponential and hyperbolic functions and their inverses. Power series. Numerical solution of equations.

Functions of several variables: partial derivatives and multiple integrals.

10.92 MATHEMATICS.

A course in statistics for Wool Technologists.

Fundamental statistical ideas (randomness, sampling, etc.). The standard elementary distributions: Poisson, binomial, and normal. Sampling distributions derived from the normal distribution (χ^2, t-, and F- distributions) and standard tests based on these. Introduction to experimental designs and their analyses.

Mathematics (General Science).

10.01 General Mathematics.

(Four one-hour lectures per week for two terms and three one-hour lectures per week in third term.)

The syllabus for this subject is similar to that for 10.91 Mathematics.

10.1 Mathematics I.

(Four one-hour lectures and two tutorial hours per week for three terms.)

Calculus and elementary functions.
Co-ordinate geometry.
Differential equations.
Dynamics.
Theory of equations.

10.2 Mathematics II.

(Three one-hour lectures and two tutorial hours per week for three terms.)

Calculus.
Differential equations (and elementary Fourier analysis).
Co-ordinate geometry (and elementary vector analysis).
Dynamics.
Statics.
Infinite series.
Elementary complex functions.

10.2H Higher Mathematics II.

(Seven one-hour lectures per week for three terms.)

Analysis.
Dynamics.
Differential equations.
Vectors.
Algebra.
Geometry.

10.3 Mathematics III.

(Five one-hour lectures per week for three terms.)

Algebra.
Vector analysis.
Differential geometry.
Foundations of geometry.
Differential equations—special functions.
Functions of a complex variable.
Statistics.
Numerical analysis.
Hydrodynamics.
Cartesian tensors.

10.3H Higher Mathematics III.

(Ten one-hour lectures per week for three terms.)

A selection of topics from:
Analysis.
Matrices, and group theory.
Differential and algebraic geometry.
Partial differential equations.
Advanced vector analysis.
Tensor analysis.
Variational calculus.
Mathematical statistics.
Generalised dynamics.
Dynamics of a continuous medium.
Potential theory.
Numerical mathematics.

ARCHITECTURE.

Subjects 11.00 to 11.96.

11.101-11.105 Theory of Structures, and Structures A and B.

The whole range of this subject has been divided into five sections. The first four sections (subjects 11.101, 11.102, 11.103 and 11.104) are compulsory and taken by all students, whereas the last section (subject 11.105) is taken only by those students who elect to do so. It is presumed that these latter students have aptitudes for the structural design subjects of the course and also that they intend to practise it in some measure in their profession.

From this point of view the first four sections have been designed to cover the major portion of the field of structures as it affects the Architect, but a certain amount of the work is intended to be dealt with descriptively rather than analytically. In the last section it will, therefore, be necessary to revise the early work, supplying the analytical proofs where necessary, and then proceed to the more advanced work in order to complete the field.

Supplementing the theoretical work there will be exercises in structural design and testing work in the Testing Laboratory (e.g., 8.22 Materials of Construction).

11.101 Theory of Structures I.

The first-year series of lectures in Theory of Structures is designed to give a thorough grounding in the principles used in calculations relating to architectural construction and covers the following:—

Statics.—Composition and resolution of co-planar forces; equilibrium of co-planar forces (both concurrent and non-concurrent); moments, couples and equations of equilibrium; force polygons and funicular polygons; forces acting on and determination of stresses in pin-jointed structures by graphical and resolution methods.

Beams.—Moment determination of reactions for simply supported beams (up to and including two supports and two overhanging ends).

Shear in beams, determination of shear and shear force diagrams.

Bending moments in beams, and bending moment diagrams for beams.

Correlation of and relationship between shear and bending moments in beams.

Modulus of elasticity.

Summation of elementary beam theory.

11.102 THEORY OF STRUCTURES II.

Beam Theory.—Bending moments and shear force—Diagrams, analysis and relationship to loading. Explanation and derivation of section modulus, moment of inertia, radius of gyration, moment of resistance, deflection and factor of safety.

Theory of Bending.—Fibre stress, horizontal and vertical shear, proof of formulae, relation between deflection and bending moment.

Column Theory.—Short columns, long columns, slenderness ratio and eccentric loading, combined bending and direct stress.

Structural Timber.—Properties, gradings, permissible stresses, factors of safety.

Design of beams and checking of stresses.

Design of columns and checking of stresses.

Design of floor systems including connections of members.

Design of roof trusses with wind loading, bending and direct stress on upper chord, roof truss connection of members by bolting and ring connectors, roof systems.

Footings.—Considerations and design for strip footings and isolated footings.

Retaining Walls.—Arched, gravity, buttress, counterfort. Overturning, sliding, drainage, foundation pressure for cases when material retained is: water, granular, fragmentary, cohesive-clay.

Angle of repose, internal friction.

Concept of equivalent fluid pressure and surcharge.

11.103 THEORY OF STRUCTURES III.

The study of structures in third year is concentrated on structural steelwork (riveted and welded construction) and reinforced concrete.

The sequence of lectures is arranged to provide the design information required by the student in carrying out problems in the Building Construction Class, and the information given precedes the class work so as to allow the student to determine size of structural element prior to commencing detailed drawing.

The influence on design by the Local Government requirements is discussed and all design is related to such requirements.

Structural Steel (riveted and welded construction.)—

Revision of work on properties of steel, use of rolled steel joists sections, plated sections, use of steel handbooks, properties of sections.

Steel Beam. Design, plated sections, lateral support, web buckling, stiffeners, and bearing. Design of joints, curtailment of plates, beam to beam and beam to column connections.

Steel Columns. Radius of gyration, lateral support, effective length, design of columns with concentric and eccentric loads, design of columnplates, stool connections, cap and base plates, splices.

Steel Roof Trusses. Types of trusses, types of sections, design of members, joints and fixings, truss framing arrangement and bracing.

Reinforced Concrete.—

General theory of design, usual mixes and strengths, types of reinforcement.

Design of columns (concentric loads only). Rectangular and spirally wound, bar lists and reinforcement positioning.

Design of beams. Free ended, fixed ended, continuous (using coefficients), web reinforcement, cantilevers, use of compression reinforcement. Beam theory, formulae, shear and bond stresses.

Design of slabs. One way, two way, continuous, placing of reinforcement, stair construction, retaining walls.

Design of footings. Unreinforced and reinforced types as governed by limiting dimensions, effect of base plate pressure on design.

General. Design effect of varying stresses in concrete by altering mix, increasing depth, varying stress in steel reinforcement.

11.104 AND 11.105 STRUCTURES A AND B.

The emphasis in fourth and fifth years is placed on the principles of design and facts governing the selection of types of structure for different building types rather than the detail mathematical calculation which is kept to a minimum, particularly in fourth year.

11.104 STRUCTURES A.

The study of structural elements of the beam, column, truss, footing and slabs is developed to include the special and compound examples not designed in third year.

Examples of contemporary work in this field are examined with the object of determining the most suitable structure for given problems.

Detail study is applied to structural elements as follows:—

Beams—Deflection, analysis of continuous frames by moment distribution method, fixing for temperature expansion, haunching.

Columns—Eccentricity, composite columns, and fixity. Examples of rigid frames. Principles of deflection and sway. Points of contraflexure.

Trusses—Special cases in timber, steel, and materials such as aluminium. Reinforced concrete trusses.

Footings—Bearing capacity in relation to short term and long term settlement. Seasonal movement.

Slabs—Flat slabs, deflection.

General—Prestressing, fireproofing, precast units, shell concrete, fatigue in structures.

11.105 STRUCTURES B (ALTERNATIVE TO 11.115 PLANNING RESEARCH).

Selected examples from the work treated in the fourth year are calculated and designed in detail and shop drawings prepared, with special attention to rigid frames in steel and concrete.

Further examples and study on: Curved beams, vicendral trusses, arches and domes, the shape of members or frames, materials best employed in given circumstances.

11.11 DESCRIPTIVE GEOMETRY.

This subject provides an introduction to general draughtsmanship. The student is taught the correct choice of drawing office materials, use of instruments, the elements of good lettering, geometric drawing, perspective and sheet composition. A good grounding in this work is essential in later years.

There are about thirty-two lecture-demonstrations followed by drawing. Each student is required to complete thirty sheets of drawings dealing with the following: Exercises in line drawing and plane geometry; lettering; orthographic, isometric, oblique, axonometric projection; theory of perspective, exteriors, interiors, inclined planes; shadows cast by geometrical features and simple architectural subjects on vertical and horizontal planes; shadows in perspective; solid geometry; development of intersections and surfaces; roof developments and layout; graphic symbols.

11.115 PLANNING RESEARCH (ALTERNATIVE TO 11.105 STRUCTURES B).

During the first term the student is required to work as a member of a group. Each group is assigned a particular building of architectural merit and historical significance, and must carry out a complete investigation of the building and furnish a report including photographs, drawings and evidence of thorough research of historical background.

During the second and third terms each student is required to study some special department of planning, relative to modern design. Considerable freedom is allowed, but the student must provide evidence of his own studies and reading. One or two advanced exercises in individual research may be given relative to the projects being undertaken in architectural design and construction. Moreover, in addition to this each student has to prepare a dissertation which he will read before the general body of students, answer questions relative to it from his audience of fellow students and take part in general discussion upon it.

11.125—11.126 PROFESSIONAL PRACTICE.

Contracts; relationship of builder, client and architect; professional ethics as laid down by the Royal Australian Institute of Architects; services and fees; office administration; building law and regulations; aspects and problems of practice; business principles; building finance and supervision; relations with the quantity surveyor, structural engineer and other specialists.

11.135 SPECIFICATIONS.

The definition of a specification; the purpose for which it is written; its legal importance and relationship to the building contract; authorship, essentials in writing, composition and style.

Types of specifications in writing, composition and style.

Types of specifications, method of writing, heading and subheadings, the use of indices; explanation of provisional amounts and P.C. items; the use of schedules and abstracts.

Preamble to a specification; special conditions, requirements of local authorities; the trade clauses.

In the third term a practical example of specification writing is studied and the use of the standard specification explained.

11.145 BUILDING RESEARCH REVIEW.

A series of lectures on the work of organisations in Australia and overseas engaged in research on problems related to building, including materials, structure and functional requirements.

Special attention is given to contemporary problems in building production, new materials and methods, prefabrication, preassembly, standardisation, dimensional co-ordination; relation of building regulations with new materials and methods; the use of research information by the practising architect.

11.164 ACOUSTICS AND SOUND INSULATION.

Nature of sound, wave length, frequency amplitude. Resonance. Hearing, thresholds of audibility, masking. Reflection, diffraction, absorption, transmission. Units of intensity and loudness. Geometrical acoustics. Acoustic materials. Auditorium design. Noise reduction in buildings. Transmission of air-borne and impact sound through walls, floors, windows and doors. Isolating noise of machinery.

11.176 Architectural Science and Research Thesis.

During this period, the student is encouraged to study some specialised aspect of architectural planning and research, such as the latest developments in the equipment and engineering services of buildings, and specialised planning and equipment of buildings, such as hospitals, schools, etc. Some of this advanced study will be relative to the design projects being carried out under the heading of architectural design and construction, civic architecture or town planning, or the student may, with the approval of the Professor, pursue some avenue in scholarship, such as the literature of architecture, aesthetics or history; this work will be embodied in a thesis to be submitted by the student; importance is attached to the general presentation of this thesis.

11.186 Civic Architecture.

A limited number of informal lectures is given by the Professor of Town and Country Planning of the University of Sydney covering the principles and problems of civic architecture. Research and practical problems are carried out, usually relating to improvement and re-development from a planning and architectural point of view, of parts of existing cities, such as Sydney and Newcastle.

Civic surveys are made of the actual areas and all relative information is obtained by the students in groups, generally with the support of town planning officials in Sydney, Wollongong, Newcastle, etc., who indicate the basic economic, social and industrial conditions within which the student may have to re-plan and re-design the particular street or area.

11.196 Town Planning.

Introductory course of lectures, arranged by the Department of Town and Country Planning, University of Sydney. There is one term of studio work associated with the lectures. The course of lectures is preparatory to the post-graduate diploma course in Town Planning, conducted jointly by the University of Sydney and the New South Wales University of Technology. This introductory course of lectures provides a brief outline of what is comprised within town and country planning, and touches on the history of town planning, the theory and practice of town planning, and draws attention to the social, economic, geographic and architectural factors involved.

11.203 Building Services and Equipment A.

Drainage, sullage disposal, septic tanks, sub-soil drainage, house drainage, by-laws, etc.; laying, joining and testing drains; ventilation of same; water supply, fittings and materials, water storage tanks, pumps, etc.; meters; fire services; sanitary plumbing; types of soil and waste fittings; design and installation of sanitary fittings, soil stacks, waste stacks, flushing systems, hospital and laboratory fittings and appliances; domestic layout including storage tanks, etc.

Gas service and domestic gas service and installation, appliances, flues, etc., heaters, stoves, fires, etc., refrigerators.

Hot water services of various kinds, solid fuel, gas, electric, separate and individual types, various appliances, hot water boilers and heating units; relative costs for different types of building.

11.204 Building Services and Equipment B.

Generation and use of steam; sources of heat, combustion, selection of boilers; flues, stacks; layout of boiler rooms.

Hot water supply; types of calorifiers; hot water storage tanks, layout of plant; hot water boilers.

Heating of buildings; heat transmission through walls and floors, etc.; types of radiators, accessories, pipe systems; equipment and fittings.

Pumps; application to specific jobs.

Ventilation; natural and mechanical; air change, fans, ducts, registers; requirements of local authorities.

Refrigeration; refrigeration cycle; machines and accessories; location of plant; cool rooms, construction and insulation.

Air conditioning; description of sensible heat: latent heat, dew point, humidity, heat content of air; relation of aspect to head load, human occupancy, etc.

Fire protection; sprinkler systems; requirements of controlling authorities; fire extinguishers.

Lifts; application of lifts to buildings; types of lifts; requirements of controlling authorities; size of lift cars; size of walls; motor rooms; enclosures.

Lighting; natural and artificial; light intensity; requirements for lighting; types of lamps and fittings; calculation of lighting requirements; methods of installation; switch rooms, etc.

Call systems; application of call systems in hospitals, hotels, business premises, factories, etc.; telephones for intercommunication.

Kitchen equipment; items for kitchen equipment, their application and use; methods of operation, gas, electricity, steam, fuel oil, coal, coke. Servery equipment and accessories.

11.21-11.22 Freehand Drawing and Presentation.

Freehand drawing provides an extension of the experience of mechanical draughtsmanship. The course is designed to aid facile expression of ideas and to develop in the student an awareness of the harmony of the principles of linear construction with visual aspects of form.

Practical work in various media is intended to develop a correlation between hand and eye, and a gradually increasing skill in depictive power.

The course is designed to develop in the student an appreciation of the formal values underlying pictorial structure, and a skill in using the media with which he will be concerned. To ensure this, practical exercises are designed to provide experience in varied media and the student is required to treat a given perspective as the subject of composition within a limited range of tonal values and colours.

It is required that the student shall complete all work set during the course, which extends over two years, each of three terms' duration.

The practical work is intended to be carried out in the studio during each period. Each project is preceded by a brief lecture-demonstration and where possible projects are subject to display and discussion when completed.

Students are required to keep a sketch book as a supplementary project.

11.21 Freehand Drawing and Presentation I.

Subjects include—Selection and care of equipment, principles of linear perspective, general drawing, object drawing, quick sketching, memory drawing, outdoor sketching and studies, rendering in various media and techniques, and presentation.

11.22 Freehand Drawing and Presentation II.

Continuation of subjects set out in 11.21 at a higher level and extension to include elementary measuring and plotting in association with sketching buildings.

11.215 Estimating.

Introduction; methods employed for estimating; standard mode of measurement; profit, establishment and other changes; plant—purchase and hiring costs; awards, insurances, taxes, etc.; local and other authorities—scale of fees and charges; provisional and prime cost items.

Trades and Operations. Examples of "building up" the elements of unit cost rates in respect to: excavation, drainage, concrete, formwork, reinforcement, brickwork, masonry, structural steel and ironwork, carpentry and joinery, plumbing, floor and wall tiling, paving, plastering, painting and decorating, glazing.

The subject-matter for each trade or operation will include:—

(*a*) Current material prices.

(*b*) Schedule of unit labour costs.

(*c*) Memoranda in respect—weights, mixing proportions and yield of materials; waste allowance; working costs and depreciation of plant; scaffolding, etc.

(*d*) Problems for students to work out, using class examples for reference.

Variations.

(*a*) Measuring and valuing.

(*b*) Methods of adjusting.

Schedules.

(*a*) Grouping of unit items to obtain a bulked cost rate for different structural parts of buildings.

(*b*) Comparison of costs for alternative methods of construction related to structural parts of a building.

11.31-11.32 Architectural Studies and Design.

A course in general design, taken over first and second years, leading to Architectural Design and Construction. The objectives of this study are a development of aesthetic perception in the student and an awareness of his relation to his environment. By process of inquiry and critical analysis each student is encouraged to make individual assessment of design fundamentals.

11.31 Architectural Studies and Design I.

This subject embraces architectural drawing, rendering, perspective and introduction to design.

The student works in the studio under the guidance of an instructor. Short lectures are given in conjunction with the studio work. Exercises are carried out dealing with the following:

Architectural Drawing—Selection of materials; linear patterns: lettering; sketch plan presentation.

Rendering—Wash exercises in monochrome and colour; value, hue and intensity; rendered elevations and perspectives.

Perspective (in conjunction with Descriptive Geometry sheets) —Exteriors, interiors and shadows in perspective.

Design—Elements of design—line, shape, form, texture and colour; study of objects of everyday use; analysis of an architectural feature.

In third term a design assignment is carried out, involving the selection and evaluation of qualities which are necessary for an object to possess good design.

11.32 Architectural Studies and Design II.

Design Fundamentals.

Design Concept—Elements of design and principles of composition introducing three dimensional design exercises; models; analytical study of value in colour.

Colour—Historical survey and theories of colour mixing; the Otswold and Munsell Systems of colour notation; the psychology of colour and its relation to purpose.

Texture—The senses involved and study of characteristics of surfaces; relation to purpose; texture "collages".

Space Concept—Study of space articulation; the model; analytical purpose problems and integration of previous studies.

11.41-11.43 History of Architecture.

This is one of the basic subjects leading to Architectural Design, not because of possible present-day use of any plan or feature from the works of past masters, but for the reason that some knowledge of past systems of building, use of materials, principles of design, use of geometry and choice of form for purpose and beauty rightly should be understood. The place of architecture and living environment in the social structure of peoples and their effect on the course of civilisation provide a useful and substantial part of the knowledge required by designing architects of this age.

The subject is treated in a wide manner, appropriate reference being made to significant events and conditions; the mass movement of peoples and the effect of military invasions; land and sea trading routes, lines of communication and the spreading of ideas; political, religious, social and economic influences; the work of the guilds and craftsmen.

The allied arts and minor crafts are considered as well as the masterpieces of architecture. Most examples are examined analytically in plan, external form, section and structure. The approach is critical rather than archaeological, the past affording examples of how recurrent architectural problems have been solved structurally and aesthetically. Some consideration is also given to urban planning, streets, grouping, gardens, etc.

The subject is divided into three stages. Each stage consists of about thirty-three one-hour lectures. A final examination is set at the close of each stage.

11.41 History of Architecture I.

Primitive construction: the correlation of hands and mind and the beginnings of architecture.

Ancient (*1st Term*). Works of the Egyptians, Chaldaeans, Assyrians, Babylonians, Persians, Pelasgians and Etruscans.

Classic (*2nd Term*). Works of the Greeks and Grecian Empire.

Classic (*3rd Term*). Works of the Romans and Roman Empire.

11.42 History of Architecture II.

Study of the evolution of church architecture of the Eastern and Western types and the rise and perfection of Gothic architecture.

Early Christian. The emergence of the basilican type of church building. Variations from the Roman type.

Byzantine. Works of the Byzantine Greeks and development of Eastern types of domed churches. Carcase and "finish" method of construction.

Romanesque. The development of Western Christian architecture. Experiments in form and construction towards ideal of a complete architecture in stone, including vaulted ceilings.

Gothic. The pointed style. Zenith of medieval architecture. Engineering in stone. The "unit-bay" system of construction. The correlation of balanced forces to produce stability in buildings of great height. Cathedrals, abbeys, churches, monasteries, castles, municipal buildings, guild-halls, etc. Gothic vaulting, church fitments and decoration.

11.43 History of Architecture III.

Architecture of the Renaissance in Europe.

Italy. Florence and the early Renaissance; the architecture of Venice; the mature Renaissance and Rome; Palladianism and the Baroque; planning and garden design.

France. Early influence of Italy; the architecture of the Loire; the evolution of the French chateau and landscaping; the unification of the arts under Louis XIV; French civic design.

England. Influences of the early continental craftsmen; Jacobean architecture; Inigo Jones and the unification of foreign elements; Wren and his school; Palladian influence and the Baroque; the development of the English house during the Renaissance; English contribution to planning.

History of architecture in the 19th and 20th Centuries. The Industrial Revolution and the Romantic Movement. The Age of Revivals; Archaeology and Medievalism; the Eclectics. The emergence of the engineer and the growth of specialisation; Art Nouveau and the Deutche Werkbund; the development of the Garden City. Social changes and the development of Building Acts. New materials and new techniques. The evolution of the steel framed building, reinforced concrete; its influence on the development of free planning. Louis Sullivan and Frank Lloyd Wright; Le Corbusier and Cubism, the Villa and the Zeilenbau. The development of the house. The growth of the modern city.

11.52 Building Science.

Heat as a form of energy, its molecular movement and measurement. Ways in which heat affects homogeneous and heterogeneous solids and their relationship to thermal movement and stresses.

Factors affecting transmission of heat; conduction, convection and radiation. Low and high frequency radiations and their relationship to diathermanous materials.

Calculation of thermal expansion and its resultant stresses. Differential movement in buildings and problems of restraint. Prevention of thermal movement by various methods.

Climate and its influence on design and construction. Australian climatic zones. Ways in which heat gains ingress to buildings and preventive measures. Thermal insulation, its advantages and disadvantages. Thermal capacity and the ways in which it may be used to advantage.

Theory of insulation and the relationship between molecular structure and conduction. Air as an insulator.

Overall thermal transmission coefficient and the relationship of its composite factors. Calculations of thermal conduction of walls. Ventilation of cavities. Transmission through ceilings and roofs and typical calculations.

Sunlit surfaces and rise in temperature and variation due to colour and texture, with calculations.

Reflective insulation and its effect upon radiant heat.

Effects of moisture on thermal conductivity.

11.61 Building Trades and Crafts.

Short lectures given by different specialists on the staff, both from the point of view of the employer (the master builder) and the specialist craftsman. The specialist trade instructors in the department provide demonstrations in the techniques of bricklaying, carpentry, joinery, plastering, painting and decorating. Each student is required to do a small amount of practical work, such as mixing mortar, carrying and laying of bricks, elementary practical work in carpentry and joinery, plastering and painting. Model making, in connection with the architectural studies.

The general intention of this period is to familiarise the student with the tools and terms used by the building craftsman, and to give him an understanding of the craftsman's skill.

11.71 Building Construction I.

Lectures.

Brief instruction on draughting techniques, projections and lettering.

Brick manufacture, types and qualities; bonding. Types and composition of mortars and their uses.

Cement manufacture, types and uses. Concrete and its constituents. Bulking of sand and determination of correct water content by slump test. Vibrated and lightweight concretes.

Footings and foundations and requirements of Local Councils and Ordinance 71. Trenches and timbering.

Cavity wall construction and treatment of openings.

Hardwoods and softwoods, conversion and seasoning; moisture content and shrinkage. Decay and defects.

Ground floor construction, timber and concrete and types of finishes. First-floor timber construction.

Fireplaces and flues and design requirements.

Flat roof construction with consideration of waterproofing and insulation. Types of roof coverings. Skillion and pitched roofs, sizes of members according to Ordinance 71. Suitable roof coverings and their methods of fixing. Chimney stacks and flashings to pitched and flat roof surfaces. Roof plumbing and materials used.

Timber-framed house construction, floors, walls, gable end details.

Weatherboarding and asbestos cement external covering.

Brick veneer construction. Joinery joints and applications. Types of doors and frames.

Functions and types of windows.

Stone, its selection and uses in building. Types of walling. Cast stone, terrazzo and terracotta.

Water collection and distribution.

Domestic plumbing and drainage according to Ordinance.

Plastering, types of bases and precautions to be taken. Fibrous plaster manufacture. Acoustic tiles.

Paints and their components.

Glass manufacture. Types of glass and their uses.

Practical.

Studio work comprises a number of half-imperial detail sheets done during first and second terms. These are designed to give the student practice at setting up a sheet and improving his draughting.

During third term the students have an Integration problem which correlates elementary design with constructional detailing in the form of working drawings of a simple building.*

*See 11.31, Architectural Studies and Design I, at page 308.

11.72 Building Construction II.

Lectures.

The course comprises thirty-four one-hour lectures covering the following points of construction:—

Timber stairs; cupboards and storage walls; large glass areas; building site assessment and preparations; footings; piling and rafts; demolitions; excavations; shoring; underpinning; basement construction; water, moisture and damp-proof walls; theory, preparation and handling of concrete; pouring of concrete, formwork; theory of reinforcing of concrete, brickwork and masonry, placing of reinforcement; roofing of large areas; heavy timber construction; load bearing brick walls; warehouse construction; fire resisting construction; curtain walls; wall facings and finishes (internal and external); floor surfacings.

As it is impossible to cover all points in connection with any topic under discussion in the time available, each lecture is supplemented with a detailed list of references.

Practical.

The work for the year consists of five sheets of detailed drawings and five sheets of working drawings, of imperial size, exemplifying the subject matter of Building Construction Theory II. The actual problems set cover mainly:—Joinery, advanced domestic construction, heavy timber construction, heavy footings, load bearing brick walls and the roofing of large areas. Particular attention is paid to the correct method of executing working drawings and all work is to comply with relevant by-laws and regulations.

11.73 Building Construction III.

Lectures and practical periods for the study of advanced constructional work beyond that of years I and II.

Advanced building detailing, building layout as affected by Local Government regulations, Sydney Corporation Act By-laws 51 to 58 inclusive.

Ordinary and fireproof construction, curtain walls, stairways, lifts, light wells. Consideration and detailing of problems met in framed construction, both steel and reinforced concrete.

Economical frame layouts and relationship to architectural plans and design. Detail drawings of wall sections, special facings, flashings, flat roofs, drainage, parapets, fireproofing, internal finishes, etc., and working drawings of multi-storey frame buildings, design and detailing of structural elements in steel (riveted and welded work) and reinforced concrete following the lectures in 11.103 Theory of Structures.

The working drawings and details of a multi-storey frame building are required to be done for an Integration problem which is treated in the Design class for some of the architectural design aspects.

11.81 INTRODUCTION TO ARCHITECTURE AND BUILDING.

(*a*) The functions of the architect in society; the functions of related specialists, builders, structural engineers, quantity surveyors, town planners, specialists in services and equipment, the general foreman, craftsman and labourer.

(*b*) The structure of the building industry, how the architect fits into it; professional and trade organisations in the industry; the manufacture and distribution of building materials.

(*c*) Brief description of the main subject matter which the student will have to undertake throughout the whole course; how one subject is complementary to another and the practical implications of all the subjects.

(*d*) Basic principles in architecture and building; the fundamentals in the course of study which the student must watch for; architecture is fine building; it consists of three things, efficient planning, scientific structure, and beautiful appearance; outline of main points under these three heads in anticipation of the lectures on the theory of architecture and building science, to follow in succeeding years.

11.82 THEORY OF ARCHITECTURE A.

Basic functions of buildings; clients' needs and programme of requirements; functional planning, scientific structure, beautiful appearance; introduction to planning; scientific study of requirements; processes in determination of plan; circulation; process diagrams in planning; site and surroundings; study of various sites and how they affect the building; prospect, aspect, orientation; drawing up a programme of requirements; requirements and human need; locality, structure economy, historical and contemporary structure; classical and contemporary plan composition; symmetry and asymmetry; decisive plan forms; proportioning of plan units; principles of architectural composition; aesthetic theories; modes of thought; buildings as organisms; visual art, unity, duality, contrast, rhythm, proportion, scale, character; verticality, horizontality; the dominant, major and minor features; major and minor focal points; composition of masses; space enclosure in three dimensions; the element of decision; accentuation.

11.82A THEORY OF ARCHITECTURE.

A course for students in Civil Engineering emphasising the engineering approach to Architecture, and consisting of selected material from 11.82 Theory of Architecture A.

11.83 Theory of Architecture B.

Factors influencing architectural design: people, climate, topography, materials, economics, social system, etc.; influence of the weather and the "elements", i.e., sun, light, air, wind, rain, etc.; orientation.

Elements of contemporary architecture; floors, walls, roofs, windows, doors, etc.; expression of function, materials and construction; style; character and atmosphere; colour and texture in buildings.

Choice of materials; engineering services and equipment in buildings.

Logical approach to an architectural problem; procedure of planning and design from the broad aspects to the detailed.

Influence of adjacent buildings on design; elementary notes on urban architecture; scale and other principles of design in simple contemporary work; detailing; the surroundings of buildings. Contemporary philosophies.

11.91 Building Science.

This subject deals with the physical and chemical properties of the major building materials. Emphasis is placed on testing methods as laid down in British and Australian standards, suitable tests being carried out in laboratory periods.

Chemical.

Elements, compounds and mixtures.

Chemical changes and their laws. Symbols, direction of chemical change, valency formulae and equations.

Properties of metals and non-metals.

Basic chemical compounds, acids bases and salts.

Oxidation and reduction, combustion.

States of matter, solubility. Evaporation, crystallisation, deliquescence. Hard and soft waters.

Hydrolysis, ionisation, electrolysis.

Sulphur and its compounds, sulphates.

Chlorine and chlorides.

Carbon dioxide and carbonates. Limestone and lime gypsum.

Silicon and silicates. Sand, sandstone. Alumina.

Metals, iron and steel, copper, tin, zinc, lead.

Aluminium, alloys, brass and bronzes.

Physical.

The porosity of building materials, absorption, permeability and capillarity. Weathering, efflorescence and decay. Methods of test.

Elasticity. Stress and strain. Tension.

Compression and transverse testing.

Thermal expansion. Heat transmission and insulation.

Condensation.

Materials.

Types of stone, their durability and uses.

Bricks, tiles and clay products.

Limes, plasters and cements.

Sands and gravels. Grading curves.

Mortars and concretes.

Timber, structure, seasoning, moisture content.

Protection from insect and fungal attacks.

Properties and uses of the common metals.

11.93-11.96 Architectural Design and Construction.

This range of subjects embodies and applies all the subject matter of the other lectures and studies in the Architecture Course. Architectural Design includes planning, construction, specialised building techniques, engineering services and equipment, specification, estimating and building job supervision and control.

The whole course consists of a series of practical problems in design, generally accenting fundamental aesthetic and technical points but with problems interspersed expressly to stimulate imaginative thinking.

In all problems construction is considered an essential part of design. In many cases special or unusual points in design are required to be substantiated by sketch details of construction. At least once in the latter end of the course structural calculations and details of construction are produced for a large building.

All work is marked by a jury, with class criticism and discussion.

11.93 Architectural Design and Construction A.

Studio assignments on the analysis of building elements for structure and function, historical survey and consideration of contemporary application in various structural systems, followed by integration development in simple structure. Analysis of module planning, solid and void, plan composition and massing, siting and sun penetration. Requirements in living, eating and sleeping, followed by inclusive consideration in domestic design (multi-cell type), co-ordinating all structural and functional analysis, furniture and interior design and landscaping, in sketch esquisse, working drawing, specification and rendered presentation.

11.94 Architectural Design and Construction B.

Problems more intricate in planning and technical aspects; exercises designed to determine the influence on design of climate and the elements; construction and materials; the logical use of glass; natural lighting and aspect; the aesthetic exploitation of such practical needs in modern building; expression of character in building.

In third term, a series of lectures is given on furniture; cabinet-making; the aesthetics of interior finishes, furniture, carpets, curtains and furnishings; colour, materials and techniques in interior decoration.

11.95 Architectural Design and Construction C.

Lighting, both natural and artificial; design of commercial buildings and the examination of associated economic factors; industrial planning, expression of function in large architectural projects; influence of adjacent buildings or sites on design; housing; group building; simple problems in urban architecture involving the concept of town planning. Where possible problems are set for actual sites.

11.96 Architectural Design and Construction D.

Large architectural projects, usually done in small groups, relative to actual sites and involving considerable research into human and community requirements and the problems of structure and mechanical and other equipment associated with large buildings; problems in specialised buildings to fit the present and future needs of the developing community.

APPLIED PSYCHOLOGY.

Subjects 12.00 to 12.70.

12.01 Psychology I.

Three hours per week of lectures and practical work.

This course may be the only contact many students have with psychology. It is therefore planned to be appropriate to the largest number of students as well as a suitable introduction to more advanced work. The topics to be studied are the subject matter and methods of psychology, the biological and social determinants of behaviour, the basic processes of development of personality, motivation, perception, thinking, learning, individual differences, ability, the organisation of behaviour in the adult, adjustive behaviour, an analysis of selected life situations—marital adjustment, vocational adjustment, adjustment to age. Throughout the course attention will be given to the nature and kind of methods used in psychology, observation, experiment, measurement, the function of hypotheses, verification of hypotheses and causation.

12.02 Psychology II.

Two lectures and two periods of practical work per week.

The course provides for detailed study of the fields of motivation, perception and learning. In addition, an experimental course is provided which includes the usage of apparatus and instruments and a series of lectures on scientific method and experimental design.

12.03 Psychology III.

Three lectures and one hour of practical work per week.

This course aims to consider theories of personality and the criteria for the evaluation of personality theory. It should assist the student to develop a theory of personality which he can apply to his work. It considers the empirical aspects of personality as related to theories. Such topics as types of personality, cultural background of personality, factor analysis and personality, patterns of personality development and personality and adjustment problems are included. Practical work will include reworking experimental data basic to some of the theories.

12.10 Psychological Assessment I.

One lecture and two hours practical work per week.

The course consists of:

The logical aspects of measurement: the role of measurement in modern science, uses of mental measurement. The nature of fundamental units, derived units. Kinds of criteria for measuring the validity of various kinds of tests, objective and subjective criteria used to measure tests of achievement, general aptitude, special aptitude, interests, attitudes and personality. The construction of quality scales and their use as validity criteria; the composite criterion.

Types of job analysis and their use as criteria. Factors affecting the use of criterion measures.

Reliability—analysis of variance. Understanding of true score, errors of measurement, index of reliability, influence of range of talent on coefficient of correlation. The concept of optimum administration time as related to validity and reliability. The relation of the distribution of item difficulty and item discrimination to validity and reliability.

Item construction: problems of sampling; a consideration of the mental processes involved in answering various types of items. Scoring devices: formulae for correction of chance success; weighting test scores according to dispersion, reliabilities and validities. Rating scale methods: optimum number of scale units; types of scales for various purposes; errors in rating. Interpretation of test scores and ability patterns.

12.11 Psychological Assessment II—Industry.

One lecture and two hours practical work per week.

Measurement of individual differences. Test theory; intelligence tests—uses and limitations. Primary mental abilities. The growth and decline of intelligence. Achievement, aptitude, interest, personality and trade tests used in selection and assessment. The use of questionnaires, rating scales, inventories, cumulative records in the measurement of work effort, responsibility, productivity and motivation. Group methods of selection and management. Interviewing; different types of interview. Interpretation of results, case analysis, differential occupational ability patterns. The employee selection ratio and critical scores.

12.11a Psychological Assessment IIa—Counselling.

One lecture and two hours practical work per week.

Measurement of individual differences. Test theory. Intelligence tests—uses and limitations. Primary mental abilities. The growth and decline of intelligence. Achievement, aptitude, interest, personality and special tests used in counselling. Group and individual tests. Diagnosis questionnaires. The use of records, references and authoritative opinion. Directive and non-directive interviewing. The evaluation of assessment data. Case analysis, differential occupational ability patterns, differential educational achievement patterns, differential avocational interest patterns. Interpretation of growth and development profiles. Problems of selection. Critical ratio.

12.20 Psychology IV—Social.

Three hours lectures per week.

This course will take up the general problems of social behaviour and the relationship of social psychology to psychology on the one hand, and to the various social sciences on the other. It will discuss the theory of institutions, groups, and social movements, social controls, group pressures and standards, conformity and social norms. The importance of status, role, behaviour, communication, rumour, attitude formation and the various mechanisms of social expression will be investigated. The relationship between character, society and culture, studies in the authoritarian personality, ethnocentricism, prejudice and theories of leadership are topics included in the courses.

12.21 Psychology V—Applied Social.

Two hours lectures, two hours practical work per week.

The course will include the following topics:

Theory.—Supervision: leadership and power relation in industry; industrial motivation; morale dimensions; dynamics of social change and industrial behaviour; the field of human relations. Psychological features of human relations. Mechanism in social interaction exemplified in various consultative situations. An examination of British and American studies in group dynamics and human relations programmes.

Practical.—Systematic observation of spontaneous social occurrences. Systematic observation of group phenomena. Experimental studies on group influence on skills and the communication of attitudes.

Ethics.—The distinction between a code of behaviour and an ethic. Psychology and ethics. Theory and practice. Social responsibility. A positive ethic.

12.30 Industrial Psychology.

Two hours lectures per week.

This course deals with the adjustment of the individual to the work situation.

A. *Work as Part of a Pattern.*—Acceptance of work. General treatment of problems of incentives and absenteeism, personal and group efficiency.

B. *Environmental Conditions Affecting Work Behaviour.*—Lighting, ventilation, colour, temperature, etc.

C. *Physiological Conditions Affecting Work Behaviour.*—Physique, posture, movement, motor co-ordination, speed, span of perception, fatigue.

D. *Social Conditions Affecting Work Behaviour.*—Social structure and organisation. Explanations of group behaviour. Industrial groups. Social integration. Social factors and perception. Attitudes, beliefs, ideals, loyalties. Social controls.

INDUSTRIAL AND LABOUR RELATIONS.

Three hours lectures per week.

I. *Industry as a complex social organisation.*

The development of modern industry: The factory system and its forerunners. Factory production. Capitalism, science, and technology; individualism and the division of labour. The growth of professional management. The development of Australian industry.

The industrial community: Interdependence of industry and community. Types of industrial communities. Effects of community values on personality development, *e.g.*, mining.

Social classes and industry: The nature of social classes. Occupational distribution. Occupational mobility.

Social controls of industry.

II. *Problems of planning.*

The development of personnel management. Relation of personnel administration to social and economic objectives; influence of early social legislation, scientific management. Contributions from sociology, psychology and political science; rise of trade unionism and labour legislation. Organisation of personnel administration. Human relationships and technical efficiency. Efficiency and effectiveness. The significance of personnel selection and placement, job analysis and classification, time study and rate setting, job evaluation and classification, training and promotion, employee services, employee adjustments, personnel records and controls. Evaluation of personnel administration. Cost of personnel administration. Measurement of cost, savings, pattern and future for personnel research.

III. *Labour relations.*

The nature of labour relations: Industrial and population distribution, social and economic objectives, types of labour problems—social, political, psychological and economic. Historical background.

The organisation of labour: Line and staff organisation. Committee organisation. Union and management organisation. Joint consultation.

Labour legislation: Labour standards, wage and hour regulations, arbitration, workers' compensation.

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12.40 Personnel Techniques.

One lecture and three hours practical work per week.

In this course, students learn through practice many of the techniques described in other courses—the development of a personnel programme, job analysis, job description. Demands of occupations on the individual. Unit of work, selection, training and promotion.

12.40A Psychology Vb—Counselling Techniques.

Two lectures and four periods of practical work per week.

The purpose of this course is to give first-hand acquaintance with the techniques of counselling and to develop the skill to use them with individuals in need of counselling.

Types of counselling problems. The case history of the individual. Tests, academic records, vocational history, family background. Relating the characteristics of the individual to possible work adjustment. Interviewing—basic concepts of interviewing—types of interview. Provision for practice in conducting interviews. Application of measurement techniques. Individual and group tests. Different types of tests. Making case studies. Recording of data, report writing and supervised experience in industry, technical colleges, Government and social service agencies.

12.44 Occupational Information.

One lecture per week.

This course aims to give a realistic background of information concerning occupations and industries. In the first section a study is made of the literature and in the second section the student develops occupational and industrial information by observation in the field.

Topics will include jobs and industries classification, and obtaining facts by job analysis. The necessity of obtaining facts first-hand by observation. Preparation of job information for counselling—job descriptions, job families, occupational trends. Patterns of jobs in individual establishments, flow of work, promotional sequences, relationship of jobs to the functions of the firm.

12.70 Psychology IVb—Principles of Counselling.

Two hours lectures and two hours practical work per week.

The scope of counselling work in industry, education and the public service. The counselling function in a modern community. The assumptions and philosophy of counselling. Theories of counselling and psycho-therapy. Counselling services. The analysis of counselling records. Counselling as a learning process. The purpose and use of different techniques. Directive and non-directive counselling. Theory of group counselling and group therapy. The place of mental health programmes in modern institutions.

HUMANITIES AND SOCIAL SCIENCES.

The courses for 1956 will be as follows:—

G1 Logic (Compulsory).

Science is sometimes described as organised or connected or systematised knowledge; logic may be roughly described as an enquiry into the kinds of organisation, connection and system found in extended bodies of knowledge. For instance, if you open at random a textbook on a scientific subject, you are quite likely to come upon such a statement as this:

> "It can be shown by the methods of thermodynamics that Raoult's law and the osmotic pressure equation are related; the validity of one requires the validity of the other." (Linus Pauling—*General Chemistry,* p. 293).

Mostly, when we read a statement like that, we look closely at such terms as "thermodynamics", "Raoult's law" and "osmotic pressure"; we take for granted that we clearly understand the terms "shown", "methods", "law", "equation", "related", "validity", "requires". Now what we thus ordinarily take for granted is what logic invites us to question and examine—logic is a study in which we ask, for instance, just what we do when we "show" something; in which we ask whether there are distinguishable "methods" for "showing" things; ask whether an "equation" can or cannot be a "law"; ask how statements and terms can be "related"; ask whether "validity" is to be distinguished from "truth", and ask how it comes that the "validity" of something can "require" the "validity" of something else.

In general, all serious discussion, in any field of knowledge, makes constant use of such terms as "suppose", "because", "if . . . . then", "implies", and so on; every page of scientific writing mentions "facts", "hypotheses", "theories" and "explanations". It will be our business in this course to examine those features of coherent knowledge which are indicated by these and similar terms. It is hoped that students will find this examination interesting in its own right; and hoped also that it will assist them to make critical appraisals of arguments in other fields of study.

Recommended Books—

No books are prescribed for the course, but students would find it much to their advantage to possess, or have access to, one or several of the following:—

Cohen, M. R., and Nagel.—*An Introduction to Logic and Scientific Method.* Routledge and Kegan Paul—(Complete Edition, 1949).

Eaton, R. M.—*General Logic.* Scribner, 1931.

Black, M.—*Critical Thinking.* Prentice-Hall, 1950.

Larrabee, H. A.—*Reliable Knowledge.* Houghton Mifflin, 1945.

Stebbing, L. S.—*A Modern Introduction to Logic.* Methuen, 1945.

G2 Introduction to Modern Philosophy (Compulsory).

The editors of *The Concise Oxford Dictionary* hold that philosophy is especially concerned with ultimate reality, and with the most general causes and principles of things; and many philosophers would agree with them. For this course, however, we have in mind a rather more modest conception of philosophy. We shall take it that modern philosophy has, to a large extent, been concerned with an examination of the ways in which we may arrive at reliable generalised knowledge; and that, among the many questions to which philosophers have given attention, a central place is occupied by some questions which concern the nature of systematic enquiry—these are the questions we shall chiefly consider.

We shall therefore be most concerned with those parts of philosophy which lie nearest to logic; but in this course (in contrast to G1 Logic) we shall have in mind the historical fact that the period in which Bacon, Descartes, Locke, Berkeley and Hume were shaping some important parts of the modern philosophic tradition was also the period in which such men as Kepler, Galileo, Gilbert, Harvey and Newton were laying the foundations of modern science. One of the books we shall study is Descartes' *Discourse on the Method of Rightly Conducting the Reason and Seeking Truth in the Sciences.* The title itself points to the close connections, at this time, between philosophy and science. These connections we shall look at in some detail; in looking at them we shall be taking up, for example, questions about the nature of explanation, the establishing of general truths, the distinction between reason and experience, the nature of perception, the notion of matter or substance, the distinction between primary and secondary qualities, and the notion of causation.

The course will not pretend to be a comprehensive introduction to modern philosophy; it will rather be concerned with those parts of philosophy which, in the work of the seventeenth century writers, are linked to the development of what has come to be called the scientific method of enquiry. It will aim, incidentally, to show whether there is indeed one or several methods of enquiry which are peculiar to the sciences. The exposition will be partly historical, but the chief emphasis throughout will be placed on the questions raised and the answers which may be given to them, rather than on the mere historical succession of theories. It is hoped that students will thus come to see some of the important philosophic presuppositions which underlie much of modern science.

Recommended Books—

Students will be expected to read some of the works of Bacon, Descartes, Locke, Berkeley and Hume. There are editions of some of the writings of Descartes, Berkeley and Hume in the Everyman Library (Dent); for Bacon and Locke students may consult:

Burtt, E. A.—*The English Philosophers from Bacon to Mill.* The Modern Library, 1939.

Some useful discussions of the work of these philosophers, and its relations with contemporary science, will be found in—

Wolf, A.—*A History of Science, Technology and Philosophy in the 16th and 17th Centuries.* Allen and Unwin (2nd Edition, 1950).

Russell, B.—*History of Western Philosophy.* Allen & Unwin, 1948.

Butterfield, H.—*The Origins of Modern Science.* Bell, 1949.

Burtt, E. A.—*The Metaphysical Foundations of Modern Physical Science.* Routledge and Kegan Paul—(Revised Edition, 1949).

G3 Philosophy of Science (Minor Elective).

A Minor Elective for full-time students in their third year. An account will be given of the growth of some major scientific theories—for instance, those associated with Copernicus, Newton, Stahl (phlogiston), Black (caloric), Dalton, Young and Fresnel (the luminiferous ether) and Darwin. Members of the class will be expected to undertake, independently, an examination of some substantial scientific theory.

Recommended Books—

Detailed references will be given in class, but the following books will be generally useful:—

Wightman, W. P. D.—*The Growth of Scientific Ideas.* Oliver and Boyd, 1950.

Einstein, A., and Infeld, L.—*The Evolution of Physics.* Cambridge, 1938.

G6 Philosophy (Major Elective).

Full-time students in their final year may take philosophy as a Major Elective. The course will aim to give an introduction to present-day thought in some major branches of philosophy. It will include 24 lectures on ethics or moral philosophy, 24 lectures on the theory of knowledge, and 24 lectures on the logic of science and mathematics. Students will be expected to undertake some independent reading. Full lists of references will be given in class.

G7c Philosophy (Conversion).

The full course of 72 hours for conversion students will consist of three parts, each of 24 hours. Part I, given in First Term, will be devoted to logic, as outlined under course G1 above; Part 2, given in Second Term, will be an introduction to modern philosophy along the lines of course G2 above; Part 3, in Third Term, will be devoted either to moral theory, or to the theory of knowledge, or to the logic of science and mathematics. If numbers permit, students will be able to make their own choice from these three possibilities for Part 3. Reading lists will be given in class.

G8 Philosophy (Compulsory if G1 and G2 Not Taken).

This course, which is taken by students in part-time courses of the Faculty of Engineering, is a combination of G1 Logic and G2 Introduction to Modern Philosophy.

G10 English (Compulsory).

A course of 48 lectures on Language and Literature for all undergraduates.

In the Language part of the course consideration will be given to the following: the determining factors in the development of the English Language, the formation of its vocabulary and the principles of its structure, the criteria of good and bad writing, the critical appraisal of prose passages and the writing of various kinds of prose.

Recommended books—

Simeon Potter—*Our Language,* Penguin.
King and Ketley—*The Control of Language,* Longmans.
G. H. Vallins—*Good English,* Pan.

The Literature part of the course is directed towards an appreciation of fiction and drama through a study of selected novels and plays. Questions such as the following will be considered: What are the methods of literary criticism? What distinguishes good literature from bad? What is meant by the terms theme, subject, form, structure, texture, style? What are the distinguishing characteristics of fiction and drama? To what extent are novelists and playwrights bound by the practical demands of their media? What are the means by which a writer sets the mark of his personality on his work? The texts, which will be studied too as works in their own right, are:—

Fiction—

Nigel Balchin—*Mine Own Executioner,* Pan.
John Steinbeck—*The Grapes of Wrath,* Penguin.
Joyce Cary—*Herself Surprised,* Penguin.
Evelyn Waugh—*The Loved One,* Penguin.
Graham Greene—*Brighton Rock,* Penguin.
George Orwell—*Nineteen Eighty-Four,* Penguin.
Henry Fielding—*Joseph Andrews,* Penguin.

Drama—

G. B. Shaw—*Pygmalion*, Penguin.
Oscar Wilde—*The Importance of Being Earnest*, Penguin.
John Galsworthy—*Strife*, Duckworth.
Maxwell Anderson—*Winterset*, The Bodley Head.
J. M. Morrell (Ed.)—*Four English Tragedies*, Penguin.

G11 English (Minor Elective).

A course of 24 lectures in second term for third-year students.

Satire is likely to appeal strongly to those who are more interested in the critical content than the aesthetic quality of literary works. So, the novels below will be studied partly for their criticisms of modern life. They will be studied mainly, however, for their more strictly literary properties, for the light they throw on satire as a literary genre. Some of the topics for discussion will be: The relationship between realism and satire and between satire and allegory; the conventional masks and devices of the satirist; the modes of irony in satire; the characteristic traits of the protagonists in satire; and the ways in which a satirical intention predetermines the plot and characterisation of a novel.

Recommended books—

George Orwell—*Animal Farm*, Penguin; *Nineteen Eighty-Four*, Penguin.
Evelyn Waugh—*Decline and Fall*, Penguin.
Aldous Huxley—*Brave New World*, Chatto.
Sinclair Lewis—*Main Street*, Penguin.
Nancy Mitford—*The Pursuit of Love*, Penguin.
Elmer Rice—*A Voyage to Purilia*, Penguin.
Samuel Butler—*Erewhon*, Penguin.

G12 English (Major Elective).

A course of 72 lectures in first and second terms for fourth-year students.

This is a course on modern literature, English, American and Australian. It contains a core of works for compulsory detailed study and some additional literature for more rapid and selective reading. The texts are chosen for their individual merit and their representative character. The aim of the course is to indicate the variety and main concerns of modern literature and to encourage critical appreciative reading.

The course will include discussions, play-readings and recordings as well as lectures. The drama is to be studied with reference, whenever possible, to current films and stage productions.

Main Texts—

Students may use any editions which are available.

(*a*) *Drama*—
T. S. Eliot—*The Cocktail Party.*
William Inge—*Come Back Little Sheba.*
Eugene O'Neill—*Emperor Jones.*
Bernard Shaw—*Man and Superman.*
J. M. Synge—*The Playboy of the Western World.*
Douglas Stewart—*Ned Kelly.*

(*b*) *Fiction*—
F. Scott Fitzgerald—*The Great Gatsby.*
Joyce Cary—*The Horse's Mouth.*
Arthur Koestler—*Darkness at Noon.*
D. H. Lawrence—*Sons and Lovers.*
Samuel Butler—*The Way of All Flesh.*
Tom Collins—*Such is Life.*

G13c English (Conversion).

This course of 72 lectures is a combination of G10 and G11, G10 being given in Terms 1 and 2 and G11 in Term 3.

G20 and G20b History (Compulsory).

G20 is divided into two sections, both of which must be taken by all full-time students.

G20.1 *The Background to Western Civilisation.*

This section of 24 lectures is designed to give the student some acquaintance with the principles and foundations of modern western civilisation by means of a very general survey of the development of human society from the Renaissance to the present day. The treatment of so vast a theme must necessarily be highly selective, and the lectures will describe only those developments and personalities which have given to the western civilisation its specific character and whose influence upon the outlook and conditions of western society remains potent to-day. The main topics will be: the Reformation and the growth of religious toleration; the Renaissance and the transition from medieval to modern; the birth of modern science; the Industrial Revolution; the French Revolution and the idea of the "Rights of Man"; the rise of democracy; nationalism; imperialism; Karl Marx; Darwin and the theory of evolution; the growth of the Modern State; and the problem of international organisation.

Although the treatment of these topics will be primarily historical, every effort will be made to avoid a dull recital of facts and dates. The importance of art and literature, and especially of thought and ideas will be stressed, and an endeavour will be made to present as vivid a picture as possible of the different ways of life that men have followed and fought over. Whenever possible, visual aids will be employed to illustrate the lectures. The course will emphasise the revelance of the study of the ideas and events of the past to the modern world; and, by providing the student with standards of comparison with societies and ways of life and thought different from his own, we hope to develop in him a sense of perspective, an attitude of tolerance, and a critical approach to the problems of to-day.

G20.2 *Australian History.*

This section of 24 lectures attempts in brief outline to present the political, cultural and economic background of the modern Australian Commonwealth, and to give an understanding of the living problems of the contemporary world in their special reference to Australia.

The following topics will be discussed: the convict system in its British background and its influence on Australian development; the evolution of government, from the penal colony to the granting of self-government, and thence to the establishment of the Commonwealth; questions of land exploration, occupation and disposal, with reference to such topics as squatting and land legislation; the emergence of organised labour as a powerful economic and political force from its 19th century beginnings through to such developments as wage fixation and industrial conciliation and arbitration; the forces making for greater social complexity; the great gold discoveries, the diversification of farming, increased manufacturing and continued urbanisation all creating additional problems. Finally, some consideration of Australia as a nation: the character and peculiarities of the federal constitution, immigration policy, and the attitude which Australia has adopted on various matters of international concern.

G20B History (Compulsory).

This course of 36 lectures is compulsory for all part-time Engineering students. The outline for this course is the same as that given for G20.1 The Background to Western Civilization.

G21 History (Minor Elective).

A student electing to take this subject may choose any one of the following four courses:—

G21.1 *International Organisation.*

A course of 24 lectures dealing with the most acute problem of the modern world—the problem of achieving international peace and security. The lectures will discuss such topics as: what the League of Nations really was; why the League failed; the Permanent Court of International Justice; the setting-up of the United Nations; the problem of the "veto"; the "cold war"; the future prospect.

G21.2 *Diplomatic Background to the Second World War.*

This course will contain an examination of world history, especially European and American, between 1919 and 1939. In particular, attention will be paid to the rise of the Communist, Fascist and Nationalist Socialist forces within Europe, and their expansion beyond. This inquiry will form the basis of an analysis of the events leading to the Second World War, which forms the central theme of the course; but also involved is an investigation of American-Japanese relations and other allied matters.

G21.3 *South-East Asia.*

A course covering some of the political and geographical problems of the countries of southern and eastern Asia: India, Pakistan, Burma, Malaya, Thailand, Indo-China, Indonesia, the Philippines, China and Japan. This region, a near-neighbour of Australia, contains more than one-half the world's people, and has been the scene of some of the most recent political changes. Within such a vast field, a selection will be made of both local and regional topics, including the following: boundary problems of India and Pakistan; Vietnam and Vietminh in Indo-China; the background to Communist China; population pressure in Indonesia; Japan's ambitions in eastern Asia; race, commerce and tradition in Malaya. Some of the features discussed have general application to the area and will be treated more broadly: for example, the geographical and economic basis of rice growing; the widespread lack of industrialisation and the proportionately high percentage of rural workers; the general illiteracy; the influence of Christianity as compared with that of other religions. In dealing with such general topics and in particular cases also, the significance of Australian contacts with the various countries concerned will be stressed.

G.21.4 *Soviet Russia.*

A brief account of the history of Soviet Russia from the collapse of the Tsarist regime until the recent past. The chief interest of this course will centre around internal political developments beginning with the Bolshevik Revolution, though attention will be paid to questions such as Soviet ideology, economic growth, and foreign policy.

G22. HISTORY (MAJOR ELECTIVE).

History of Australia.

This course of 72 lectures is designed to survey the more important aspects of Australian history up to the present day. It will avoid an insular approach, and will discuss Australian history in its broader setting of British and World History, with constant references to the British background and to the stories of Canada, New Zealand and South Africa. The preliminary part of the course deals with the opening up of the Pacific and with the maritime explorers. Then follows an analysis of the 18th century background to make more apparent the reasons for the decision to establish a penal settlement in eastern Australia in 1788. Subsequent lectures trace the gradual evolution from penal to free settlements. Explorers open up the continent and the pastoral industry expands and flourishes; immigration from the United Kingdom is encouraged; and the foundadations of an urban society laid; and the cessation of transportation to eastern Australia heralds the advent of representative and responsible government to the several colonies. All these developments (1815-1850) are related to the English background of the Industrial Revolution, industrial unrest and post-war political and social discontent culminating in Chartism. At the same time, progress in Australia is compared and contrasted with developments in Canada, New Zealand and South Africa, with their problems of national and racial contacts. After a survey of the colonies of settlement and of British colonial policy generally, the story returns to Australia, where the discovery of gold in New South Wales and Victoria in 1851, with its accompanying flood of immigrants, confronts the colonies with recognisably modern problems. There is a moderately successful agitation for political democracy against the interests of the squatters and their allies, and the bitter struggle between farmers and squatters "to unlock the land". Immigration stimulates secondary industry and Australia's "Industrial Revolution", trade unionism and the rise of the Labor Party. The 1890's are a decade of crisis, involving the country in a disastrous depression and in a series of strikes and lock-outs. In the political sphere, Federation is achieved at the end of the century. In the last 50 years Australia's domestic history has not been without incident—e.g., the principle of the Basic Wage, the political conflict between Labor and non-Labor, and the depression of the 1930's—but events have forced the nation to define more exactly its attitude to European and Pacific affairs and to relations with Britain and other members of the British Commonwealth. Participation in two world wars and in the League of Nations and the United Nations demonstrates Australia's growing realisation of her duties as a member of the community of nations.

G22c History (Conversion).

Students taking this subject may do either of the following:—

G22.1c *History of Australia.*

The outline of this course is the same as that given for G22 History.

G22.2c *Background to Western Civilisation.*

This course of 72 lectures represents an extended version of the course outlined under G20.1 History. In this case, the development of human society is studied from the earliest times to the present day, and the early lectures will discuss such topics as the birth of civilisation in the Near East, the Egyptian, Greek and Roman "contributions", the rise of Christianity, feudalism, and the relationship between religion and politics in the Middle Ages. From this point, the course will deal with the significant themes of modern history already outlined above.

G30 Government (Minor Elective).

The American Political System.

A study of American political institutions and dominant political ideas, especially in recent years. The course will include some historical and social background but will deal chiefly with the recent working of political parties, trade unions, etc., and of the institutions of State and Federal Government in the United States.

Reference Books—

Laski, H. J.—*The American Presidency.*
Key, V. O.—*Politics, Parties and Pressure Groups.*
Brogan, D.—*An Introduction to American Politics.*

G31 Government (Major Elective).

A course of 72 lectures. The course will be divided into two parts, the first dealing mainly with description and analysis of political institutions, the second with some important questions in political theory.

Part A will examine the working of Parliamentary government in Australia, dealing with such topics as—

The Constitution—formation, growth, present working;
Political parties and pressure groups;

Parliamentary institutions—State and Federal;

The electoral system;

The social framework in which the government works, etc.,

and making comparative studies of similar aspects of the British, the American and at least one other political system.

Part B will examine critically some representative political theories of the past and present and so attempt some appreciation of the problems involved in such topics as—

Democracy, Socialism, Communism;

Constitutions and constitutional government;

Political power, political rights, political equality;

The State and the individual.

Recommended Books—

Part A—

Crisp—*Parliamentary Government in the Commonwealth of Australia.*
Overacker—*The Australian Party System.*
Miller—*The Australian Political System.*
Ogg—*English Government and Politics.*
Brogan—*An Introduction to American Politics.*

Part B—

D. Pickles—*An Introduction to Politics.*
Gray—*The Socialist Tradition.*
Sabine—*A History of Political Theory.*
Truman—*The Governmental Process.*

G31c Government (Conversion).

This course of 72 lectures will be the same as that described under G31 Government.

G40 Psychology (Minor Elective).

Heredity and some Social Issues.

This topic is offered as a means of directing students to a critical examination of a number of related social questions which are commonly approached with an uncritical acceptance of current prejudices and practices.

It is intended that an approach to these questions be made through an understanding of scientifically determined facts in order that the dangers of mere opinion or "commonsense" shall be seen as a questionable approach to social questions, in the same way as it is to those technical fields which may be regarded by the student, as an intending technologist, as his major field of study.

As part of this intention, the reality of the distinctions, as well as the inter-relationships between heredity and environment, will be examined from the standpoint of causal elements in social behaviour. An examination will then be made of the methods and findings of typical investigations into relevant psychological aspects of these social questions.

Synopsis—

1. A statement of main issues.
2. The mechanism of heredity.
3. The limits of heredity—what we do and do not inherit.
4. The nature and effects of environment.
5. Heredity and sex differences.
6. Heredity and "race" differences.
7. Heredity and "class" differences.
8. Heredity and delinquency and crime.
9. Heredity and social customs.

Reference Books—

Scheinfeld, A.—*You and Heredity.*
Blackburn, J.—*The Framework of Human Behavior.*
Anastasi, A. & Foley—*Differential Psychology.*
Klineberg, O.—*Social Psychology.*

G41 Psychology (Minor Elective).

The principal aim of this course is to acquaint the student with psychology as a cultural subject.

Beginning with the discoveries of Freud and stemming from them, dynamic psychology has made a profound impact on thought in almost all fields of enquiry, notably the social sciences. As a consequence, the findings of psychology have led to a clearer understanding of custom, convention, morality and the like.

A general account will be given of the basic tenets of psychoanalytic theory and their modification in recent years. This will be followed by an account of the influence of psychoanalytic concepts on literature, art, religion, social theory, anthropology, education and of the manner in which psychology has thrown light on various social problems such as sexual morality, conventionalism, the social deviant, censorship and values.

The principal objective of the course is to develop criticism by encouraging the student to see things as they are and through such objectivity to assist him to see through the assumptions and illusions current in the conventional virtues and customs.

Reference Book—

Freud, S.—*Introductory Lectures on Psychoanalysis.*

G42 Psychology (Major Elective).

This course will be confined to a treatment of general psychology with a social emphasis. The usual topics of general psychology—perceiving, thinking, remembering, intelligence, personality, motivation and emotion—will be covered and their social aspects considered.

Reference Books—

Stagner, R. & Karwoski, T. S.—*Psychology.* McGraw Hill, New York, 1952.

Klineberg, O.—*Social Psychology.*

Hartley & Hartley—*Fundamentals of Social Psychology.*

G42c Psychology (Conversion).

The outline of this course is the same as that given for G42 Psychology.

G50 Economics (Minor Elective).

Twenty-four lectures given by Professor Hartwell and Mr. Runcie. This is a course in Descriptive Economics, giving an account of the development and present structure of the Australian economy. It may be taken by itself as a self-contained course, or as a descriptive introduction to the fourth-year Major Elective in Economics.

A brief outline follows:—

Stages and events in the development of the Australian economy; the prison farm; the pastoral and gold era; industrialisation. The growth of Australia's national income; how it is now made up and to whom it is distributed. Structure of the economy; size and location of industries; survey of economic resources. Population: growth and present distribution. Key industries: wool, wheat, coal, steel, transport and irrigated agriculture. Foreign trade: imports, exports and the balance of payments; the tariff system. The Australian banking system. Government finance: taxation, Loan Council, the Budget, State finances; other activities of governments in the economy. Trade unions: organisation and policies; the Arbitration Court; joint consultation; incentive schemes.

Reference Books—

Commonwealth Year Book (most recent).

Andrews, J.—*Australia's Resources and Their Utilisation,* Parts 1 and 2.

G51 Economics (Major Elective).

This course will be divided into two parts—

A. *Economic History* (24 lectures).

The Industrial Revolution. An examination of the industrial revolution in Great Britain, Germany, U.S.A., Russia and Japan, and an historical analysis of the problems of economic development with special reference to the under-developed countries of the world.

B. *Economic Theory* (48 lectures).

The aim is to provide a course which outlines the working of a modern economic system, with particular reference to the Australian economy.

Economic activity can be envisaged as a circular flow of money in which there are (a) income payments to various persons and institutions (for labour or the use of capital); and (b) expenditure, by those persons and institutions, on the output of business enterprises. The rate of money flow is known as the National Income; the limitations of this concept, its relationship to the standard of living, and the problems of its measurement in Australia are examined. The fluctuations in the rate of flow may be due to seasonal influences, Inventory Cycles, the Trade Cycle, Industry Cycles and Long Waves. Of these the Trade Cycle ("booms and depressions") is the most important and is singled out for special study.

The characteristics and the growth of a money economy are sketched with particular attention to banking, the growing provision of hire purchase finance, central banking and government fiscal policy.

The sources of instability in Australia are intensified because of dependence on overseas trade and capital. Hence, the principles underlying international trade and the balance of payments are essential to an understanding of the working of the Australian economy.

The importance of the individual firm and industry in the economy is sketched and their principles of operation considered.

Recommended Books—

Samuelson, P. A.—*Economics, an Introductory Analysis* (2nd ed., 1951).
Cole, G. D. H.—*Introduction to Economic History, 1750-1950* (1952).

G51c Economics (Conversion).

This course of 72 lectures will be the same as that described under G51 Economics.

TEXT BOOKS.

The following text books are recommended for 1956.*

PHYSICS—1.00 to 1.92.

SUBJECT.	TEXT BOOK.
1.11 Part I, 1.41, 1.41D, 1.91 — Physics ...	Lemon and Ference—*Analytical Experimental Physics.*
	Reference.
	Robertson—*Introduction to Physical Optics.* Gilbert—*Electricity and Magnetism.* Milton—*Heat.* Stranathan—*Particles of Modern Physics.*
1.11 Part II, 1.12, 1.12A, 1.42, 1.42D, 1.92 — Physics ...	Margenau, Watson and Montgomery—*Physics—Principles and Applications.*
	Reference.
	Sears—*Principles of Physics*—(Vols. I, II and III). Kronig—*Textbook of Physics.* Frank—*Introduction to Electricity and Optics.* Robertson—*Introduction to Physical Optics.* Starling—*Mechanical Properties of Matter.* Semat—*Introduction to Atomic and Nuclear Physics*
1.13 Physics	Harnwell—*Principles of Electricity and Electromagnetism.* Kittel—*Introduction to Solid-State Physics.* Rojansky—*Introductory Quantum Mechanics.* Zemansky—*Heat and Thermodynamics.* Hardy and Perrin—*Principles of Optics.*
1.14 Physics	Shockley—*Electrons and Holes in Semi-Conductors.* McCrea—*Relativity Physics.*
	Optometrical Science.
Advanced Visual Physiology and Physiological Optics.	Adler—*Physiology of the Eye.* Ogle—*Researches in Binocular Vision.* Hartridge—*Recent Advances in the Physiology of Vision.*
	Reference.
	Wright—*Researches in Normal and Defective Colour Vision.* Duke-Elder—*Textbook of Ophthalmology.* Polyak—*The Retina.* Dudley—*Stereoptics.* Tschermak—*Physiological Optics.* Granit—*Sensory Mechanisms of the Retina.* Gibson—*The Perception of the Visual World.* Hering—*Spatial Sense and Movements of the Eye.* Luneburg—*Mathematical Analysis of Binocular Vision.*

* NOTE.—Text books for subjects not listed will be recommended by lecturers in those subjects.

APPLIED CHEMISTRY—2.00 to 2.97.

SUBJECT.	TEXT BOOK.
2.111 Chemistry	Latimer and Hildebrand—*Reference Book of Inorganic Chemistry* (Revised Edition, 1940). *Bound with* Hildebrand—*Principles of Chemistry* (5th Edition, 1947). Sydney Technical College—*First Year Practical Chemistry Notes*—Union Store. Read—*Textbook of Organic Chemistry* (3rd Edition). *OR* English and Cassidy—*Principles of Organic Chemistry*. *OR* Garside and Phillips—*Textbook of Pure and Applied Chemistry* (1953). Getchell—*Organic Chemistry—A Brief Course.* 1954. **Reference.** Lanford—*Using Chemistry*, 1955. Marvell and Logan—*Chemical Properties of Organic Compounds—An Introduction.*
2.184 Botany	McLean and Cook—*Textbook of Theoretical Botany.* **Reference.** Smith—*Cryptogamic Botany* (2 vols.). Fritsch—*The Structure and Reproduction of the Algae* (2 vols.). Gaumann and Dodge—*Comparative Morphology of the Fungi.* Campbell—*Mosses and Ferns.* Bower—*Primitive Land Plants.* Coulter and Chamberlain—*Morphology of the Gymnosperms.* Chamberlain—*The Living Cycads.* Eames—*Morphology of Vascular Plants.* Randle—*Classification of Flowering Plants* (2 vols.). Hutchinson—*The Families of Flowering Plants.* Sinnott, Dunn and Dobzhansky—*Principles of Genetics.* Huxley—*Evolution : the Modern Synthesis.*
2.194 Zoology	Imms—*Textbook of Entomology.* Grove and Newell—*Animal Biology.* Storer—*General Zoology.* **Reference.** Borradaile et al.—*The Invertebrata.* Parker and Haswell—*Textbook of Zoology.* Tillyard—*Insects of Australia and New Zealand.* Sinnott et al.—*Principles of Genetics.* Dobzhansky—*Genetics and the Origin of Species.* Mays, Linsley and Usinger—*Methods and Principles of Systematic Zoology.* Bullough—*Practical Invertebrate Anatomy.* Weichert—*Anatomy of Chordates.*

APPLIED CHEMISTRY—2.00 to 2.97—*continued.*

Subject.		Text Book.
2.32 2.32A 2.32D	Physical Chemistry	Glasstone—*Elements of Physical Chemistry.* **Reference.** Glasstone—*Textbook of Physical Chemistry.* Eastman and Rollefson—*Physical Chemistry.* Hammett—*Introduction to the Study of Physical Chemistry.* **Practical.** Palmer—*Practical Physical Chemistry.* Practical Notes—*Physical Chemistry I and II.*
2.33	Physical Chemistry ...	Glasstone—*Elements of Physical Chemistry.* **Reference.** Glasstone—*Textbook of Physical Chemistry.* Eastman and Rollefson—*Physical Chemistry.* Hammett—*Introduction to the Study of Physical Chemistry.* **Practical.** Practical Chemistry Notes—*Physical Chemistry I and II.*
2.34 2.34D	Physical Chemistry	**Reference.** Alexander and Johnson—*Colloid Science.* Harrison, Lordand and Loofbourow—*Practical Spectroscopy.* Steiner—*Chemical Thermodynamics.* Nachtreib—*Spectrochemical Analysis.* Laidler—*Chemical Kinetics.* Hinshelwood—*The Structure of Physical Chemistry.*
2.41 2.41A 2.41B	Chemistry	Latimer and Hildebrand—*Reference Book of Inorganic Chemistry* (Revised Edition, 1940) *Bound with* Hildebrand—*Principles of Chemistry* (5th Edition, 1945). Brown—*A Simple Guide to Modern Valency Theory.* English and Cassidy—*Principles of Organic Chemistry.* *OR* Read—*Textbook of Organic Chemistry* (3rd Edition). *General Chemistry Practical Notes*—University of Technology. Vogel—*Textbook of Qualitative Chemical Analysis* (3rd Edition, 1945).
2.42	Inorganic Chemistry	Sidgwick—*Chemical Elements and their Compounds* (2 vols.). Emeleus and Anderson—*Modern Aspects of Inorganic Chemistry.* Brown—*A Simple Guide to Modern Valency Theory.*

APPLIED CHEMISTRY—2.00 to 2.97—*continued.*

SUBJECT.	TEXT BOOK.
	Reference.
2.44, 2.44D Inorganic Chemistry.	Coulson—*Valence.* Van Arkel—*Molecules and Crystals.* Cook and Duncan — *Modern Radio-Chemical Practice.*
2.52, 2.52A Quantitative Analysis.	Vogel—*A Textbook of Quantitative Inorganic Analysis.* *OR* Kolthoff and Sandell—*A Textbook of Quantitative Inorganic Analysis.* Sydney Technical College—*Quantitative Analysis I Practical Notes*—Union Store.
	Reference.
2.53 **Quantitative Analysis**	Hildebrand and Lundell—*Applied Inorganic Analysis.* Willard and Diehl—*Advanced Quantitative Analysis.* Lundell and Hoffman—*Outlines of Methods of Chemical Analysis.* Walton—*Principles and Methods of Chemical Analysis.* Welcher—*Organic Analytical Reagents.* Sandell—*Colorimetric Determination of Traces of Metals.* A.S.T.M.—*Methods of Chemical Analysis of Metals.* *British Standard Methods of Analysis for Iron and Steel.* Sydney Technical College—*Quantitative Analysis II, Practical Notes*—Union Store.
	Reference.
2.54, 2.54D Quantitative Analysis.	Balston and Talbot—*A Guide to Filter Paper and Cellulose Powder Chromatography.* Pollard and McOmie—*Chromatographic Methods of Inorganic Analysis.* Kolthoff and Lingane—*Polarography.* Kolthoff and Furman—*Potentiometric Titrations.* Samuelson—*Ion Exchangers in Analytical Chemistry.* Luder and Zuffanti—*Electronic Theory of Acids and Bases.* Audrieth and Kleimberg—*Non-Aqueous Solvents, Applications as Media for Chemical Reactions.*
2.62 Organic Chemistry	English and Cassidy—*Principles of Organic Chemistry.* *OR* Noller—*Chemistry of Organic Compounds.*

APPLIED CHEMISTRY—2.00 to 2.97—*continued.*

SUBJECT.		TEXT BOOK.
2.63 2.63A	Organic Chemistry	Finar—*Organic Chemistry* *OR* Fieser and Fieser—*Organic Chemistry* *OR* Noller—*Chemistry of Organic Compounds.*
2.64 2.64A 2.64D	Organic Chemistry	Turner and Harris—*Organic Chemistry.* Wilde—*Characterisation of Organic Compounds* *OR* Openshaw—*Characterisation of Organic Chemistry.*

Reference.

2.65A	Applied Organic Chemistry.	Markley, K.—*The Fatty Acids.* Bailey, A. E.—*Industrial Oil and Fat Products.* —*Progress in the Chemistry of Fats and Related Products Series.* Ralston, A. W.—*Fatty Acids and their Derivatives.* Weissberger, A. (Ed.)—*Techniques of Organic Chemistry Series.* Gibb, J. R.—*Optical Methods of Analysis.* Guenther, E.—*The Essential Oils.* (Vols. I, II and III.) Simonsen, Sir J.—*The Terpenes.* Rodd, A. E. (Ed.)—*The Chemistry of Carbon Compounds.* Manskie, R. H. and Holmes, H. L.—*The Alkaloids Series.* Suter, C. M. (Ed.)—*Medicinal Chemistry Series.* Techmeisser, L. and Cholnoky, L.—*Principles and Practice of Chromatography.* Bloch, R. J.—*Paper Chromatography.* Samonds, H. R. and Ellis, C.—*Handbook of Plastics.* Schmidt, A. X. and Marlies, C. A.—*Principles of High Polymer Theory and Practice.* Frean, D. E.—*The Chemistry of Insectecides.* Rosenberg, H.—*Vitamins.* Harris, R. S. and Thimon, K. V. (Ed.)—*Vitamins and Hormones—Advances in Research and Applications.* Sibrell, W. H. and Harris, R. S. (Ed.)—*The Vitamins Series.* *British Pharmacopoeia.* *U. S. Pharmacopoeia.* *A.S.P.M. Standards in Plastics.*

APPLIED CHEMISTRY—2.00 to 2.97—*continued.*

SUBJECT.	TEXT BOOK.
	Reference.
2.65B Applied Organic Chemistry.	Neuthrath, H. and Bailey, K.—*Proteins.* Wright, W. D.—*The Measurement of Colour.* Markley, K.—*The Fatty Acids.* Kent, Jones and Amos—*Modern Cereal Chemistry.* Sibrell, W. H. and Harris, R. S. (Ed.)—*The Vitamins Series.* Winston—*The Analysis of Foods.* Karrer, P. and Jucker, E.—*Carotenoids.*
	Reference.
2.72 Mathematical Chemistry.	Worthing and Geffner—*The Treatment of Experimental Data.* Hitchcock and Robinson—*Differential Equations in Applied Chemistry.* Crumpler and Yoe—*Chemical Computation and Errors.* Bridgman—*The Method of Dimensions.* Barbor and Thiessen—*How to Solve Problems in Physical Chemistry.*
2.73 Mathematical Chemistry.	Brownlee—*Industrial Experimentation.* Moroney—*Facts from Figures.*
	Reference.
	Bennett and Franklin—*Statistical Analysis in Chemical Industry.* Davies, O. L. (Ed.)—*Statistical Methods in Industry and Research.* Davies, O. L. (Ed.)—*Design and Analysis of Industrial Experiments.*
	Reference.
2.91 Biochemistry	Bell—*Carbohydrate Biochemistry.* *Practical Notes*—2.91 *Biochemistry*—Union Store.
2.911 Biology General Biology.	Smith et al.—*Textbook of General Botany.* Grove and Newell—*Animal Biology.* Bucksbaum—*Animals without Backbones.*
	Reference.
	Murray—*Biology.* McLean and Cook—*Biology.* Rogers et al.—*Man and the Biological World.* Storer—*General Zoology.* Sinnott—*Botany—Principles and Problems.* Hill et al.—*Botany.* Scheinfeld—*You and Heredity.* Borradaile—*Manual of Zoology.* Peacock—*Elementary Microtechniques.* Briggs—*Anatomy of Animal Types.* Ward and Whipple—*Freshwater Biology.* Tansley—*Introduction to Plant Ecology.* McLean and Cook—*Practical Field Ecology.* Carey—*Botany by Observation.* Besley and Meyer—*Field Work in Animal Biology.*

SUBJECT.	TEXT BOOK.
2.912 Biology	Smith et al.—*Textbook of General Botany.* Grove and Newell—*Animal Biology.* **Reference.** Borradaile—*Manual of Zoology.* de Beer—*Vertebrate Zoology.* Romer—*Man and the Vertebrates.* Maximon and Bloom—*Textbook of Histology.* Schafer—*Essentials of Histology.* Gillison—*Histology of the Body Tissues.* Eames and MacDaniels—*Introduction to Plant Anatomy.* Jones—*Introduction to Floral Mechanisms.* Swingle—*Textbook of Systematic Botany.* Hutchinson—*Families of Flowering Plants.* Berkeley—*Practical Plant Anatomy.* Saunders and Manton—*Practical Vertebrate Morphology.* Harris—*Wild Flowers of Australia.*
2.92 Biochemistry	Baldwin—*Dynamic Aspects of Biochemistry.* **Reference.** Fruton and Simmonds—*General Biochemistry.* *Practical Notes*—2.92 *Biochemistry*—Union Store
2.924 Microbiology	Salle—*Fundamental Principles of Bacteriology.* Clifton—*An Introduction to the Bacteria.* Gardner—*Bacteriology for Medical Students and Practitioners.* Bigger—*Handbook of Bacteriology.* Fairbrother—*A Textbook of Medical Bacteriology.* **Reference.** Muir and Ritchie—*A Manual of Bacteriology.* Mackie and McCartney—*An Introduction to Practical Bacteriology.* Smith and Martin—*Zinsser's Textbook of Bacteriology.* Wilson and Miles—*Principles of Bacteriology and Immunity.* Topley and Wilson. Anderson—*An Introduction to Bacteriological Chemistry.*
2.925 Microbiology	Gale—*The Chemical Activities of Bacteria.* Wilson and Miles—*Principles of Bacteriology and Immunity.* Topley and Wilson. **Reference.** Baumgartner—*Canned Foods—An Introduction to their Microbiology.* Prescott and Dunn—*Industrial Microbiology.* Jensen—*Microbiology of Meats.* Tanner—*Microbiology of Foods.* Lodder and Kreger—*The Yeasts—A Taxonomic Study.* Werkman and Wilson—*Bacterial Physiology.*

APPLIED CHEMISTRY—2.00 to 2.97—*continued.*

SUBJECT.		TEXT BOOK.
2.926	Microbiology ...	Alexopaulos—*Introductory Mycology.* Bessey—*Morphology and Taxonomy of Fungi.* **Reference.** Wolf and Wolf—*The Fungi* (Vols. I and II). Ainsworthy and Bisby—*Dictionary of the Fungi.* Large—*The Advance of Fungi.* Smith—*Introduction to Industrial Mycology.* Buller—*Researches on Fungi* (Vols. I–VI). Hawker—*Physiology of the Fungi.* Wacksman—*Principles of Soil Microbiology.* Forster—*Chemical Activities of the Fungi.* Cartwright and Findlay—*Decay of Timber and its Prevention.*
2.95	Biochemistry ...	Baldwin—*Dynamic Aspects of Biochemistry.* Fruton and Simmonds—*General Biochemistry.* **Reference.** Sumner and Somers—*Chemistry and Methods of Enzymes.* *Practical Notes*—2.95 *Biochemistry I*—Union Store.
2.96 2.97	Biochemistry ...	Sumner and Somers—*Chemistry and Methods of Enzymes.* Tauber—*The Chemistry and Technology of Enzymes.* **Reference.** Dixon—*Multi-Enzyme Systems.* Sumner and Mybach—*The Enzymes.*

CHEMICAL ENGINEERING 3.00 to 3.824.

3.14 3.14A	Industrial Chemistry	Riegel—*Industrial Chemistry* (5th Edition). Shreve—*Chemical Process Industries.* Groggins—*Unit Processes in Organic Synthesis.*
3.24 3.24D	Chem. Engineering Unit Operations.	Brown and Associates—*Unit Operations.* Perry—*Chemical Engineers' Handbook.* Badger and McCabe—*Elements of Chemical Engineering.* Kern—*Process Heat Transfer.* Rouse—*Elementary Mechanics of Fluids.* Henderson and Perry—*Agricultural Process Engineering* (Food Technology Students). **Reference.** McAdams—*Heat Transmission.* Riegel—*Chemical Machinery.* Robinson and Gilliland—*Fractional Distillation.* Treybal—*Liquid Extraction.* Sherwood and Pigford—*Absorption Extraction.*

CHEMICAL ENGINEERING—3.00 to 3.824—*continued.*

	Subject.	Text Book.
3.34 3.34D	Chemical Engineering Design.	Low—*Pocket Book for Mechanical Engineers.* *OR* *Mechanical World Pocket Book.* Faires—*Design of Machine Elements.* *OR* Maleev—*Machine Design.* Perry—*Chemical Engineers' Handbook.* Stoever—*Applied Heat Transmission.* *OR* McAdams—*Heat Transmission.* *B.S. Code* 1500 *Fusion Welded Pressure Vessels.* *S.A.A. British Specification* 436 (*Gears*). Institution of Engineers—*Australian Standard Engineering Drawing Practice* (1952 Edition). Morris and Jackson—*Absorption Towers.* **Reference.** Hesse and Rushton—*Process Equipment Design.* Marks—*Mechanical Engineers' Handbook.* American Society for Metals—*Metals Handbook.* *A.S.M.E.—Boiler Construction Code.* *S.A.A. Boiler Code, C.B.* 1. *S.A.A. Code for Corrosion Resistant Steel Boilers. C.B.* 10. *S.A.A. Welding Code, C.A.* 8. *S.A.A. Code for Structural Steel in Buildings, C.A.*1. *S.A.A. Code for Reinforced Concrete.* *S.A.A. Crane and Hoist Code.*
3.44	Chemical Engineering Calculations.	Hougen, Watson and Ragatz—*Chemical Process Principles* (Vol. I.) *Material and Energy Balances.* **Reference.** Sherwood and Reed—*Applied Mathematics in Chemical Engineering.* Davis, D. S.—*Empirical Equations and Nomography.* Chambers—*Statistical Calculations.* Brownlee—*Industrial Experimentation* (4th Edition, 1949). Hitchcock and Robinson—*Differential Equations* (2nd Edition, 1936). Lipka—*Graphical and Mechanical Computations.* Haslam and Russell—*Fuels and Their Combustion.* Davies, O. L.—*Statistical Methods in Research and Production.* Worthing and Geffner—*Treatment of Experimental Data.* I. S. & E. S. Sokolnikoff—*Higher Mathematics for Engineers and Physicists.*
3.54	Chemical Engineering Materials.	Stevens and Donald—*Rubber in Chemical Engineering*, 1949.

CHEMICAL ENGINEERING—3.00 to 3.824—*continued.*

	Subject.	Text Book.
		Reference.
3.54	Chemical Engineering Materials—*contd.*	Vivian—*Essential Metallurgy for Engineers,* 1948. Rollason—*Metallurgy for Engineers,* 1947. Smith, Paul I.—*Plastics for Production,* 1944. Barron—*Modern Plastics,* 1949. Burton, W. E. (Ed.)—*Engineering with Rubber,* 1949. U.S. Department of Interior, Bureau of Reclamation—*Concrete Manual.* Norton—*Refractories,* 1949. Morey, G. W.—*Properties of Glass,* 1938.
3.65	Chemical Engineering Thermodynamics and Kinetics.	Smith, J. M.—*Introduction to Chemical Engineering Thermodynamics.*
		Reference.
		Hougen, Watson and Ragatz—*Chemical Process Principles* (Vols. II and III.) Dodge—*Chemical Engineering Thermodynamics.* Guggenheim—*Thermodynamics.* Hinshelwood—*Kinetics of Chemical Change.*
3.814	Food Technology I...	Baumgartner, J. G.—*Canned Foods.* Tressler, D. K. and Evers, C. F.—*The Freezing Preservation of Foods.* Blanck F. C.—*Handbook of Food and Agriculture.*
		Reference.
		Jacobs, M. B.—*Food and Food Products* (3 vols.).
3.824	Food Technology II...	Bate-Smith, E. C. and Morris, T. N.—*Food Science.* Bailey, E. A.—*Industrial Oil and Fat Products.* Jensen, L. B.—*Meat and Meat Foods.*
		Reference.
		Mrak, E. M. and Stewart, G. F.—*Advances in Food Research* (Vols. I–V).

METALLURGY—4.00 to 4.912.

4.12	General Metallurgy	Alexander, W. and Street, A.—*Metals in the Service of Man.* Penguin. Brown A. and Orford, A.—*The Iron and Steel Industry.* Farwell, G.—*Down Argent Street.* Johnson, Sydney. Butts, A.—*Metallurgical Problems* (2nd Edition). McGraw-Hill. Newton, J.—*Introduction to Metallurgy* (2nd Edition). Wiley.
4.22	Metallurgical Engineering I.	Schuhmann—*Metallurgical Engineering* (Vol. I). Norton—*Elements of Ceramics.* Butts—*Metallurgical Problems.* Darken and Gurry—*Physical Chemistry of Metals.* Thring—*The Science of Flames and Furnaces.*

METALLURGY—4.00 to 4.912—*continued.*

Subject.	Text Book.
4.32 Physical Metallurgy I	Cottrell, A. H.—*Theoretical Structural Metallurgy* Arnold. Hume-Rothery, W.—*The Structure of Metals and Alloys.* Inst. Metals. Kehl, G. L.—*Principles of Metallographic Laboratory Practice.* (3rd Edition). McGraw Hill. Hollomon, J. and Jaffe, L.—*Ferrous Metallurgical Design.* Wiley. Sachs, E. and van Horn, K.—*Practical Metallurgy.* A.S.M.
4.33 Physical Metallurgy II	Boas, W.—*An Introduction to the Physics of Metals and Alloys.* Melbourne University Press. Hume-Rothery, W.—*Atomic Theory for Students of Metallurgy.* Inst. Metals. Bassett, C. S.—*Structure of Metals* (2nd Edition). McGraw-Hill. Rayner, G. V.—*An Introduction to the Electron Theory of Metals.* Inst. Metals. Cottrell, A. H.—*Dislocations and Plastics Flow in Crystals.* Oxford University Press. Read, W. T.—*Dislocations in Crystals.* McGraw-Hill. Bain, E. C.—*Functions of the Alloying Elements in Steel.* A.S.M. Bullens, D. K.—*Steel and Its Heat Treatment.* Wiley. Grossmann, M. A.—*Elements of Hardenability.* A.S.M.
4.912, 4.912D Materials Technology.	Leighou—*Chemistry of Engineering Materials.* Rollason—*Metallurgy for Engineers.* Carman—*Chemical Constitution and Properties of Engineering Materials.* Garside—*Process and Physical Metallurgy.* Kayser—*Basic Engineering Metallurgy.* Evans—*Introduction to Metallic Corrosion.* H. M. Stationery Office—*The Efficient Use of Fuel.*

MECHANICAL ENGINEERING—5.00 to 5.74.

5.101 Engineering Drawing and Materials	Institution of Engineers, Australia—*Australian Standard Engineering Drawing Practice* (CZ1—1946). Sydney Technical College—*Lecture Notes for Mechanical Engineering I.*
5.11, 5.11D Engineering Drawing.	As for 5.101 Engineering Drawing and Materials.
5.12, 5.12D Mechanical Engineering Design.	Black—*Machine Design.* *OR* Faires—*Design of Machine Elements.*

MECHANICAL ENGINEERING—5.00 to 5.74—*continued.*

	SUBJECT.	TEXT BOOK.
5.13 5.13D	Mechanical Engineering Design.	Black—*Machine Design.* *OR* Faires—*Design of Machine Elements.*
		Reference.
		B.S.S. Spur Gears.
		B.S.S. Worm Gears.
		S.A.A. Crane and Hoist Code, C.B. 2.
		N.S.W. Lifts and Scaffolding Act.
5.14 5.14D	Mechanical Engineering Design.	Walshaw—*Diesel Engine Design.*
5.32 5.32D	Engineering Mechanics.	Den Hartog—*Mechanics.* Sydney Technical College—*Lecture Notes for Mechanical Engineering IIIA.*
		Reference.
		Rosenauer and Willis—*Kinematics of Mechanisms.*
5.33 5.33D	Theory of Machines	Holowenko—*Dynamics of Machinery.* Sydney Technical College—*Lecture Notes for Mechanical Engineering IIIA.*
5.33A	Theory of Machines ...	Den Hartog—*Mechanical Vibrations.* Sydney Technical College—*Lecture Notes for Mechanical Engineering IIIA.*
5.34 5.34D	Theory of Machines	Den Hartog—*Mechanical Vibrations.* Holowenko—*Dynamics of Machinery.* Den Hartog—*Mechanics.*
5.41 5.41D	Descriptive Geometry.	Abbot—*Practical Geometry and Engineering Graphics.*
5.52	Fluid Mechanics ...	Vennard—*Elementary Fluid Mechanics.*
5.53 5.53D	Fluid Mechanics ...	Hunsaker and Rightmire—*Engineering Applications of Fluid Mechanics.* Addison—*Centrifugal and other Rotodynamic Pumps.*
5.54 5.54D	Fluid Mechanics ...	Wislicenus—*Fluid Mechanics of Turbo-Machines.* Vincent—*Theory of Gas Turbines and Jet Engines.*
5.72 5.72D	Thermodynamics ...	Faires—*Heat Engines.* *OR* Wrangham—*Theory and Practice of Heat Engines.*
		Reference.
		Inchley (Ed. Baker)—*Theory of Heat Engines.*
5.73 5.73D	Thermodynamics ...	Wrangham—*Theory and Practice of Heat Engines.* Sydney Technical College—*Lecture Notes for Mechanical Engineering IIIB.*
		Reference.
		Lewitt—*Thermodynamics Applied to Heat Engines.*
		Pye—*The Internal Combustion Engine.*
		Inchley (Ed. Baker)—*Theory of Heat Engines.*
		Kearton—*Steam Turbine Theory and Practice.*
5.74 5.74D	Thermodynamics ...	Wrangham—*Theory and Practice of Heat Engines.*
		Reference.
		Kearton—*Steam Turbine Theory and Practice.*
		Cohen and Rogers—*Gas Turbine Theory.*

MECHANICAL ENGINEERING—5.00 to 5.74—*continued.*

SUBJECT.	TEXT BOOK.
5.74 / 5.74D Thermodynamics—*continued.*	Shepherd—*Introduction to Gas Turbine.* Macintyre and Hutchinson—*Refrigeration Engineering.*
Seminars	Willis, A. H.—*The Technical Lecture.*

ELECTRICAL ENGINEERING—6.00 to 6.95.

6.104 Electrical Engineering	Chestnut and Mayer—*Servomechanism and Regulating System Design* (Vol. I.) **Reference.** Golding, E. W.—*Electrical Measurements and Measuring Instruments.* Pitman. Hague, B.—*A. C. Bridge Methods.* Pitman. Terman and Pellit—*Electronic Measurements.* McGraw-Hill. Karo—*Electrical Measurements.* (Vols. I and II.) Harris—*Electrical Measurements.* Laws—*Electrical Measurements.*
6.12 / 6.12D Electric Circuit Theory	Timbie and Bush—*Principles of Electrical Engineering* (4th Edition). Kerchner and Corcoran—*Alternating Current Circuits* (3rd Edition) Wiley. **Reference.** McGreevy, T.—*The M.K.S. System of Units.* Frazier, R. H.—*Elementary Electric Circuit Theory.* Golding, E. W.—*Electrical Measurements and Measuring Instruments.*
6.13 Electric Circuit Theory	Kerchner and Corcoran—*Alternating Current Circuits* (3rd Edition) Wiley. Kimbark, E. W.—*Electrical Transmission of Power and Signals,* Wiley. **Reference.** Le Page and Seely—*General Network Analysis.* Goldman—*Transformation Calculus and Electrical Transients.*
6.13A Electric Circuit Theory	Kerchner and Corcoran—*Alternating Current Circuits* (3rd Edition) Wiley.
6.13B Electric Circuit Theory	Kimbark, E. W.—*Electrical Transmission of Power and Signals.* Wiley. Kerchner and Corcoran—*Alternating Current Circuits* (3rd Edition) Wiley.
6.214 Power Systems ...	Starr, A. T.—*Generation, Transmission and Utilization of Electrical Power* (2nd Edition). M.I.T.—*Magnetic Circuits and Transformers.* **Reference.** Westinghouse Electric Mfg. Co.—*Electrical Transmission and Distribution Reference Book* (4th Edition).

ELECTRICAL ENGINEERING—6.00 to 6.95—*continued.*

Subject.	Text Book.
6.214 Power Systems—*contd.*	Knowlton, A. E.—*Standard Handbook for Electrical Engineers.* McGraw-Hill.
	Kimbark, E. W.—*Power System Stability* (2 vols.). Wiley.
	Carr, T. H.—*Electrical Power Stations* (2 vols.). Chapman & Hall.
	Waddicor, H.—*Principles of Electric Power Transmission.* Chapman & Hall.
	Stigant and Lacey,—*J. & P. Transformer Book.* Johnson & Phillips.
	Wagner and Evans,—*Symmetrical Components.* McGraw-Hill.
	Stubbings, G. W.—*Automatic Protection of A.C. Circuits.* Chapman & Hall.
6.224 Electrical Machines ...	Fitzgerald and Kingsley—*Electric Machinery.* McGraw-Hill.
	Say, M. G.—*Performance and Design of Alternating Current Machines.*
	Reference.
	Concordia, C.—*Synchronous Machines, Theory and Performance.* Wiley.
	Lawrence, R. R.—*Principles of A.C. Machinery.* McGraw-Hill.
	Langsdorf, A. S.—*Principles of Direct Current Machines.* McGraw-Hill.
	Sah, A. P. T.—*Fundamentals of Alternating Current Machines.* McGraw-Hill.
	Parker, Smith and Say—*Electrical Engineering Design Manual.* Chapman & Hall.
6.23 Electric Power Engineering.	Clayton, A. E. —*Performance and Design of Direct Current Machines.* Pitman.
	Say, M. G.—*The Performance and Design of Alternating Current Machines.* Pitman.
	Reference.
	Fitzgerald and Kingsley—*Electric Machinery* McGraw-Hill.
6.23A Electric Power Engineering.	Say, M. G.—*The Performance and Design of Alternating Current Machines.* Pitman.
6.23B Electric Power Engineering.	Clayton, A. E.—*The Performance and Design of Direct Current Machines.* Pitman.
	Reference.
	Fitzgerald and Kingsley—*Electric Machinery.* McGraw-Hill.

ELECTRICAL ENGINEERING—6.00 to 6.95—*continued.*

SUBJECT.	TEXT BOOK.
6.234 Utilization and Control of Electrical Plant	Chestnut and Mayer—*Servomechanism and Regulating System Design.* (Vol. I.) Say, M. G.—*The Performance and Design of Alternating Current Machines.* Pi man. Clayton, A. E.—*The Performance and Design of Direct Current Machines.* Pitman. **Reference.** Brown and Campbell—*Principals of Servomechanisms.* Thaler and Brown—*Servomechanism Analysis.* Fett, G. H.—*Feedback Control Systems.* Porter, A.—*An Introduction to Servomechanisms.* Teustin, A.—*D. C. Machines for Control Systems.* Reyner J. H.—*Magnetic Amplifiers.* C.S.I.R.—*Textbook of Radar.* Terman, F. E.—*Radio Engineering.* Amalgamated Wireless Valve Co.—*Radiotron Valve Data Book.* Westinghouse Electric Mfg. Co.—*Industrial Electronics Reference Book.* Wiley. Brown, Hoyler and Bierwirth—*Radio Frequency Heating.* Starr, A. T.—*Electronics* (Other references as appropriate from Option I.)
6.303 Electronics	Starr, A. T.—*Electronics.* Pitman. (Students intending to specialise in Electronics are advised to also purchase Terman, F. E.—*Radio Engineering.* (3rd Edition) McGraw-Hill.)
6.303A Electronics	Gray—*Applied Electronics.*
6.303B Electronics	Parker, P.—*Electronics.* Arnold. *OR* Gray—*Applied Electronics.* *OR* Starr, A. T.—*Electronics.* Pitman.
6.304A, 6.304B Industrial Electronics and Control.	Chestnut & Mayer—*Servomechanisms and Regulating System Design* (Vol. I). Wiley.
6 .314 Radio Communications	Arguimbau, L. B.—*Vacuum Tube Circuits.* Wiley. Terman, F. E.—*Radio Engineering* (3rd Edition) McGraw-Hill. Terman, F. E.—*Radio Engineer's Handbook.* McGraw-Hill.
6.324 High Frequency Engineering	Terman, F. E.—*Radio Engineering* (3rd Edition) McGraw-Hill. Langford-Smith, F.—*Radiotron Designer's Handbook* (4th Edition) A.W.A.

ELECTRICAL ENGINEERING—6.00 to 6.95—*continued.*

SUBJECT.	TEXT BOOK.
6.334 Line Communications	Starr, A. T.—*Telecommunications.* Pitman. Cohen, B. S.—*Handbook of Telecommunications.* Pitman.
	Reference.
	Attwood—*Electric and Magnetic Fields.*
6.83 Electrical Engineering.	Cook and Carr—*Elements of Electrical Engineering* (6th Edition) Wiley. Erickson and Bryant—*Electrical Engineering Theory and Practice.* Wiley.
6.83D Electrical Engineering	Erickson and Bryant—*Electrical Engineering Theory and Practice.* Wiley.
6.94 Electrical Engineering	Erickson and Bryant—*Electrical Engineering Theory and Practice.* Wiley.
	Reference.
Electrical Measurements.	Golding, E. W.—*Electrical Measurements and Measuring Instruments.* Pitman. Hague B.—*Alternating Current Bridge Methods.* Pitman. Harthorn—*Radio Frequency Bridge and Resonance Methods.*

MINING ENGINEERING AND APPLIED GEOLOGY—7.00 to 7.703.

7.001 7.001D Mining Processes ...	Elford and McEwan—*Coal Mining in Australia.* Lewis—*Elements of Mining.*
	Reference.
	Statham—*Coal Mining.* N.S.W. Mines Department—*Prospectors' Guide.*
7.002 Coal Mining	Statham—*Winning and Working.* Given—*Mechanical Loading of Coal Underground.*
	Reference.
	Peele—*Mining Engineers' Handbook* (2 vols., 3rd Edition, 1941).
7.013 Metalliferous Mining...	Young—*Elements of Mining.*
	Reference.
	Peele—*Mining Engineers' Handbook* (2 vols., 3rd Edition, 1941). Downey—*Timbering of Metalliferous Mines.* Jeppe—*Gold Mining on the Witwatersrand* (2 vols.). Jackson and Hedges—*Metal Mining Practice.* Du Pont—*Blaster's Handbook.* Beringer—*Underground Practice in Mining* (3rd Edition, 1947). Aust. Inst. Min. and Met.—*Mining Methods in Australia* (Vol. II, 5th Empire Mining Congress).

MINING ENGINEERING AND APPLIED GEOLOGY—7.00 to 7.703—*cont.*

SUBJECT.	TEXT BOOK.
7.023 Mining Engineering ...	Atlas—*Manual of Rock Blasting.*
	Penman and Penman—*Principles and Practice of Mine Ventilation.*
	Reference.
	Jeppe—*Gold Mining on the Witwatersrand* (2 vols.).
	Peele—*Mining Engineers' Handbook* (2 vols., 3rd Edition, 1941).
7.024 Mining Engineering ...	Broughton—*Electric Winders* (2nd Edition, 1948).
	Staley—*Mine Plant Design.*
	Young—*Elements of Mining.*
	Peele—*Mining Engineers' Handbook* (2 Vols., 3rd Edition, 1941).
	Wheeler, H. R.—*Manual of Modern Underground Haulage Methods.*
7.034 / 7.034D } Mineral Dressing ...	Mitchell, D. R.—*Coal Preparation.*
	Gaudin—*Principles of Mineral Dressing.*
	Reference.
	Taggart, A. F.—*Handbook of Mineral Dressing.*
	Taggart, A. F.—*Elements of Ore Dressing.*
	Richards and Locke—*Textbook of Ore Dressing.*
	Wark and Sutherland—*Principles of Flotation.*
	Edwards—*Texture of the Ore Minerals.*
	Short—*Microscopic Determination of the Ore Minerals.*
7.042 Mining Science ...	Moss—*Gases, Dust and Heat in Mines.*
	Penman and Penman—*Principles and Practice of Mine Ventilation.*
	Whitaker, J. W.—*Mine Lighting.*
	Whitaker and Willet—*Colliery Explosions and Recovery Work.*
	Haldane and Graham—*Method of Air Analysis.*
	Reference.
	N.S.W. Coal Mines Regulation Act.
	N.S.W. Mines Inspection Act.
7.044 Mining...	Fritzsche and Potts—*Horizon Mining.*
	Whitaker and Willet—*Colliery Explosions and Recovery Work.*
	Penman and Penman—*Principles and Practice of Mine Ventilation.*
	Waltham—*Mine Rescue and First Aid.*
	Reference.
	Peele—*Mining Engineers' Handbook* (2 Vols., 3rd Edition, 1941).
	Aust. Inst. of Min. and Met.—*Coal Mining in Australia* (Vol. III, 5th Empire Mining Congress).
7.064 Mineral Economics ...	Truscott—*Mine Economics.*

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MINING ENGINEERING AND APPLIED GEOLOGY—7.00 to 7.703—*contd.*

SUBJECT.	TEXT BOOK.
7.502 Geology	Emmons, Thiel, Stauffer and Allison—*Geology—Principles and Processes* (4th Edition, 1955). *OR* Longwell and Flint—*Physical Geology* (1955.) **Reference.** Schultz and Cleaves—*Geology in Engineering.* (1955). Ries and Watson—*Engineering Geology* (5th Edition, 1948).
7.503, 7.503A, 7.503B Petrology	Tyrrell—*The Principles of Petrology* (9th Edition, 1948). Rogers and Kerr—*Optical Mineralogy* (1942). **Reference.** Pettijohn—*Sedimentary Rocks* (1949). *OR* Krumbein and Sloss—*Stratigraphy and Sedimentation* (1951). Turner and Verhoogen—*Igneous and Metamorphic Petrology.* (1951). Harker—*Metamorphism.* Hatch, Wells and Wells—*The Petrology of the Igneous Rocks* (10th Edition, 1949).
7.504 Advanced Petrology	Ford, W. E.—*E. S. Dana's Textbook of Mineralogy,* (4th Edition). New York, John Wiley & Sons. **Reference.** Winchell, A. N.—*The Microscopic Characters of Artificial Inorganic Solid Substances or Artificial Minerals* (2nd Edition). New York, John Wiley and Sons, 1931. (With a chapter on the universal stage, by R. C. Emmons.) Hartshone, N. H. and Stuart, A.—*Crystals and the Polarising Microscope.* London, Edward Arnold and Co., 1950. Chamot, E. M. and Mason, C. W.—*Handbook of Chemical Microscopy* (2 Vols., 2nd Edition). New York, John Wiley and Sons, 1949.
7.511 Mineralogy	Rutley—*Elements of Mineralogy* (24th Edition, 1948).
7.512, 7.512D Mineralogy and Crystallography.	Phillips, F. C.—*An Introduction to Crystallography.* London, Longman's Green and Co., 1951. Hurlbut, C. S.—*Dana's Manual of Mineralogy.* (15th Edition) New York, John Wiley and Sons, 1952. **Reference.** Ford, W. E.—*E. S. Dana's Textbook of Mineralogy* (4th Edition). New York, John Wiley and Sons. Rogers, A. F. and Kerr, P. F.—*Optical Mineralogy* (2nd Edition). New York, McGraw-Hill Book Co.
7.513 Advanced Mineralogy	Ford, W. E.—*E.S. Dana's Textbook af Mineralogy* (4th Edition). New York, John Wiley and Sons.

MINING ENGINEERING AND APPLIED GEOLOGY—7.00 to 7.703—*contd.*

SUBJECT.	TEXT BOOK.
	Reference.
7.523, 7.523A, 7.523B Stratigraphy and Palaeontology.	David, T. W. E.—*Geology of the Commonwealth of Australia* (Vol. I, 1950).
	Shrock, R. R. and Twenhofel, W. H.—*Principles of Invertebrate Palaeontology* (2nd Edition, 1953).
	Glaessner, M. F.—*Principles of Micro-Palaeontology* (1944).
	Zittel, Carl A. von—*Textbook of Palaeontology.*
7.533, 7.533A, 7.533B Economic Geology	Lindgren, W.—*Mineral Deposits* (4th Edition, 1933).
	OR
	Bateman, A.—*The Formation of Mineral Deposits.*
	Reference.
	Newhouse, W.—*Ore Deposits as related to Structural Features* (1942).
	Niggli, P.—*Rocks and Mineral Deposits* (English Translation, 1954).
7.534 Geology	Forrester, J. D.—*Principles of Field and Mining Geology.*
	Reference.
	McKinstry—*Mining Geology.*
	Raistrick and Marshall—*Nature and Origin of Coal and Coal Seams.*
	Stutzer and Noe—*Geology of Coal.*
	Lindgren—*Mineral Deposits* (4th Edition, 1933).
	Bateman, A. M.—*Economic Mineral Deposits* (2nd Edition, 1950).
	Leggett—*Geology and Engineering.*
	Heiland—*Geophysical Exploration.*
7.542 Geophysics	Dobrin—*Introduction to Geophysical Prospecting* (1st Edition, 1952).
	Reference.
	Gutenburg, B.—*Internal Constitution of the Earth* (1951).
	Heiland, C. A.—*Geophysical Exploration* (1940).
	Limbgrove—*The Pulse of the Earth* (1947).
7.553 Geology of Fuels ...	Landes— *Petroleum Geology* (1951).
	Reference.
	Paige, S.—*Application of Geology to Engineering Practice* (Berkey Volume, 1950).
	Tolman, C. F.—*Groundwater* (1937).
	Reference.
7.574 Advanced Engineering Geology.	Leggett—*Geology and Engineering* (1939).
	Paige, S.—*Application of Geology to Engineering Practice* (Berkey Volume, 1950).
	Tolman, C. F.—*Groundwater* (1937).
7.602 Geology	As for 7.502 Geology.
7.612 Mineralogy	As for 7.512 Mineralogy and Crystallography.

MINING ENGINEERING AND APPLIED GEOLOGY—7.00 to 7.703—*contd.*

SUBJECT.	TEXT BOOK.
7.633 Geology	Rutley—*Elements of Mineralogy* (24th Edition, 1948). Smith, H. G.—*Minerals and the Microscope* (4th Edition, 1940). **Reference.** Rogers and Kerr—*Optical Mineralogy* (1942). David—*The Geology of the Commonwealth of Australia.* Harker—*Petrology for Students* (7th Edition). Hatch, Wells and Wells—*The Petrology of the Igneous Rocks* (10th Edition, 1949). Tyrrell—*The Principles of Petrology* (9th Edition, 1948). Dana—*Textbook of Mineralogy* (4th Edition). Emmons—*Geology of Petroleum* (2nd Edition). Lahee—*Field Geology* (4th Edition, 1941). Bateman, A. M.—*Economic Mineral Deposits* (2nd Edition, 1950). Lindgren—*Mineral Deposits* (4th Edition, 1933). Reports of Scientific Societies and Geological Surveys. Andrews, E. C.—*The Mining Industry of N.S.W.* (Department of Mines, N.S.W., 1929.) Edwards, A. B.—*Geology of Australian Ore Deposits* (Vol. I, Empire Mining Congress). McKeown, M. R.—*Coal in Australia* (Ibid., Vol. VI).
7.644 Geophysics and Geotectonics	Dobrin—*Introduction to Geophysical Prospecting*, John Wiley and Sons.
7.673 Geology	Leggett—*Geology and Engineering.* John Wiley and Sons.
7.703 Geology	As for 7.502 Geology.

CIVIL ENGINEERING—8.00 to 8.94.

	Reference.
8.112 } 8.112D } Theory of Structures	Den Hartog—*Strength of Materials.* Salmon, E. H.—*Materials and Structures* (Vol. I, *Elasticity and Strength of Materials*). Timoshenko and MacCullough—*Elements of Strength of Materials* (3rd Edition, 1949).
8.113 Structures	*S.A.A. Code CA2.* **Reference.** Stewart, D. S.—*Practical Design of Simple Steel Structures* (Vols. I and II—3rd and 2nd Editions, respectively). Grinter, L. E.—*Design of Modern Steel Structures.* Pippard and Baker—*Analysis of Engineering Structures* (2nd Edition, 1943). Husband and Harby—*Structural Engineering* (5th Edition, 1947). Salmon—*Materials and Structures* (Vols. II–VI, *Theory and Design of Structures*). Sutherland, H. and Reese—*Introduction to Reinforced Concrete Design* (2nd Edition, 1943).

CIVIL ENGINEERING—8.00 to 8.94—*continued.*

	Subject.	Text Book.
8.114	Structures	Same as for 8.113—Structures, and— Magnel, G.—*Prestressed Concrete.*
8.122	Structures	*S.A.A. Interim Codes* 350, 351, 352. **Reference.** Stewart, D. S.—*Practical Design of Simple Steel Structures* (Vols. I and II—3rd and 2nd Editions, respectively). Grinter, L. E.—*Design of Modern Steel Structures.*
8.123 8.123D	Structures	Same as for 8.113—Structures. **Reference.**
8.22	Materials of Construction.	Salmon, E. H.—*Materials and Structures* (Vol. I). Davis, H. E., Troxell and Wiskocil—*Testing and Inspection of Engineering Materials.* *A.S.A., B.S.S., and A.S.T.M. Specifications.* (Where applicable.) Murdock—*Concrete Materials and Practice.* **Reference.**
8.23 8.23D	Materials of Construction.	U.S. Bureau of Reclamation—*Concrete Manual.* Bateman, J. H.—*Materials of Construction.* Bauer—*Plain Concrete* (3rd Edition, 1949). Lea and Desch—*The Chemistry of Cement and Concrete.* Murdock—*Concrete Materials and Practice.* **Reference.**
8.33	Engineering Computations.	Allock and Jones—*The Nomogram* (4th Edition, 1950). Lipka, J.—*Graphical and Mechanical Computation,* Part II. Southwell, R. V.—*Relaxation Methods in Engineering Science.* Whittaker, E. T., and Robinson—*The Calculus of Observations* (4th Edition, 1944). **Reference.**
8.53	Fluid Mechanics ...	Rouse—*Elementary Mechanics of Fluids.* Vennard—*Elementary Fluid Mechanics* (3rd Edition, 1954). Dodge and Thompson—*Fluid Mechanics.* Wislicenus—*Fluid Mechanics of Turbo-Machinery* **Reference.**
8.54	Applied Hydraulics ...	Rouse (Ed.)—*Engineering Hydraulics.* Addison—*Hydraulic Measurements.* Bakmeteff—*Hydraulics of Open Channels.* Allen—*Scale Models in Hydraulic Engineering.* Streeter—*Fluid Dynamics.*
8.63	Civil Engineering ...	Wisler and Brater—*Hydrology.* Linsley, Kohler and Paulhus—*Hydrology.* Johnstone and Cross—*Elements of Hydrology.* Smith, H. G.—*Minerals and the Microscope.* Leggett—*Geology and Engineering.*

CIVIL ENGINEERING—8.00 to 8.94—*continued.*

Subject.	Text Book.
	Reference.
8.64 Civil Engineering ...	Barrows—*Water Power Engineering.* Creager, Justin and Hinds—*Engineering for Dams.* Steel—*Water Supply and Sewerage.* Phelps—*Public Health Engineering.* Webb—*Railroad Construction.* Taylor—*Docks, Wharves and Piers.* Etcheverry—*Irrigation Practice and Engineering.*
8.73, 8.73D Soil Mechanics ...	Terzaghi and Peck—*Soil Mechanics in Engineering Practice.* Taylor, D. W.—*Fundamentals of Soil Mechanics.* Tshebotarioff, G. P.—*Soil Mechanics, Foundations and Earth Structures.* McGraw-Hill. T. William Lambe—*Soil Testing for Engineers.* Terzaghi—*Theoretical Soil Mechanics.*
8.73H Soil Mechanics and Hydrology ...	A.S.T.M., 1950—*Soil Testing Procedures.* As for 8.73 and 8.73D—Soil Mechanics.
8.912, 8.92, 8.92B, 8.92D, 8.92M Properties of Materials.	Davis, H. E., Troxell and Wiskocil—*Testing and Inspection of Engineering Materials.* Salmon, E. H.—*Materials and Structures* (Vol. I).
	Reference.
	Beaumont, R. A.—*Mechanical Testing of Metallic Materials* (2nd Edition, 1944). Stanford, E. G.—*The Creep of Metals and Alloys.* Batelle Memorial Institute—*Prevention of the Failure of Metals under Repeated Stress.* Gilkey, Murphy and Bergman—*Materials Testing.* Williams—*Hardness and Hardness Measurements.* A.S.T.M., B.S.S. specifications, special references, etc. Nadai, A.—*Theory of Flow and Fracture of Solids.*
	Reference.
8.94, 8.94D Properties of Materials.	Murphy, G.—*Advanced Mechanics of Materials.* Freudenthal, A. M.—*The Inelastic Behaviour of Engineering Materials and Structures.* Tee, G. H.—*An Introduction to Experimental Stress Analysis.* Nadai, A.—*Theory of Flow and Fracture of Solids.*

WOOL TECHNOLOGY—9.00 to 9.94.

	Reference.
9.104 Nutrition	Halnan and Garner—*Science and Practice of Feeding Farm Animals.* Morrison, F. B.—*Feeds and Feeding.* British Ministry of Agriculture Bulletin—*Rations for Livestock* (11th Edition). National Research Council—*Recommended Nutrient Allowances for Domestic Animals.* Maynard, L.—*Animal Nutrition.*

WOOL TECHNOLOGY—9.00 to 9.94—*continued.*

Subject.		Text Book.
9.12 9.13 9.14	Livestock Production	Belschner, H. G.—*Sheep Management and Diseases.* Pearse, E.—*Sheep Farm and Station Management.* Fraser, A.—*Sheep Husbandry.* Fraser, A.—*Sheep Farming.* Thomas, J. F. et al.—*Sheep.* Hammond, J.—*Growth and Development of Mutton Qualities in Sheep.* Coffey—*Productive Sheep Husbandry.* Phillips, R. W.—*Breeding Animals Suited to Unfavourable Environments.* Beattie, W. A.—*Beef Cattle Breeding and Management.* Snapp, R. R.—*Beef Cattle.* Roberts, F. H.—*Insects Affecting Livestock.* Sisson—*Anatomy of Domestic Animals.* Dukes, H. H.—*Physiology of Domestic Animals.* Schafer, E.—*Essentials of Histology,* Trautmann and Fiebiger—*Fundamentals of the Histology of Domestic Animals.* Allee, W. C. et al.—*Principles of Animal Ecology.* McMeekan, C.P.—*Principles of Animal Production.* Hammond, J.—*Farm Animals.* Nicholls, J. E.—*Livestock Improvement.* Ashton, L. G. (Ed.)—*Dairy Farming in Australia.* (N.S.W. Edition.) Hungerford—*Diseases of Livestock.* Kelley—*Sheep Dogs.*
9.134	Introductory Accounting	Yorston, Smyth and Brown—*Elementary Accounting.* Yorston, Smyth and Brown—*Accounting Fundamentals.* Goldberg—*A Philosophy of Accounting.*
9.144	Commercial Law ...	Yorston and Fortescue—*Australian Mercantile Law.* **Reference.** Mitchell (Ed.)—*Essays on the Australian Constitution.* Baalman—*Outline of Law in Australia.*
9.22	Agronomy	Wadham and Wood—*Land Utilization in Australia.* Russell, E. J.—*Soil Conditions and Plant Growth.* Stephens, C. G.—*A Manual of Australian Soils.* C.S.I.R.O.—*The Australian Environment.*
9.24	Pastoral Agronomy ...	Semple, A. T.—*Improving the World's Grasslands.* Beadle, N. C.—*Vegetation and Pastures of Western N.S.W.* Black, J. M.—*Flora of South Australia* (Parts I and II). Levy, E. B.—*Grasslands of New Zealand.*

WOOL TECHNOLOGY—9.00 to 9.94—*continued.*

	Subject.	Text Book.
9.34	Banking, Currency and Exchange	Mills and Walker—*Money.* F. Benham—*Economics.* **Reference.** Renwick and Simpson Lee—*The Economic Pattern.* Gifford, Wood and Reitsma—*Australian Banking.*
9.74	Fibre Science... ...	Preston, J. M.—*Fibre Science.* *British Wool Manual.* Luniak—*Identification of Textile Fibres.* Alexander and Hudson—*Wool—Its Chemistry and Physics.* Textile Institute of Dyers and Colourists—*Textile Progress.*
9.94	Genetics	Snyder, L. H.—*Principles of Heredity.* Lush, J. L.—*Animal Breeding Plans.* Lerner—*Population Genetics and Animal Improvement.* Dunn, L. C.—*Genetics in the 20th Century.* Mather—*Biometrical Genetics.* Snedecor, G. W.—*Statistical Methods.* Goldschmidt, R. B.—*Understanding Heredity.* Scheinfeld, A.—*The New You and Heredity.* Kelley, R. B.—*Principles and Methods of Animal Breeding.* Hagerdoorn, A.—*Animal Breeding.*

MATHEMATICS—10.00 to 10.92.

10.11	Mathematics ...	Durell, C. V., and Robson, A.—*Elementary Calculus,* Vols. I, II. Bell, London. Middlemiss, R.—*Analytic Geometry.* McGraw Hill, New York.
10.11B	Mathematics ...	Lamb, H.—*Dynamics.* Cambridge.
10.12	Mathematics ...	Rutherford, D. E.—*Vector Methods.* Oliver and Boyd, Edinburgh. Sokolnikoff, I. S. and E. S.—*Higher Mathematics for Engineers and Physicists.* McGraw Hill, New York. Jaeger, J. C.—*An Introduction to the Laplace Transformation.* Methuen, London. **Reference.** Synge, J. L., and Griffith, B. A.—*Principles of Mechanics.* McGraw Hill, New York. Bell, R. J. T.—*Co-ordinate Geometry of Three-dimensions.* Macmillan, London.
10.22	Mathematics ...	Students should not procure text-books before consulting the lecturer concerned.
10.23	Mathematics ...	Students should not procure text-books before consulting the lecturer concerned.
10.33	Mathematics ...	Churchill, R. V.—*Introduction to Complex Variables and Applications.* McGraw Hill, New York. Brainerd, J. G., Koehler, G., Reich, H. J. and Woodruff, L. F.—*Ultra-High-Frequency Techniques.* Nostrand, New York.

MATHEMATICS—10.00 to 10.92—*continued.*

Subject.		Text Book.
		Reference.
10.33	Mathematics—*contd.*	Stratton, J. A.—*Electromagnetic Theory.* McGraw Hill, New York. Carslaw, H. S., and Jaeger, J. C.—*Operational Methods in Applied Mathematics.* Oxford. Paradine, C. G. and Livett, B. H. P.—*Statistics for Technologists*, E.U.P.
		Reference.
10.43, 10.63	Mathematics ...	Anderson, R. L. and Bancroft, T. A.—*Statistical Theory in Research.* Mood, A. M.—*Introduction to the Theory of Statistics.* Weatherburn, C. E.—*A First Course in Mathematical Statistics.* Further references will be given in class.
10.91	Mathematics ...	Caunt, G. W.—*Elementary Calculus.* Oxford.
		Reference.
		Osgood, W. F. and Graustein, W. C.—*Plane and Solid Analytic Geometry.* Macmillan, London. Sokolnikoff, I. S. and E. S.—*Higher Mathematics for Engineers and Physicists.* McGraw Hill, New York.
		Reference.
10.92	Mathematics ...	Moroney, M. J.—*Facts from Figures.* Pelican, London. Fisher, R. A. and Yates, F.—*Statistical Tables.* Oliver & Boyd, Edinburgh. Wilks, S. S.—*Elementary Statistical Analysis.* Princeton University Press. Quenouille, M. H.—*Introductory Statistics.* Butterworth Springer, London.

ARCHITECTURE—11.00 to 11.96.

		Reference.
11.101	Structures I	Reynolds and Kent—*Introduction to Structural Mechanics.*
		Reference.
11.102	Structures II ...	Reynolds and Kent—*Introduction to Structural Mechanics.*
		Reference.
11.103	Structures III ...	Reynolds and Kent—*Structural Steelwork.* Stewart, D. S.—*Practical Design of Simple Steel Structures* (Vols. I and II). Husband and Harby—*Structural Engineering.* Sutherland and Reece—*Introduction to Reinforced Concrete Design.*
		Reference.
11.11	Descriptive Geometry	Lee, L. A., and Reekie, R. F.—*Descriptive Geometry for Architects and Builders.* Faulkner, Ziegfield and Hill—*Art Today*

ARCHITECTURE—11.00 to 11.96—*continued.*

SUBJECT.	TEXT BOOK.
11.164 Acoustics and Sound Insulation.	Cullum, D. J. W.—*Practical Application of Acoustic Principles.* Knudsen and Harris—*Acoustical Designing in Architecture.* Constable, J. E. R. & K. M.—*The Principles and Practice of Sound Insulation.* Vagenal, Hope—*Practical Acoustics.* Post War Building Studies No. 14—*Sound Insulation and Acoustics.* **Reference.** Holmes, John—*Applied Perspective.* Scott, Robert Gillam—*Design Fundamentals.*
11.31, 11.32 Architectural Studies and Design.	Graves, Maitland—*The Art of Colour and Design.* Rathbone, Richard Adams—*Introduction to Functional Design.* Ostwald, Wilhelm—*Colour Science.* Munsell, A. H.—*A Colour Notation.* Evans, Ralph M.—*An Introduction to Colour.* Moholy-Nagy, L.—*Vision in Motion.* Kepes, Gvongy—*The Language of Vision.*
11.41, 11.42, 11.43 History of Architecture.	Fletcher, Sir Banister—*History of Architecture—On the Comparative Method.* Briggs, M. S.—*Architecture.* **Reference.** Statham, H. H.—*A History of Architecture* (3rd Edition, 1950). Normand—*A Parallel of the Orders of Architecture.* Anderson, W. J. and Stratton—*Architecture of the Renaissance in Italy.* Ward, W. H.—*Architecture of the Renaissance in France* (Vols. I and II). Whittick, A.—*European Architecture in the 20th Century.* Mumford, L.—*Culture of Cities.* Giedion, S.—*Space, Time, and Architecture.* Pevsner, N.—*European Architecture.* Herman, M.—*The Early Australian Architects and Their Work.* Reid, D. A G.—*Building Science* (2 vols.).
11.52 Building Science ...	Geeson—*Building Science* (Vol. I). Fitzmaurice—*Principles of Modern Building.* **Reference.** Barrow—*Building Science.* Knight, B. H.—*Builders' Materials.* Shute—*Modern Building Materials.*
11.71, 11.72 Building Construction.	*Local Government Ordinance*, No. 71. *Sydney Corporation Act, By-laws* 51 to 58 inclusive. Mitchell, G. A.—*Building Construction—Elementary Course.* Mitchell, G. A.—*Building Construction—Advanced Course.*

ARCHITECTURE—11.00 to 11.96—*continued.*

Subject.	Text Book.
11.71, 11.72 Building Construction—*contd.*	**Reference.** McKay, W. B.—*Building Construction* (Vols. I, II and III.) Mackey, G. F.—*Gregory's Modern Building Practice in Australia.* Sharp, W.—*Australian Methods of Building Construction.* Fitzmaurice, R.—*Principles of Modern Building* (Vol. I).
11.82, 11.82A, 11.83 Theory of Architecture.	Robertson, Howard—*Principles of Architectural Composition.*
11.91 Building Science ...	As for 11.52—Building Science.

APPLIED PSYCHOLOGY—12.00 to 12.70.

Subject.	Text Book.
12.01 Psychology I. ...	Munn, N. L.—*Psychology.* Houghton Mifflin. *OR* Woodworth and Marquis—*Psychology.* Methuen. **Reference.** Anastasi, A. and Foley, J. P.—*Differential Psychology.* Macmillan. Boring, Langfeld and Weld—*Foundations of Psychology.* Wiley. Crafts, L. W. et al.—*Recent Experiments in Psychology* (1st and 2nd Editions). Valentine and Wickens—*Experimental Foundations of General Psyshology.* Rinehart. Drever, J.—*A Dictionary of Psychology.* Pelican. Warren—*A Dictionary of Psychology.* Houghton Mifflin. Klineberg, O.—*Social Psychology.* Holt. Ruch, F.—*Psychology and Life.* Scott Foresman.
12.02 Psychology II ...	Stagner, R.—*Psychology of Personality.* McGraw-Hill. Morgan, C. J. and Stellar, E.—*Physiological Psychology.* McGraw-Hill. Young, P. T.—*Motivation of Behaviour.* Wiley. **Reference.** Carmichael, L. (Ed.)—*Manual of Child Psychology* Wiley. Werner, H.—*Comparative Psychology of Mental Development.* Follett. Zubek and Solberg—*Human Development.* McGraw-Hill. Barker, R., Kounin, J. S. and Wright, H. F.—*Child Behaviour and Development.* McGraw-Hill.
12.03 Psychology III ...	Eysenck, H. J.—*The Structure of Human Personality.* Methuen. *OR* Cattell, R. B.—*Personality.* McGraw-Hill.

APPLIED PSYCHOLOGY—12.00 to 12.70—*continued.*

SUBJECT.	TEXT BOOK.
	Reference.
12.03 Psychology III—*contd.*	Allport, G.—*Personality.* Constable.
	Murray, H. A. et al—*Explorations in Personality.* Oxford University Press.
	Lewin, Kurt—*Dynamic Theory of Personality.* McGraw-Hill.
	Hunt, J. McV.—*Personality and the Behaviour Disorders.* Ronald.
12.10, 12.11, 12.11A Psychological Assessment.	Students should not procure text-books before consulting the lecturer concerned.
12.20 Psychology IV—Social.	Hartley and Hartley—*Fundamentals of Social Psychology.*
	Asch, S.—*Social Psychology.*
12.21 Psychology V—Applied Social.	Students should not procure text-books before consulting the lecturer concerned.
12.30 Industrial Psychology	Ghiselli and Brown—*Personnel and Industrial Psychology.* McGraw-Hill.
	Chapanis, Garner and Morgan—*Applied Experimental Psychology.* Wiley.
	Reference.
	Viteles, M.S.—*Motivation and Morale in Industry.* Staples Bros. Ltd.
	Blum, M. L.—*Readings in Experimental Industrial Psychology.* Prentice Hill.
	Viteles, M. S.—*Industrial Psychology.*
	Karn, H. W. and Gilmer, B. V.—*Readings in Industrial and Business Psychology,* McGraw-Hill.
	Poffenberger, A. T.—*Principles of Applied Psychology.* Appleton Century.
Industrial and Labour Relations.	Students should not procure text-books before consulting the lecturer concerned.
12.40 Personnel Techniques	Students should not procure text-books before consulting the lecturer concerned.
	Reference.
	Johnson, Boise and Pratt—*Job Evaluation.* Wiley.
	Tead and Metcalf—*Personnel Administration.* McGraw-Hill.
	Ghiselli and Brown—*Personnel and Industrial Psychology.* McGraw-Hill.
	Scott, Clothier, Mathewson and Spriegel—*Personnel Management.* McGraw-Hill.
	Reference.
12.70 Principles of Counselling.	Dollard and Miller—*Personality and Psychotherapy.* McGraw-Hill.
	Rogers, C. R.—*Counselling and Psychotherapy* Houghton Mifflin.

APPLIED PSYCHOLOGY—12.00 to 12.70—*continued.*

SUBJECT.	TEXT BOOK.
	Reference—*contd.*
12.70 Principles of Counselling—*contd.*	Rogers, C. R. (Ed.)—*Client Centred Therapy.* Houghton Mifflin.
	Evelison, E. H.—*Childhood and Society.* Mertin and Co.
	Slavsen, S. R.—*Analytic Group Psychotherapy.* Columbia University Press.
	Blum, M. L. and Balinsky, B.—*Counselling and Psychotherapy.* Prentice Hill.
	Berdin, E. S.—*Trends in Student Personnel Work.* Minnesota Press.
	Mowrer, O. H.—*Learning Theory and Personality Dynamics.* Herald Press.
	Robinson, F. P.—*Principles and Procedures in Student Counselling.* Harper Bros.
	Fenickel—*Psychoanalytic Theory of Neurosis.*

HUMANITIES AND SOCIAL SCIENCES—G1 to G51.

Recommended text books are indicated under Description of Subjects, pages 323 to. 336.

REPORT

of the

COUNCIL OF THE NEW SOUTH WALES UNIVERSITY OF TECHNOLOGY

For the Year Ended 30th June, 1955.

The Council of the New South Wales University of Technology in pursuance of the provisions of section 47 (1) of the Technical Education and New South Wales University of Technology Act, 1949-1955, has the honour to transmit to the Minister for Education the following report upon the proceedings of the University during the period of twelve months ended 30th June, 1955.

General.

This year has been one of consolidation and expansion of the University's organisation and activities. A number of the Council's major objectives have been achieved. Particularly significant were the opening of the first permanent building at Kensington and the transfer of a large part of the University to the new site. During the year facilities for advanced training and research in the various branches of science and technology have been extended, while the appointment of additional senior staff has ensured the maintenance of high standards in all the Schools.

The number of students attending University courses has again increased this year, from 4,366 in 1954 to 4,746 in 1955. Enrolments in the day degree and conversion courses for 1955 are 726, compared with 626 in 1954, while the number of students working for higher degrees has increased from 169 to 187. Enrolments at Newcastle University College continue to increase, 539 registered students being enrolled this year, as against last year's 476. The number of students taking Arts courses at Newcastle has increased from 95 in 1954 to 135.

During the year 23 graduate and special courses were conducted. They were designed to acquaint practising scientists and technologists with recent developments in their particular fields. These were attended by 866 persons and this response by personnel in industry has been most gratifying. It was necessary to arrange repeat sessions of some courses to accommodate the large numbers of applicants. Included in the courses were one at Wollongong and one at Broken Hill, both of which were well attended.

With the vesting in the Council of complete authority for the control of the University on 1st July, 1954, certain changes were made in the University's administrative organisation. The Council's Committees were reorganised to secure a closer co-ordination of their various functions. Five hundred and ten members of the staff were transferred from the Department of Technical Education to the University. A University Personnel Section was established as part of the Bursar's Division. The new arrangements have contributed to the successful functioning of the University administration in a year of considerable developmental activity.

The New South Wales Parliament in March, 1955, passed the Technical Education and New South Wales University of Technology (Amendment) Act, 1955. This provides for certain changes in the incorporating Act. The titles of President, Vice-President and Director were altered to Chancellor, Deputy Chancellor and Vice-Chancellor respectively. Provision was made for an increase in the membership of Council from thirty to thirty-nine. This gives representation to the Professorial Board and to the agricultural, pastoral and rural interests in the State as well as increasing the representation of the graduates of the University. The change of titles was requested by Council. The other change was seen as a natural consequence of the University's consistent progress and of its acceptance of wider responsibilities in extending research and other activities designed to assist all sections of the State's primary and secondary industries.

The opening of the first permanent building on the University site at Kensington, by His Excellency the Governor, Lieutenant-General Sir John Northcott, took place on 16th April, 1955. A congregation of over 1,200 attended the ceremony, which was held in conjunction with the first conferring of degrees at Kensington. The opening of the new building, which is now occupied by four Schools and the University Administration, marks an important advance in the provision of facilities on the University site at Kensington. Plans for the next stage of the building development are well advanced, and include the provision of four large buildings for the Faculty of Applied Science, a main hall, a students' residential college and several smaller buildings. Further details of the development of the site at Kensington appear later in the report.

The successful operation throughout the year of the part-time degree courses introduced in 1954, and the continued interest of students and of industry in these courses, has confirmed the Council's opinion that courses of this kind, supplemented by practical industrial experience, provide a most effective means of advanced specialised training in scientific and technological fields for students seeking professional qualifications while gainfully employed. Council is also pleased to report that the benefits resulting from the integration in 1954 of the early stages of a number of diploma courses with those of the corresponding part-time degree courses have been considerable. They have provided increased facilities for those students wishing to proceed to a degree and have brought the whole undergraduate body into closer association. They have eliminated certain duplication of teaching and facilities and made possible a greater concentration of activities at the undergraduate level.

An extensive programme of research was carried out during the year. Many new projects were undertaken, and work on a large number of long-term projects was continued. Close co-operation with industry has been maintained by the Schools, and increasing support for the work being undertaken has been received from industrial and Governmental undertakings. A development of particular importance within the year was the establishment of a Research Institute of Nuclear Engineering, in which advanced research connected with the utilisation of nuclear energy as a source of industrial power will be carried out.

Appointments were made to the Foundation Chair of History at Newcastle University College and an Associate Professorship of Production Engineering in the School of Mechanical Engineering.

Council approved the creation of Chairs in Accountancy, Economics and Textile Technology, a further Chair in Applied Chemistry and Associate Professorships in Chemical Engineering and Civil Engineering. Appointments to these positions should be made very soon. Council also approved the creation of a Chair in Metallurgy or Mechanical Engineering at Newcastle University College and an Associate Professorship in Mechanical Engineering at Wollongong.

To meet the steady progress being made at Newcastle University College, additional senior staff have been appointed to the School of Humanities and Social Sciences and the range of Arts subjects has been considerably extended. The increased level of activity has required additional accommodation and two major building extensions are in hand. The College has been assisted throughout the year by the guidance of the Newcastle University College Advistory Committee, which was established in June, 1954.

Amendments to the Technical Education and New South Wales University of Technology Act, 1949.

On 4th March, 1955, the State Parliament passed the Technical Education and New South Wales University of Technology (Amendment) Act, 1955, by which the incorporating Act was amended in two important respects in so far as the University is directly concerned, viz.:—

The titles of President, Vice-President and Director of the University were altered to Chancellor, Deputy Chancellor and Vice-Chancellor respectively. The change in titles had been requested by Council.

Provision is made for the membership of the Council to be increased from thirty to thirty-nine members, by including—

(i) two members to represent agricultural, pastoral and rural interests;

(ii) the Chairman of the Professorial Board; and

(iii) not more than seven members elected by the graduates of the University, the number being calculated in accordance with the number of graduates of the University.

The necessary consequential amendments to the Regulations and By-laws of the University have been made, and the new members will be appointed to Council in the biennial reconstitution of Council in July, 1955.

The Council.

At the meeting of Council held on 14th March, 1955, the Hon. Mr. Justice J. S. J. Clancy was re-elected Deputy Chancellor of the University for the ensuing term of two years.

On 27th April, 1955, the Hon. J. J. Maloney, M.L.C., was re-elected to Council as the representative of the Legislative Council of New South Wales.

Mr. H. F. Heath, B.A., B.Ec., Member of the New South Wales Public Service Board, was appointed to the Council on 1st April, 1955. Mr. Heath's appointment was made to fill the vacancy occasioned by the death of Mr. J. P. Glasheen.

In May and June, 1955, the biennial elections of members of Council to represent the principal faculties, the teaching staff and the graduates and undergradutes of the University were held. On 14th March, 1955, Council had approved the designation of the Faculties of Applied Science, Engineering, and Humanities and Social Sciences as the three principal faculties next to elect representatives to the Council, and in June, 1955, the following senior members of staff were elected to represent the faculties—

Professor R. H. Myers, M.Sc., Ph.D., A.I.M., A.M.Aus.I.M.M., A.R.A.C.I., Professor of Metallurgy, Faculty of Applied Science; Professor C. H. Munro, B.E., F.R.San.I., M.I.E.Aust., Professor of Civil Engineering, Faculty of Engineering; Professor R. M. Hartwell, M.A., Dip.Ed., Professor of Economic History, Faculty of Humanities and Social Sciences.

Dr. F. S. Bradhurst, Hon. D.Sc., A.S.T.C., Managing Director, Holbrooks (A'sia) Ltd., and Mr. L. S. Baker, B.E., A.S.T.C., Assistant Contract Engineer, Westinghouse (Rosebery) Pty. Ltd., were elected as graduate representatives, and Mr. H. R. Harant, B.E., A.S.T.C., Engineer, Postmaster-General's Department, was elected as representative of the undergraduates in May, 1955. In June, Associate Professor J. F. D. Wood, B.Sc., B.E., A.M.I.E.Aust., Associate Professor of Mechanical Engineering, was re-elected as member of Council to represent the teaching staff. These members were appointed to Council for a period of two years as from 1st July, 1955.

The Council held five ordinary meetings and three special meetings during the year. Membership of Council and the attendances at meetings are set out in Appendix I. to this Report.

The various standing committees of Council continued to function effectively throughout the year. A list of the Committees and their membership is contained in Appendix II.

Obituary.

The Council expresses its deep regret at the death of Mr. J. P. Glasheen, Dip.Ec., A.C.I.S., Member of the New South Wales Public Service Board, and records its appreciation of the services he rendered to the University. Mr. Glasheen had been a member of the Developmental Council, and served on the Council of the University from its inception on 5th July, 1949, until his decease in December, 1954. Mr. Glasheen was a member of the Academic Committee and of the Buildings and Equipment Committee of Council.

Advisory Panels.

Meetings of the Advisory Panels related to University courses were held on the dates shown hereunder. A Surveying Advisory Panel and a Commerce Advisory Panel were appointed during the year.

20th January, 1955—Optometry Advisory Panel.

16th March, 1955—Architecture Advisory Panel.

17th March, 1955—Building Advisory Panel.

29th March, 1955—Quantity Surveying Advisory Panel.

19th April, 1955—Electrical Engineering Advisory Panel.

21st April, 1955—Aeronautical Engineering Advisory Panel.

28th April, 1955—Surveying Advisory Panel.

5th May, 1955—Applied Geology Advisory Panel.

12th May, 1955—Mechanical Engineering Advisory Panel.

31st May, 1955—Electrical Engineering Advisory Panel.

16th June, 1955—Applied Physics Advisory Panel.

Enrolments.

Details of enrolments for 1955 are as shown hereunder—

Day Degree Courses.

Course.	1st Year.	2nd Year.	3rd Year.	4th Year.	5th Year.	Total.
Applied Chemistry	15	9	4	8	...	36
Applied Geology	7	1	1	...	...	9
Applied Physics	...	...	1	...	...	1
Architecture	35	13	10	9	4	71
Chemical Engineering ...	23	8	7	4	...	42
Civil Engineering	51	54	32	19	...	156
Electrical Engineering ...	35	25	20	17	...	97
Food Technology	2	1	2	...	...	5
General Science	8	3	...	...	...	11
Mechanical Engineering ...	29	21	20	15	...	85
Metallurgy	5	2	...	...	...	7
Mining Engineering	5	7	3	2	...	17
Wool Technology	9	4	6	3	...	22
	224	148	106	77	4	559

Conversion Courses.

Applied Chemistry	47
Applied Physics	1
Chemical Engineering	19
Civil Engineering	16
Electrical Engineering (including Radio Engineering)	21
Mechanical Engineering	22
Metallurgy	23
Mining Engineering	1
Optometrical Science	17
	167

Part-time Degree and Diploma Courses.

Course.	1st Year.	2nd Year.	3rd Year.	4th Year.	5th Year.	6th Year.	Miscellaneous.	Total.
*Aeronautical Engineering	9	15	4	5	6	...	...	39
Applied Biology ...	9	8	10	4	6	4	...	41
Applied Chemistry ...	70	57	51	59	59	32	...	328
†Applied Geology ...	3	1	1	...	...	...	...	5
†Applied Psychology	10	2	1	4	...	...	...	17
*Architecture ...	44	25	26	21	38	39	...	193
*Building	6	3	10	2	12	...	...	33
Chemical Engineering	46	33	27	22	21	18	...	167
Civil Engineering ...	78	68	68	71	83	...	...	368
Electrical Engineering	84	80	58	55	57	...	...	334
Food Technology ...	2	4	3	4	1	4	...	18
General Science (including Science Diploma)	27	6	12	9	11	1	...	66
†Industrial Chemistry	55	9	14	5	...	...	...	83
Leather Chemistry ...	2	2	...	2	1	...	...	7
Mechanical Engineering	136	138	137	96	109	...	...	616
*Metalliferous Mining Engineering ...	7	3	2	4	2	...	...	18
Metallurgy	36	22	11	21	11	23	...	124
*Naval Architecture...	2	2	3	1	...	...	...	8
*Optometry	8	5	12	5	7	...	...	37
*Physics	3	4	4	5	2	...	...	18
*Production Engineering	17	18	9	8	10	...	...	62
*Quantity Surveying	3	4	5	...	3	...	...	15
*Radio Engineering ...	30	22	20	31	11	...	...	114
Miscellaneous Subjects	...	...	...	...	...	...	121	121
	687	531	488	434	450	121	121	2,832

*Diploma course only.

†These courses lead to a degree and do not qualify for the diploma of Associateship of Sydney Technical College.

Instruction in degree courses was provided at Sydney, Newcastle and Wollongong and in diploma courses at Sydney, Newcastle, Wollongong, Lithgow and Broken Hill.

Higher Degree Courses.

Master of Science	75
Master of Engineering	45
Master of Architecture	4
Doctor of Philosophy	63
	187

Arts Courses (Newcastle University College).

One-hundred and thirty-five students are enrolled in the Arts courses which were established at Newcastle University College at the beginning of 1954.

Graduate and Special Courses.

Enrolments in graduate and special courses conducted in the various Schools during the year totalled 866. A list of these courses appears on pages 382 and 383 of this report.

Scholarships, Bursaries and Fellowships.

The Council gratefully acknowledges the following Scholarships, Bursaries and Fellowships which were made available during the year:—

Three Australian Atomic Energy Commission Research Studentships.

The Australian Leather Research Association Fellowship.

The Broadcasting Radio Electrical Industries Fellowship Club, Sydney, Scholarship.

The Imperial Chemical Industries of Australia and New Zealand Research Fellowship.

The John Heine Memorial Foundation Scholarship.

Eleven Joint Coal Board Scholarships.

Two Mining and Metallurgical Bursaries Fund Scholarships.

The Monsanto Research Scholarship.

One New South Wales Combined Colliery Proprietors' Association Scholarship.

Four Wool Industry Fund Scholarships.

Five Public Bursaries.

Seven Public Exhibitions.

Three hundred and seventy Commonwealth Scholarships.

Particulars of these awards are given in Appendix III.

Joint Ceremony—Opening of First Permanent Building and Conferring of Degrees.

At an impressive ceremony on 16th April, 1955, before a large congregation, the first permanent building at Kensington was opened by His Excellency the Governor of New South Wales, Lieutenant-General Sir John Northcott, K.C.M.G., K.C.V.O., C.B. His Excellency unveiled a plaque in the main vestibule to commemorate the occasion. The ceremony was attended by the Premier of New South Wales, the Honourable J. J. Cahill, M.L.A., and the Deputy Premier and Minister for Education, the Honourable R. J. Heffron, M.L.A., and was followed by the first conferring of degrees on the University's site at Kensington.

The honorary degree of Doctor of Science was conferred by the Chancellor on:—

The Honourable J. J. Cahill, Hon. LL.D. Syd., M.L.A., Premier of New South Wales and Colonial Treasurer;

The Honourable R. J. Heffron, Hon. D.Litt. Syd., M.L.A., Deputy Premier and Minister for Education;

F. S. Bradhurst, Esq., A.S.T.C., Managing Director of Holbrooks (A'sia) Ltd.;

N. E. Jones, Esq., A.S.T.C., Managing Director of Broken Hill Pty. Ltd.; and

M. A. E. Mawby, Esq., F.S.T.C., Director of Exploration and Research, the Zinc Corporation Ltd.

The Chancellor then conferred degrees on 112 students. Seven students were admitted to the degree of Doctor of Philosophy, the first occasion on which this degree has been awarded by the University of Technology, eleven to the degree of Master of Science, 37 to the degree of Bachelor of Science, 52 to the degree of Bachelor of Engineering, and five to the degree of Bachelor of Architecture.

The Premier and the Minister for Education addressed the gathering, and Dr. M. A. E. Mawby delivered the Occasional Address.

A list of the recipients of degrees is given in Appendix IV.

Newcastle University College.

On 24th March, 1955, the graduation ceremony at Newcastle University College was held, the second since the foundation of the College.

At the ceremony the honorary degree of Doctor of Science was conferred by the Chancellor on:—

W. E. Clegg, Esq., M.I.E.Aust., F.C.A.A., Chairman, Newcastle Technical Education District Council; Director-Consultant, Commonwealth Steel Co. Ltd.

J. K. MacDougall, Esq., M.I.E.E. (Lond.), A.M.I.E.Aust., Consultant to Rylands Bros., Australia, Pty. Ltd.

Degrees were conferred on twelve students of the College, one student being admitted to the degree of Master of Science, eight to the degree of Bachelor of Science, and three to the degree of Bachelor of Engineering. The Deputy Premier and Minister for Education, the Honourable R. J. Heffron, M.L.A., delivered the Occasional Address.

The Newcastle University College continued to extend its activities during the period under review. Following the approval of Council in July, 1954, a full-time course in General Science was commenced in 1955, in addition to the part-time General Science course which is also given at Sydney. The General Science courses are designed to give a more broadly based training than the specialised Applied Science courses.

The subjects offered for the Arts courses conducted at Newcastle, which qualify for the degree of Bachelor of Arts of the University of New England, have been increased in number, and courses are now offered in English I and II, French I and II, German I and II, Latin I, Philosophy I and II, Psychology I and II, Economics I and II, Education I, Mathematics I and II, and Geography I and II. This development has been made possible by the appointment of senior lecturers in several subjects, and a well-staffed School of Humanities and Social Sciences has now been built up. Enrolments in Arts courses increased to 135 this year compared with 95 in the previous year. In the 1954 first year final examinations conducted jointly for New England and Newcastle Arts students the latter gained six out of the nine first places.

Additional buildings were completed during the year to provide further accommodation for the School of Humanities and Social Sciences, including a University library, staff offices, and student common rooms. Construction is proceeding on additions to the John Darling Building which will make available a Psychology laboratory, a lecture and drawing room, and office accommodation.

In September, 1954, Council approved the Constitution of the Newcastle University College Students' Association, and this body now represents the interests of all registered students at the College.

Enrolments at Newcastle in 1955 are as shown hereunder, and total 539 students. These are included in the general enrolment figures of the University given on pages 372 to 374.

Applied Science, Engineering and Architecture.

Day Degree Courses:

Applied Chemistry	1
Chemical Engineering	1
Civil Engineering	12
Electrical Engineering	1
General Science	11
Mechanical Engineering	6
Mining Engineering	2
	34

Part-time Degree and Diploma Courses:

Applied Chemistry	35
Applied Geology	2
Architecture	21
Chemical Engineering	22
Civil Engineering	30
Electrical Engineering	28
General Science	6
Industrial Chemistry	7
Mechanical Engineering	102
Metallurgy	39
Miscellaneous Subjects	30
	322

Conversion Courses:

Applied Chemistry	6
Chemical Engineering	4
Civil Engineering	1
Electrical Engineering	4
Mechanical Engineering	6
Metallurgy	10
	31

Higher Degrees:

Master of Science	9
Master of Engineering	2
Doctor of Philosophy	6
	17

Arts Courses.

One hundred and thirty-five students (day and evening) are enrolled in Arts courses at Newcastle University College.

Total number of registered students enrolled at Newcastle, 539.

Reorganisation of University Administration

In accordance with the provisions of sections 25 and 33 of the Technical Education and New South Wales University of Technology Act, 1949, full authority for the control of the University was vested in the Council on 1st July, 1954, and the necessary changes in the University's administrative structure (details of which appear in the Report of Council for 1953-54) were effected.

The Executive Committee of Council had previously taken action to appoint Professor J. P. Baxter as Director (now Vice-Chancellor) of the University, and this action was approved by Council at its meeting of 12th July, 1954.

An invitation to join the staff of the University was extended to 513 members of staff of the Department of Technical Education who were engaged on University work. The invitation was accepted by all but three, and the members of staff transferring to the University were appointed as from 1st July, 1955.

Senior Staff

The Vice-Chancellor, Professor J. P. Baxter, by leave of the Council, visited England and America between 17th July, 1954, and 25th August, 1954, to carry out work on behalf of the Australian Atomic Energy Commission and the University.

The re-appointment of Professors A. E. Alexander, D. W. Phillips, and F. E. Towndrow as Deans of the Faculties of Applied Science, Engineering and Architecture, respectively, for the period 1st July, 1955 to 30th June, 1956, was approved by Council in May, 1955.

Appointments of senior staff during the period under review were as follow:

Professor of History and Deputy Warden, Newcastle University College:

J. J. Auchmuty, M.A., Ph.D. Dubl., M.R.I.A., F.R.Hist.S., 21st February, 1955.

Associate Professor of Production Engineering:

N. A. Hill, B.Sc., B.E. Syd., S.M. M.I.T., A.M.I.E.Aust., 10th May, 1955.

Senior Lecturer in Applied Chemistry:

R. L. Martin, M.Sc. Melb., Ph.D. Cantab., 6th July, 1954.

Senior Lecturer in Metallurgy:

W. Krysko, Dr. Ing. Berl., 12th July, 1954.

Senior Lecturer in History:

G. A. Cranfield, B.A., Ph.D. Cantab., 15th July, 1954.

Senior Lecturer in Metallurgy:

A. E. Jenkins, B.Met.E., M.Eng.Sc., Ph.D. Melb., 20th September, 1954.

Senior Lecturer in Chemical Engineering:

R. H. Buchanan, B.Sc.Corn., Ph.D., A.R.A.C.I., 1st January, 1955.

Senior Lecturer in Applied Chemistry:

F. Gutmann, Ph.D. Vienna, M.I.R.E.(Aust.), M.I.R.E. (U.S.A.), F. Inst.P., F.A.P.C., 1st January, 1955.

Senior Lecturer in Geography, Newcastle University College:

A. Tweedie, M.A. N.Z., 1st January, 1955.

Senior Lecturer in Classics, Newcastle University College:

J. Duhigg, B.A. Syd., M.A. Cantab., 1st February, 1955.

Senior Lecturer in English, Newcastle University College:

D. C. Muecke, B.A. Adel., M.A. Oxon., 1st February, 1955.

Senior Lecturer in Philosophy, Newcastle University College:

C. F. Presley, B.A. Wales, B.Litt. Oxon., 3rd February, 1955.

Senior Lecturer in Architecture:

N. J. Anderson, B.Arch. Syd., Dip.T.P. Lond., A.R.A.I.A., A.M.T.P.I., 4th February, 1955.

Senior Lecturer in Applied Chemistry:

R. A. Eade, M.Sc. Syd., Ph.D. Liv., A.R.I.C., A.R.A.C.I., 4th February, 1955.

Senior Lecturer in Mechanical Engineering:

J. N. Hool, B.E. Syd., D.Phil. Oxon., A.S.T.C., A.M.I.E. Aust., 4th February, 1955.

Senior Lecturer in Architecture:

F. Woolard, A.S.T.C. (Arch.), A.R.A.I.A., M.R. San.I. Lond., 4th February, 1955.

Senior Lecturer in Electrical Engineering:

E. G. Hopkins, B.E., Ph.D., A.S.T.C., A.M.I.E.Aust., 11th February, 1955.

Senior Lecturer in Applied Psychology, Newcastle University College:

D. R. Martin, B.A., Dip.Ed. Syd., 25th February, 1955.

Senior Lecturer in Applied Chemistry:

G. S. Buchanan, M.Sc. Syd., A.R.A.C.I., 24th March, 1955.

Senior Lecturer in Applied Chemistry:

J. J. Simes, M.Sc., Dip.Ed. Syd., Ph.D. Liv., A.R.A.C.I., 24th March, 1955.

Senior Lecturer in Applied Physics:

L. G. Parry, B.Sc. Dip.Ed. Syd., A.Inst.P., 11th April, 1955.

Senior Lecturer in French, Newcastle University College:

K. H. Hartley, M.A. Syd, Ph.D. Paris, 14th April, 1955.

Senior Lecturer in Applied Chemistry:

A. G. Parts, Mag.Chem.Techn., Dr.Phil.Nat., Dr.Habil. Tartu, 26th May, 1955.

Senior Lecturer in Civil Engineering:

G. J. Haggarty, B.E. Syd., A.M.I.E.Aust., 1st June, 1955.

Assistant Bursar:

R. G. Sutton, A.S.T.C. (Bldg.), A.A.I.B., 25th January, 1955.

During the period under review the appointments of the following senior members of staff were made retrospective to the dates shown:

Senior Lecturer in Mining Engineering:

R. G. Burdon, M.E., A.S.A.S.M., A.M.Aus.I.M.M., 1st January, 1954.

Senior Lecturer in Mechanical Engineering, Wollongong:

J. M. Carswell, A.S.T.C., 1st January, 1954.

Senior Lecturer in Applied Chemistry:

R. L. Werner, M.Sc., A.S.T.C., A.R.A.C.I., 1st January, 1954.

During the year under review study leave was approved for the following members of staff for the periods indicated:

G. H. Roper, Senior Lecturer, School of Chemical Engineering—one year from August, 1954.

L. O. Bowen, Lecturer, School of Applied Physics—one year from August, 1954.

D. J. Cole, Lecturer, School of Electrical Engineering—one year from September, 1954.

C. C. Renwick, Associate Professor of Economics, Newcastle University College—four months from November, 1954.

P. Beckman, Lecturer in Applied Chemistry, Wollongong—one year from January, 1955.

P. Spooner, Senior Lecturer, School of Architecture and Building—one year from July, 1955.

H. J. Brettle, Lecturer, School of Civil Engineering—one year from October, 1955.

G. C. Dewsnap, Senior Lecturer, School of Electrical Engineering—one year from December, 1955.

G. Shaw, Senior Lecturer, School of Applied Chemistry—one year from December, 1955.

A. F. Nettleton, Lecturer, School of Civil Engineering—one year from December, 1955.

Other members of staff on study leave during the year whose leave was approved in an earlier period were—

Professor F. E. Towndrow, Dean of the Faculty of Architecture.

Professor R. M. Hartwell, Head of the School of Humanities and Social Sciences.

S. E. Bonamy, Senior Lecturer, School of Mechanical Engineering.

A. Bryson, Senior Lecturer, School of Applied Chemistry.

J. F. McConnell, Senior Lecturer, School of Applied Physics.

J. R. Anderson, Lecturer, School of Applied Chemistry.

R. N. J. Clark, Lecturer, School of Electrical Engineering.

N. R. Davies, Lecturer, School of Applied Chemistry.

W. J. Dunstan, Lecturer, School of Applied Chemistry.

Dr. R. S. Nyholm, M.Sc. Syd., Ph.D. Leeds, D.Sc., Lond., Associate Professor of Inorganic Chemistry, resigned from the University of Technology on 25th February, 1955, in order to take up a professorship of Chemistry at London University College.

Courses of Study

In July, 1954, Council approved the establishment of a School of Applied Psychology to conduct part-time courses specialising in Counselling and in Industrial Psychology, leading to the degree of Bachelor of Science in Psychology (B.Sc.Psych.). These courses were introduced at the beginning of the 1955 academic session. The courses are concerned primarily with the application of psychology in industry, the early years being devoted to a broad basic training and the fourth and fifth years providing the more specialised professional training. Council also approved, in November, 1954, the introduction of a full-time degree course in Food Technology, in addition to the part-time course already operating, and this course was instituted in 1955. Extensive revisions were planned during 1954 to the General Science course, and following Council's approval in November of that year, the revised course was introduced on a part-time basis at Sydney, and a full-time as well as the part-time General Science course is now offered at Newcastle. The revised course has created particular interest as a training course for teachers of Science in secondary schools.

Approval was given by Council in July, 1954, for the establishment of a Faculty of Commerce, and applications have been called for Foundation Chairs in Accountancy and Economics as the first step in planning the proposed courses in general commerce, wool commerce, accountancy and public administration. In September, 1954, a Commerce Advisory Panel, comprising a group of experts in the appropriate fields, was formed in order to guide the development of the Faculty.

Following a grant of £5,000 a year for five years by the Australian Automobile Association for the establishment of a Chair in Traffic Engineering, and a grant of £5,000 a year for five years by the N.S.W. Department of Main Roads to found a Chair in Highway Engineering, Council in May, 1955, approved the establishment of the Chairs within the University, and instruction in these subjects will be introduced as soon as practicable.

During 1954 Council approved conditions for the award of the degrees of Master of Architecture and Doctor of Philosophy in Architecture, and students undertaking suitable advanced work in the School of Architecture and Building may now qualify for these degrees.

Graduate and special courses conducted during the year were as follows:

School of Applied Chemistry:

Physico-Chemical Methods of Analysis (given at Wollongong College).

Synthetic High Polymers.

Theory and Applications of Chromatography.

School of Chemical Engineering:

Elements of Food Technology.
Advances in Food Technology.
Chemical Engineering Unit Operations—Fluid Flow, Heat Transfer, and Distillation.

Some Unit Operations in the Food Industry.

School of Civil Engineering:

Applied Hydraulics.
Hydrology.
Analysis of Concrete Shell Roofs.
Engineering Computations.
Pre-stressed Concrete.

School of Electrical Engineering:

Industrial Electronics.
Protection Engineering.
Television.
Illumination I.

School of Mathematics:

Statistics in Experimental Design.
Statistics (public lectures given at Broken Hill).

School of Mechanical Engineering:

Ventilating and Air Conditioning.
Modern Feed-back Control Theory.

School of Mining Engineering and Applied Geology:

Mining Engineering for Commercial Personnel.

School of Wool Technology:

Special Lectures for the Wool Industry.
Special Lectures on Wool Production.

Fees for University Courses

At a special meeting held on 22nd November, 1954, the Council approved a new scale of fees for University courses to operate from 1st January, 1955. Although reluctant to increase fees, the Council felt obliged to take this step after having given very thorough consideration to the University's financial position and the level of fees charged for similar instruction in the other Australian Universities. The major change in the fee schedule was the raising of the fee for full-time undergraduate courses from £30 to £60 per annum, and for part-time undergraduate courses from £10 and £15 to £24 per annum.

Provision of Part-time Instruction in University Courses at Orange

Under the authority of Council to establish branches, departments or colleges of the University in approved areas in New South Wales, arrangements have been made to provide part-time instruction in the first and second years of the Mechanical Engineering diploma and part-time degree courses at Orange. The project is being supported by EMAIL Ltd. who are providing a number of scholarships to students attending the course. On completion of the second year of the course at Orange, students will qualify for admission to the second year of the full-time degree course, which they will complete in the School of Mechanical Engineering at Broadway. While attending the full-time course in Sydney, the students will be accommodated at the Student Hostel at Kensington.

Research

Research activities were continued as an essential part of the work of the University, and many of the graduate and special courses given during the period under review were centred around the results of research undertaken in the various Schools. As in previous years, a number of investigations carried out were at the request of industrial undertakings and Government Departments, who in some cases sponsored the projects. A Colloid Science Research Unit, under the direction of Professor A. E. Alexander, was created within the University, following a grant by the Commonwealth Scientific and Industrial Research Organisation of £4,000 per annum for research in this field. Also established was a Research Institute of Nuclear Engineering, to which further reference is made below.

The considerable interest and expansion in higher degree research over recent years has been maintained, and 187 persons are now engaged on such studies. A pleasing feature this year was the award for the first time of the degree of Doctor of Philosophy, evidence of the increasingly advanced nature of some of the research undertaken.

A list of research projects for this year, including higher degree studies and publications by members of the University, is set out in Appendix V.

Symposia and Lectures on Atomic Power.

The University is giving valuable assistance in the development of nuclear energy as a source of power for Australian industry. On 31st August and 1st September, 1954, a highly successful symposium on "Atomic Energy in Australia" was held at the University. The symposium was opened in the presence of His Excellency the Governor, Lieutenant-General Sir John Northcott, by the Premier, the Honourable J. J. Cahill, M.L.A., who referred to the outstanding importance of the University's work on atomic power, and announced a State grant of £125,000 to support a Research Institute of Nuclear Engineering within the University.

At the symposium, which was attended by over 200 of Australia's leading industrialists, scientists and technologists, papers were given by eight eminent authorities on various aspects of the provision of an atomic power programme for Australia, viz., Professor M. L. Oliphant, Director, School of Physical Sciences and Professor of Particle Physics, Australian National University; Dr. H. G. Raggatt, Secretary, Department of National Development; Professor L. H. Martin, Professor of Physics, University of Melbourne; Mr. S. B. Dickinson, Director of Mines, South Australia; Professor T. G. Hunter, Professor of Chemical Engineering, University of Sydney; Professor J. S. Anderson, Professor of Chemistry, University of Melbourne; and Professors J. P. Baxter and Rupert Myers of this University. At the symposium it was stressed that the main problems in the development of atomic energy in Australia were largely in the technological field rather than in the fundamental sciences. The papers presented were later published in booklet form and there has been a steady demand for copies, both in Australia and from overseas.

The University was pleased to be able to co-operate with the University of Sydney in arranging a series of lectures of a more detailed nature on the "Engineering and Technology of Atomic Power". Designed for scientists and engineers in industry, these lectures commenced on 29th March, 1955, and will conclude on 9th August, 1955. The lecturers include Professor J. P. Baxter, Professor D. W. Phillips, Professor Rupert Myers, Mr. A. Bryson and Mr. R. C. P. Cairns, from the University of Technology.

Professors Baxter and Myers also delivered lectures at a symposium conducted by the University of Melbourne on "Some Problems in the Development of Atomic Power" on 28th and 29th October, 1954.

Recognition of Architecture and Civil Engineering Degree Courses.

On 2nd December, 1954, members of the Board of Architectural Education visited the School of Architecture at Kensington and inspected the work being done by students there. Following this visit, and on the recommendation of the Board, the Royal Australian Institute of Architects granted full recognition to the degree course in Architecture, so that graduates in Architecture are now given exemption from the examinations for membership of the Institute. Advice has been received that the Board will make a similar recommendation to the Royal Institute of British Architects with a view to recognition of the degree course being given by that body.

Advice was received in June, 1955, from the Institution of Civil Engineers, London, that the degree in Civil Engineering has been accepted as granting exemption from Parts I and II of the examinations for membership of that body. This is particularly important for Asian and other overseas students whose qualification for membership of the parent institution is a requirement for professional recognition in their home country.

Department of Education and Department of Technical Education Students.

At the meeting held on 9th May, 1955, Council approved the provision of two hundred places in University courses for teachers of the Departments of Education and Technical Education and for certain Public Service trainees whose attendance is authorised by the Government Department concerned. Students attending courses under this arrangement will be exempt from the payment of fees.

Council also decided to permit a number of selected members of the University staff, nominated by Heads of Schools and approved by the Vice-Chancellor, to attend lectures without payment of fees.

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Construction of University Hydraulics Laboratory at Manly Vale.

Early in the year Council approved the establishment of an hydraulics laboratory for the School of Civil Engineering at Manly Vale, on a site adjacent to other hydraulics laboratories operated by Government Departments and made available by the Metropolitan Water, Sewerage and Drainage Board. Council later approved the letting of a contract for the supply and erection of steel frames of two buildings for a laboratory and workshop. Work is now proceeding on the preparation of the site and access roads are being built. A water supply pipeline from the Manly reservoir is being laid.

Electronic Computers in the University.

Electronic computers, often called "Electronic Brains" are becoming an essential service to scientific research, particularly in the industrial field, and there are now four computer projects in the University of Technology. The School of Mechanical Engineering has a small analogue computer to assist in its work on Automatic Control Engineering, a subject of great importance to modern technology. The computer is being used at present in connection with problems in steam power stations. The School of Electrical Engineering has three computer projects under way. In March, 1955, Council approved the purchase of a large digital computer to be built by the English Electric Company. This computer should prove of great value in the solution of complex research and industrial problems connected wth large electrical networks, nuclear power reactors, and statistical and economic problems. The Electrical Engineering School is also constructing a large analogue for the solution of complex equations, mainly in connection with postgraduate teaching and research in Automatic Control. Finally, in co-operation with the British Atomic Energy Authority, the School is engaged on building an electric analogue which will simulate the behaviour of a nuclear reactor. The analogue will be used in training students in the field of nuclear engineering in solving design problems of nuclear reactors and nuclear power stations.

Publication of "Wool Technology".

A new publication, entitled "Wool Technology", has been brought out by the School of Wool Technology. The first issue, which was published in December, 1954, comprised the full text of the special lectures for the sheep and wool industry organised by the School in August of that year. The lectures, which gave an authoritative review of research and development in the industry over the past year, were held in the Wool Sale Room, Royal Exchange Building, Sydney. Distribution of the booklet has extended not only throughout Australia, but also to Britain, New Zealand, South Africa and the United States.

A second issue of "Wool Technology", containing the text of the special lectures for the wool industry given in May, 1955, is in press.

Development of University Site at Kensington.

Development of the University site at Kensington was accelerated during the year and culminated in the opening of the first major building on 16th April, 1955, and its occupancy by the Schools of Applied Physics, Mining Engineering and Applied Geology, and Humanities and Social Sciences, and the University Administration. The School of Architecture and Building has occupied the top floor of the first permanent building since early 1954.

The School of Chemical Engineering, including the Department of Food Technology, and the School of Metallurgy continue to function successfully in the light-framed buildings at Kensington, making a total of six Schools now in operation on the University site.

The next stage in the development of the site is already under way. In November, 1954, Council approved the erection of five buildings to accommodate the Faculty of Applied Science and to include a main hall, on the area to the north of the first main building and providing a total floor space of 296,500 square feet. The preparation of the site for these buildings has already been carried out, the necessary access roads are being laid, and detailed plans and specifications are being drawn up under direction of the Government Architect. In addition, in March, 1955, Council decided upon the erection of two steel-framed aluminium buildings adjacent and identical to the Chemical Engineering Process building for the use of the Schools of Electrical and Mechanical Engineering.

The main ground improvements immediately around the first permanent building have now been completed; roads and paths and parking spaces have been laid out, and the area in front of the building provides a well established lawn interspersed with trees and shrubs. On the Anzac Parade side of the main site, four tennis courts have been made, and a sports oval is nearing completion.

The University acquired several unique and valuable works of art during the year. A copper mural panel, "The Falconer", designed by sculptor Tom Bass and symbolising the ideal that all technologists should have due regard to the aesthetic aspects of their work, was affixed to the stone facing at the main entrance to the building. In this commanding position, and rising to a height of forty-two feet, the mural excited considerable interest at the Opening Ceremony. Several original paintings were purchased by the University, including "Cooktown" by A. E. Read (the winning picture in the 1954 Wynne Art Competition), "Landscape, Pyrenees" by Rupert Bunny, and "The Wave" by John Passmore. The University was very pleased to acquire a portrait of the Chancellor, Mr. Wallace

C. Wurth, by leading Sydney artist Joshua Smith. The portrait was purchased without cost to the University from donations, mainly by members of the Council.

Student Hostel.

Extensive renovations to the Student Hostel have now been completed, all dormitories having been converted into single room accommodation, and improved kitchen equipment and toilet facilities having been installed. The recreation hall has been re-lined and provided with a new stage and dressing rooms.

In March, 1955, Council approved the erection of a modern residential college, to be erected on high ground in the north-eastern corner of the Kensington site. Plans have been drawn up by staff members of the School of Architecture and Building for a three-storey brick building centred around two quadrangles, to accommodate 191 students.

Acquisition of Land at Kingsford for University Sporting Activities.

An area of approximately 14½ acres, situated between Cook and Banks Avenues, Kingsford, has been acquired by the University. The land was previously vested in the Department of Technical Education, and was made available to the Universtiy for development as a sports ground.

Student Organisations and Activities.

During 1955 there has been a decided increase in the number of students engaging in extra-curricular activities, and the results achieved by the various student clubs and societies have been very creditable. A particularly pleasing feature is the greater participation of part-time students in the sporting and other activities of the student body; part-time students now comprise approximately 65 per cent. of club memberships. The Sydney clubs are working in close liaison with the Newcastle University College in the sporting field and a number of Newcastle students are competing in Inter-Varsity Championships as members of University teams.

The increase in sporting activity during the year was greatly assisted by the University of Technology Sports Association, the parent body in the organisation of University sport, which has supplied equipment valued at more than £700 as well as subsidising Inter-Varsity Competition travelling expenses to the extent of £400. The University was able to enter a wide variety of teams in the Inter-Varsity Competition which is the leading event of University sport: Teams in cricket, tennis, swimming, basketball, rifle-shooting, fencing, table tennis, athletics, and Rugby Union football competed. Members of the basketball, rifle-shooting, Rugby Union, and swimming teams were chosen for the Combined Universities Teams touring other States and New Zealand, and the Australian Universities

Sports Association has approved this University as hosts in athletics, rifle-shooting, and Rugby Union in the 1957 Competitions. The University also competed in the metropolitan competitions in athletics, cricket, rifle-shooting, Rugby Union, and squash racquets, being particularly successful in the two last-mentioned fields.

At its meeting held on 8th November, 1954, Council approved the granting of £500 by the University towards the cost of providing a sports oval on the Tighe's Hill site, for the use of students of Newcastle Technical College and Newcastle University College.

Following an application from the Rifle Club for financial assistance to enable a club house to be erected at the Liverpool Rifle Range, Council on 14th March, 1955, approved the purchase of materials to the value of £400 for use in the erection of a demountable building by members of the Rifle Club. The building, for which the Rifle Club will be charged an annual rent, will remain the property of the University.

Early in 1955 negotiations were concluded which enabled students of the University of Technology to join with students from the University of Sydney to form the Universities Golf Club. A licensing agreement with the Australian Golf Club at Rosebery was entered into, by which full playing rights to the Australian Golf Club inner course are given to the Universities Golf Club. A building adjoining the course is being converted by the Australian Golf Club to provide a Club House for the Universities Golf Club.

In September, 1954, Council approved the Constitution of the University of Technology Students' Union, the University of Technology Sports Association, and the Newcastle University College Students' Association. These three bodies, which together represent the general interest of all registered students, consequently now have the status of recognised University Societies.

Most Schools of the University now have a Club or Society of students in the School, designed to promote extra-curricular activities and staff/student contact and co-operation within the School. The Constitution of the Electrical Engineering Society was approved by Council in September, 1954.

The "Engineering Yearbook", produced by the students of the Faculty of Engineering, has become an established publication of continued high standard. The 1953-54 volume was published during the year, and the 1954-55 volume is in press.

On 14th March, 1955, Council approved the Constitution of the Overseas Students' Association and granted it recognition as a University student organisation. The Association is designed to promote closer cultural ties and understanding between the Australian people and the many students from overseas countries attending the University of Technology. This well-organised student group is very active socially and publishes a monthly bulletin.

Since the opening of the main building at Kensington in April, 1955, the Drama Club has had the use of the splendidly equipped theatre of modern design. This has given great impetus to the work of the Club, and four one-act plays are now in rehearsal for presentation at a "first-night" in the new theatre early in August.

The religious groups at the University—the Student Christian Movement, the Evangelical Union, and the Newman Society—were all very active during the year. Other student organisations which had a successful year were the Chess Club, which played very creditably in the New South Wales Chess Association Competition, finishing second in the "B" grade, the Music Club, which held regular weekly recitals of recorded music, and the Bush-Walkers' Club.

Benefactions.

Council acknowledges with gratitude the following benefactions which were received during the year:—

Grant of £125,000 by New South Wales Government for Research in Nuclear Engineering.—The New South Wales Government made available the sum of £125,000 for research by the University into problems of nuclear engineering. The grant was announced by the Premier of New South Wales, the Honourable J. J. Cahill, M.L.A., when opening the University's symposium on "Atomic Power in Australia" on 31st August, 1954.

Grant by Commonwealth Scientific and Industrial Research Organisation for Agricultural Engineering Research.—The Commonwealth Scientific and Industrial Research Organisation has made available the sum of £2,000 to assist research in agricultural engineering, under the direction of Professor A. H. Willis.

Rural Bank Fellowship in Agricultural Engineering.—The Rural Bank of New South Wales is making a grant of £1,200 per annum for three years in order to establish a Fellowship for research in agricultural engineering in the School of Mechanical Engineering.

Colloid Science Research Grant by Commonwealth Scientific and Industrial Research Organisation.—A grant of £4,000 per annum for research in Colloid Science was received from the Commonwealth Scientific and Industrial Research Organisation.

Grant by Australian Automobile Association for Chair in Traffic Engineering.—The Australian Automobile Association has made available £5,000 a year for five years for the establishment of a Chair in Traffic Engineering at the University of Technology.

Grant by Department of Main Roads for Chair in Highway Engineering.—A grant of £5,000 a year for five years is being made by the New South Wales Department of Main Roads for the establishment of a Chair in Highway Engineering at the University.

Australian Atomic Energy Commission Grant of £8,500 *for Research in School of Metallurgy.*—The Australian Atomic Energy Commission has donated the sum of £8,500 in support of a programme of research related to atomic energy being conducted in the School of Metallurgy.

Commonwealth Bank of Australia Rural Credits Development Fund Grant of £4,300.—A further grant of £4,300 from the Rural Credits Development Fund was received by the University for work on the following projects—

- Investigation of the chemistry of Australian ants;
- Investigation of the composition of Australian fruits;
- Studies of the vector of bean mosaic virus;
- Investigation of the physical and chemical properties of soils;
- Methods of flood estimation;
- Investigation of the composition of Australian fruits and vegetables.

Grant of £500 *by Beetle-Elliott Ltd. for Plastics Laboratory, School of Chemical Engineering.*—Beetle-Elliott Ltd. has made available the sum of £500 towards developmental work being carried out in the Plastics Laboratory of the School of Chemical Engineering, and have indicated that this assistance may be given annually.

Commonwealth Scientific and Industrial Research Organisation Grant to School of Electrical Engineering.—An amount of £750 has been made available by the Commonwealth Scientific and Industrial Research Organisation for the School of Electrical Engineering to undertake research on the representation of synchronous machines by electronic models.

Sydney Technical College Students' Union Award Fund.—An amount of £699 3s. was received from the Sydney Technical College Students' Union in order to establish the "Sydney Technical College Union Award" which shall take the form of a bronze medal and a cash prize of £25. The award is to be made annually to a graduating student of the University who has shown leadership in the development of student affairs within the University and who has shown marked academic proficiency throughout his course.

The Frank W. Peplow Prize for Church Architecture.—A donation of £250 was received from Mrs. W. M. Peplow in order to establish an annual prize of approximately £12 for Church Architecture in memory of her late husband, Mr. F. W. Peplow, a leading architect and designer of several important Australian churches.

Food Technology Laboratory Grant of £100 by H. Jones & Co. (Sydney) Pty. Ltd.—The sum of £100 was donated by H. Jones & Co. (Sydney) Pty. Ltd., to be applied to work being carried out in the Food Technology Laboratory.

Accounts.

Statements showing the position of the various funds of the University as at 30th June, 1955, duly certified by the Auditor-General, are appended to this report.

WALLACE C. WURTH, Chancellor.

APPENDIX I.

The Council.

The Council held five ordinary meetings and three special meetings during the year. The attendance of members was as follows:—

Chancellor of the University.

WALLACE CHARLES WURTH, C.M.G., LL.B., Chairman of the New South Wales Public Service Board—eight meetings.

Deputy Chancellor.

THE HON. JOHN SYDNEY JAMES CLANCY, LL.B., Justice of the Supreme Court—eight meetings.

Vice-Chancellor.

JOHN PHILIP BAXTER, O.B.E., B.Sc., Ph.D., A.M.I.Chem.E., F.R.A.C.I., Professor of Chemical Engineering, New South Wales University of Technology—eight meetings.

Members.

FREDERICK WILLIAM AYSCOUGH, B.Sc., A.R.I.C., A.R.A.C.I., Senior Lecturer in Chemical Engineering, New South Wales University of Technology; Vice-President, Technical Teachers' Association of New South Wales—seven meetings.

GEOFFREY BOSSON, M.Sc., Professor of Mathematics, New South Wales University of Technology—seven meetings.

WILLIAM EDWARD CLEGG, Hon. D.Sc., M.I.E. Aust., F.C.A.A., Chairman, Newcastle Technical Education District Council; Director-Consultant, Commonwealth Steel Co. Ltd.—three meetings.*

HAROLD GRAYDON CONDE, C.M.G., M.I.E. Aust., Manager, Electric Light and Power Supply Corp. Ltd.; Electricity Commissioner, New South Wales—four meetings.

ARTHUR DENNING, B.Sc., Dip.Ed., A.S.T.C., F.R.S.A., Director, New South Wales Department of Technical Education—eight meetings.

JOHN PATRICK GLASHEEN, Dip.Ed., A.C.I.S., Member, New South Wales Public Service Board—one meeting.* (Deceased on 24th December, 1954.)

WILLIAM MCCULLOCH GOLLAN, M.L.A., Minister for Mines—three meetings.*

JOHN WILLIAM GOODSELL, C.M.G., F.A.S.A., President, Metropolitan Water, Sewerage and Drainage Board—seven meetings.

HARRY FREDERICK HEATH, B.A., B.Ec., Member, New South Wales Public Service Board (appointed on 1st April, 1955)—one meeting.

WILLIAM GEORGE KETT, F.S.M.C., F.I.O. (Lond.), Past President, Australian Optometrical Association; Director, Mark Foy's Ltd.—four meetings.*

THE HON. ROBERT ARTHUR KING, M.L.C., Secretary, Labour Council of New South Wales—no meetings.*

JAMES NORMAN KIRBY, Managing Director, James N. Kirby Pty. Ltd.; Technical Director, Nuffield (Aust.) Pty. Ltd.; Technical Director, International Products Ltd.—five meetings.*

WILLIAM RAE LAURIE, B.Arch., F.R.I.B.A., F.R.A.I.A., Architect; Past President, Royal Australian Institute of Architects—five meetings.

JAMES KENNETH MACDOUGALL, Hon. D.Sc., M.I.E.E. (Lond.), A.M.I.E. Aust., Consultant to Rylands Bros. Aust. Pty. Ltd.—seven meetings.

THE HON. JAMES JOSEPH MALONEY, M.L.C., Minister without Portfolio—four meetings.*

FRANCIS MACKENZIE MATHEWS, B.E., M.I.E. Aust., Chairman, Wollongong Technical Education District Council; Chief Engineer, Australian Iron and Steel Ltd.—six meetings.

RICHARD GODFREY CHRISTIAN PARRY-OKEDEN, Managing Director, Lysaghts Works Pty. Ltd.; Past President, Chamber of Manufactures of New South Wales—five meetings.*

DAVID WATKIN PHILLIPS, B.Sc., Ph.D., Dip.Met.Min., F.G.S., M.I.Min.E., M.Amer.I.M.E., M.Aus.I.M.M., Professor of Mining Engineering, N.S.W. University of Technology—eight meetings.

STEPHEN HENRY ROBERTS, M.A., D.Sc., Litt.D., D.Sc.(Econ.), Vice-Chancellor, The University of Sydney—three meetings.

ARTHUR ALFRED ROBINSON, M.B.S.I., Head of School of Footwear, New South Wales Department of Technical Education—five meetings

Raymond Louis Rogerson, B.E., Assistant Engineer, Australian Glass Manufacturers Co. Pty. Ltd.—five meetings.

Gregory Bede Thomas, LL.B., B.Sc., B.E., Barrister—five meetings.

Frederick Edward Towndrow, F.R.I.B.A., F.R.A.I.A., F.T.C.P.I. (Aust.), Professor of Architecture, N.S.W. University of Technology —four meetings.

Geoffrey Ward, B.E., Engineer, Postmaster-General's Department—six meetings.

Robert Joseph Webster, M.C., A.A.A., Past President, The Australian Institute of Management, Sydney Division; Chairman of Directors and Managing Director, Burlington Mills (Aust.) Ltd.; Managing Director, Bradford Cotton Mills Ltd.—six meetings.*

John Fell Dalrymple Wood, B.Sc., B.E., A.M.I.E. Aust., Associate Professor, Mechanical Engineering, N.S.W. University of Technology; President, Technical Teachers' Association of New South Wales—seven meetings.

Harold Stanley Wyndham, M.A., Dip.Ed., Ed.D., Director-General, New South Wales Department of Education—five meetings.

* During the year leave of absence from Council meetings for various periods was granted to Professor Roberts and to Messrs. Clegg, Glasheen, Gollan, Kett, King, Kirby, Maloney, Parry-Okeden and Webster.

APPENDIX II.

Standing Committees of Council.

The membership of the standing committees of Council is as follows:

Executive Committee:

The Chancellor (Chairman).
The Deputy Chancellor.
The Vice-Chancellor.
W. E. Clegg.
A. Denning.
J. W. Goodsell.
W. G. Kett.
W. R. Laurie.
J. K. MacDougall.
Professor D. W. Phillips.
Professor S. H. Roberts.
R. J. Webster.

Finance Sub-Committee of the Executive Committee:

The Chancellor (Chairman).
The Deputy Chancellor.
The Vice-Chancellor.
J. W. Goodsell.
W. R. Laurie.

Personnel Sub-Committee of the Executive Committee:

The Chancellor (Chairman).
The Deputy Chancellor.
The Vice-Chancellor.
W. G. Kett.

Academic Committee:

The Deputy Chancellor (Chairman).
The Vice-Chancellor.
A. Denning.
H. F. Heath.
W. G. Kett.
F. M. Mathews.
Professor D. W. Phillips.
R. L. Rogerson.
G. B. Thomas.
G. Ward.
Associate Professor J. F. D. Wood.
Dr. H. S. Wyndham.

Appeals Committee:

The Chancellor (Chairman).
The Deputy Chancellor.
The Hon. J. J. Maloney.

Buildings and Equipment Committee:

W. E. Clegg (Chairman).
The Vice-Chancellor.
The Hon. W. M. Gollan.
H. F. Heath.
The Hon. R. A. King.
J. N. Kirby.
W. R. Laurie.
J. K. MacDougall.
Professor D. W. Phillips.
A. A. Robinson.
Professor F. E. Towndrow.

Library Committee:

W. G. Kett (Chairman).
The Vice-Chancellor.
Professor G. Bosson.
The Hon. J. J. Maloney.
Professor D. W. Phillips.
G. B. Thomas.

Public Relations Committee:

R. J. Webster (Chairman).
The Vice-Chancellor.
F. W. Ayscough.
H. G. Conde.
J. N. Kirby.
The Hon. J. J. Maloney.
F. M. Mathews.

Newcastle College Committee:

J. K. MacDougall (Chairman).
The Vice-Chancellor.
W. E. Clegg.
A. Denning.
R. G. C. Parry-Okeden.
Dr. H. S. Wyndham.

APPENDIX III.

Awards of Scholarships for 1955.

Scholarships during the period under review were held as set out hereunder:—

Australian Atomic Energy Commission Research Studentships.

L. A. Cambey.—Doctor of Philosophy Candidate, School of Applied Physics.

F. Lawson.—Doctor of Philosophy Candidate, School of Chemical Engineering.

G. G. Madgwick.—Doctor of Philosophy Candidate, School of Chemical Engineering.

Australian Leather Research Association Fellowship.

B. M. Gatehouse.—Master of Science Candidate, School of Applied Chemistry.

The Broadcasting Radio, Electrical Industries Fellowship Club, Sydney, Scholarship.

A. Kugavesky.—Third year, Electrical Engineering.

The Imperial Chemical Industries of Australia and New Zealand Fellowship.

J. H. Green, M.Sc. Q'ld., Ph.D. Cantab.—Work on Radio-chemistry.

The John Heine Memorial Scholarship.

C. D. Campbell, A.S.T.C.—Metallurgy conversion course.

The Mining and Metallurgical Bursaries Fund Scholarships.

C. S. Fu—fourth year, Mining Engineering.
G. B. Guest—second year, Metallurgy.

The Monsanto Research Scholarship.

G. G. Madgwick, B.Sc.—Master of Science Candidate, School of Chemical Engineering.

The Wool Industry Fund Scholarships.

S. H. Chorlton—fourth year, Wool Technology.
J. B. Conyngham—first year, Wool Technology.
J. P. Kennedy—third year, Wool Technology.
R. B. Whan—first year, Wool Technology.

Joint Coal Board Scholarships.

J. F. Ashcroft—first year, Mining Engineering.
J. L. Beatty—second year, Mining Engineering.
E. Brennan—second year, Mining Engineering.
B. Greiss—second year, Mining Engineering.
E. M. Howells—first year, Mining Engineering.
F. E. Jaggar—third year, Mining Engineering.
J. N. Kay—third year, Mining Engineering.
E. C. McDonald—second year, Mining Engineering.
R. C. Nolan—fourth year, Mining Engineering.
J. A. Shaw—first year, Mining Engineering.
G. J. Watkins—second year, Mining Engineering.

Combined Colliery Proprietors' Association Scholarship.

M. N. Booken—first year, Mining Engineering.

Bursaries and Exhibitions.

J. P. Bolyai—fourth year, Applied Chemistry.
P. J. Happ—second year, Chemical Engineering.
J. H. Watson—third year, Mechanical Engineering.
Rosemary Babbage—first year, Arts (Newcastle University College).
D. C. Laycock—second year, Arts (Newcastle University College).

Exhibitions.

W. N. Neville—first year, Mechanical Engineering.
A. J. Shaw—first year, Electrical Engineering.

Commonwealth Scholarships.

Full-time Degree Students.

D. B. Allen—fourth year, Architecture.
H. J. E. Audova—third year, Civil Engineering.
S. H. Baker—first year, Civil Engineering.
R. I. Baxter—third year, Mechanical Engineering.
S. E. Behne—third year, Architecture.
C. Bennett—fourth year, Mechanical Engineering.
R. J. Bolton—fourth year, Applied Chemistry.
J. P. Bolyai—fourth year, Applied Chemistry.
A. S. Bowman—second year, Mechanical Engineering.
C. J. Brady—third year, Mechanical Engineering.
K. Brady—first year, Architecture.
D. N. Butler—third year, Applied Chemistry.
G. D. Byrne—second year, Electrical Engineering.
P. Carters—first year, Mechanical Engineering.
G. J. Celitans—first year, Applied Chemistry.
K. G. Clancy—third year, Civil Engineering.
A. G. Clarke—third year, Civil Engineering.
N. P. Cleary—first year, Civil Engineering.
A. F. Collings—first year, Chemical Engineering.
P. M. Collins—third year, Mechanical Engineering.
J. S. Colman—fourth year, Architecture.
B. Corderoy—first year, Electrical Engineering.
A. J. Costoulas—fourth year, Applied Chemistry.
J. Coyle—fourth year, Electrical Engineering.
N. K. Cox—second year, Mechanical Engineering.
D. W. Crawford—third year, Civil Engineering.
C. J. Cripps-Clark—second year, Metallurgy.
B. M. Croker—first year, Civil Engineering.
J. P. Crowe—fourth year, Electrical Engineering.
J. E. Davies—first year, Applied Chemistry.
B. K. Davis—second year, Wool Technology.
R. H. Devine—fourth year, Architecture.
J. P. Downey—fourth year, Civil Engineering.
R. W. Doyle—third year, Wool Technology.
G. R. Draper—fourth year, Applied Chemistry.
N. J. Ellem—fourth year, Electrical Engineering.
B. S. Ellis—third year, Architecture.
M. G. Ellis—second year, Electrical Engineering.
R. J. Enright—second year, Mechanical Engineering.
K. Falk—first year, Architecture.
R. G. Farrell—first year, Mechanical Engineering.
L. S. E. Fennell—third year, Electrical Engineering.
W. J. Foster—third year, Civil Engineering.
R. J. Frost—fourth year, Civil Engineering.
G. G. Fuller—third year, Architecture.

Commonwealth Scholarships.

Full-time Degree Students (Continued).

K. G. Gately—second year, Electrical Engineering.
A. B. Goldhammer—fourth year, Electrical Engineering.
D. G. Graham—second year, Electrical Engineering.
T. J. Grainger—second year, Wool Technology.
B. L. Grieve—fourth year, Electrical Engineering.
N. E. Griffiths—first year, Civil Engineering.
G. B. Guest—second year, Metallurgy.
R. F. Haile—first year, Applied Chemistry.
H. E. Hamilton—fourth year, Electrical Engineering.
J. D. Hampton—fourth year, Electrical Engineering.
W. R. Hazell—second year, Civil Engineering.
J. M. Higgins—third year, Civil Engineering.
K. Hillier—second year, Civil Engineering.
W. H. G. Holmes—second year, Civil Engineering.
J. A. Hoore—first year, Electrical Engineering.
F. R. Hulscher—third year, Electrical Engineering.
R. W. Humphreys—second year, Applied Chemistry.
A. J. M. Irving—third year, Mechanical Engineering.
G. A. Ivers—second year, Electrical Engineering.
A. M. James—first year, Civil Engineering.
K. Jan—fourth year, Mechanical Engineering.
R. C. Johnson—third year, Electrical Engineering.
J. R. Jones—second year, Civil Engineering.
P. G. Jones—third year, Civil Engineering.
A. Kadak—third year, Civil Engineering.
J. K. Kavanagh—second year, Civil Engineering.
C. H. L. Kennard—fourth year, Applied Chemistry.
G. A. Kennedy—second year, Civil Engineering.
P. Kenny—third year, Applied Physics.
C. A. Kerr—third year, Chemical Engineering.
J. K. Knight—second year, Civil Engineering.
V. Koskins—second year, Electrical Engineering.
C. Kringas—second year, Architecture.
A. Kuru—fourth year, Civil Engineering.
A. M. Kuter—second year, Civil Engineering.
D. M. Kuter—third year, Civil Engineering.
D. T. Lacey—first year, Chemical Engineering.
M. F. Leahy—second year, Civil Engineering.
A. G. Leask—third year, Mechanical Engineering.
J. W. Lee—third year, Applied Chemistry.
W. N. Leng—fourth year, Civil Engineering.
R. M. Lennon—fourth year, Electrical Engineering.
G. W. Le Quesne—first year, Chemical Engineering.
T. B. Liggins—first year, Civil Engineering.
I. K. Lodens—fifth year, Architecture.

Commonwealth Scholarships.

Full-time Degree Students (Continued).

B. J. Lourey—first year, Applied Chemistry.
R. G. McCarthy—fourth year, Electrical Engineering.
A. B. McDermott—second year, Electrical Engineering.
R. C. McEwen—third year, Applied Geology.
W. P. MacMillan—third year, Chemical Engineering.
P. McPaul—second year, Mining Engineering.
I. H. Maggs—third year, Electrical Engineering.
R. J. Maino—fourth year, Electrical Engineering.
D. R. Mander-Jones—second year, Architecture.
A. M. Mathew—second year, Mechanical Engineering.
R. B. Meulman—third year, Mechanical Engineering.
J. L. Moloney—third year, Electrical Engineering.
P. J. P. Morse—first year, Chemical Engineering.
W. D. Mosman—first year, Chemical Engineering.
K. H. Napier—third year, Applied Chemistry.
G. Neu—fourth year, Applied Chemistry.
R. J. Neville—first year, Mechanical Engineering.
M. J. Nicholls—third year, Civil Engineering.
R. Nittim—fourth year, Civil Engineering.
J. J. O'Brien—first year, Civil Engineering.
M. J. Olde—first year, Civil Engineering.
P. J. J. O'Neill—third year, Electrical Engineering.
J. Orlovich—third year, Mechanical Engineering.
M. K. Ormay—first year, Metallurgy.
E. T. Page—third year, Electrical Engineering.
L. Panozzo—fourth year, Mechanical Engineering.
D. J. Parrott—first year, Architecture.
J. L. Pascoe—first year, Applied Chemistry.
V. Perm—fourth year, Architecture.
B. P. Pfafflin—third year, Mechanical Engineering.
P. Piira—second year, Civil Engineering.
M. T. F. Pines—fourth year, Mechanical Engineering.
M. L. Pittaway—fourth year, Civil Engineering.
G. Popowski—first year, Mechanical Engineering.
H. R. Puck—first year, Chemical Engineering.
J. A. Purnell—third year, Electrical Engineering.
J. Raffaele—first year, Civil Engineering.
M. Randoja—third year, Civil Engineering.
K. M. Ray—third year, Electrical Engineering.
M. R. Raynor—first year, Chemical Engineering.
J. Roseth—first year, Architecture.
A. G. Roxborough—second year, Civil Engineering.
J. W. Rudd—first year, Mechanical Engineering.
P. M. Ryan—third year, Civil Engineering.
S. Samsa—second year, Mechanical Engineering.

Commonwealth Scholarships.

Full-time Degree Students (Continued).

J. M. Savage—fourth year, Mechanical Engineering.
W. Savage—second year, Mechanical Engineering.
W. E. Sawell—second year, Civil Engineering.
R. E. Simson—second year, Chemical Engineering.
J. N. Skinner—third year, Wool Technology.
R. J. Slater—second year, Civil Engineering.
I. L. Smith—first year, Mechanical Engineering.
R. L. Smythe—third year, Civil Engineering.
A. J. M. Sourdin—first year, Civil Engineering.
R. M. Spencer—first year, Civil Engineering.
J. W. Spratt—fourth year, Electrical Engineering.
A. Stuart—first year, Wool Technology.
A. R. Stuart—second year, Civil Engineering.
P. A. Sullivan—first year, Mechanical Engineering.
J. W. Swan—first year, Civil Engineering.
A. Tava—second year, Electrical Engineering.
B. M. Taylor—first year, Architecture.
P. J. Taylor—first year, Civil Engineering.
G. Thieben—third year, Civil Engineering.
B. J. Thompson—first year, Electrical Engineering.
F. C. Thorvaldson—second year, Architecture.
S. R. Tibbles—third year, Chemical Engineering.
A. Tinni—second year, Civil Engineering.
B. J. Tosswill—first year, Electrical Engineering.
R. F. Tuddenham—first year, Applied Chemistry.
M. Vesk—first year, Civil Engineering.
G. S. Watson—second year, Mechanical Engineering.
R. B. Watson—first year, Mechanical Engineering.
B. G. Wenham—third year, Civil Engineering.
D. Whitfeld—fourth year, Chemical Engineering.
J. E. Winton—second year, Civil Engineering.
D. G. Wood—first year, Chemical Engineering.
E. P. Woolley—second year, Chemical Engineering.
G. K. Wyatt—first year, Chemical Engineering.
R. F. Young—second year, Electrical Engineering.

Commonwealth Scholarships.

Part-time Degree and Diploma Students.

G. Andrews—third year, Civil Engineering.
K. W. Arnold—fifth year, Applied Chemistry.
V. J. Audet—first year, Radio Engineering.
J. R. Bagshaw—first year, Applied Chemistry.
M. M. Barratt—first year, Applied Biology.
J. F. Barton—second year, Civil Engineering.

Commonwealth Scholarships.

Part-time Degree and Diploma Students (Continued).

R. A. Batchelor—first year, Radio Engineering.
L. E. Beard—fourth year, Electrical Engineering.
R. T. E. Bell—second year, Applied Chemistry.
P. J. Benbow—third year, Building.
J. A. Birch—third year, Physics.
L. J. Blakeman—fourth year, Mechanical Engineering.
R. F. E. Bolton—second year, Industrial Chemistry.
P. H. Brady—second year, Applied Chemistry.
R. G. T. Brissett—second year, Civil Engineering.
T. J. Campbell—first year, Civil Engineering.
F. P. Chesworth—second year, Architecture.
J. F. Clarke—third year, Civil Engineering.
I. M. Coggiola—second year, Applied Biology.
J. W. Coombes—second year, Civil Engineering.
R. F. Cornell—second year, Optometry.
R. L. Cotham—fourth year, Chemical Engineering.
K. E. Cottier—first year, Architecture.
J. F. Cudmore—fifth year. Applied Chemistry.
D. R. Davies—first year, Civil Engineering.
K. J. Davis—first year, Applied Chemistry.
P. J. Davis—second year, Metallurgy.
M. Desmarchelier—second year, Applied Chemistry.
W. J. Dilley—second year, Electrical Engineering.
W. W. Donald—third year, Electrical Engineering.
A. J. Edgar—first year, General Science.
W. H. Edmonds—fifth year, Chemical Engineering.
C. W. Eldridge—second year, Production Engineering.
E. J. Elgood—fourth year, Applied Chemistry.
K. M. Evans—first year, Applied Chemistry.
J. R. Fenwick—second year, Civil Engineering.
T. J. Fischof—second year, Mechanical Engineering.
T. M. Florence—fourth year, Applied Chemistry.
P. J. Gannon—first year, Civil Engineering.
R. W. Gilmour—second year, Metallurgy.
J. N. Gordon—third year, Architecture.
B. S. Gow—fourth year, Chemical Engineering.
R. A. Graham—second year, Radio Engineering.
A. H. Gray—third year, Chemical Engineering.
G. E. C. Greenham—first year, Mechanical Engineering.
D. A. Grey—second year, Industrial Chemistry.
R. B. Griffiths—third year, Civil Engineering.
D. S. Hanlon—third year, Radio Engineering.
B. J. Hartnett—fourth year, Applied Chemistry.
K. A. Hassall—third year, Architecture.
J. Hassett—first year, Chemical Engineering.

Commonwealth Scholarships.

Part-time Degree and Diploma Students (Continued).

G. J. Hay—second year, Quantity Surveying.
L. J. Henderson—first year, Chemical Engineering.
G. D. Herman—fourth year, Chemical Engineering.
R. J. Holt—third year, Electrical Engineering.
I. J. Howard—third year, Chemical Engineering.
P. R. Hunt—fourth year, Mechanical Engineering.
D. G. James—first year, Chemical Engineering.
G. J. Jameson—third year, Chemical Engineering.
J. P. Jenkin—third year, Applied Chemistry.
R. B. Jenkin—second year, Applied Chemistry.
H. W. Johnson—first year, Mechanical Engineering.
M. R. Jones—first year, Industrial Chemistry.
A. Jostsons—first year, Metallurgy.
R. H. Kennett—fourth year, Physics.
A. Kumnik—first year, Mechanical Engineering.
C. G. Lambert—third year, Chemical Engineering.
R. H. Y. Lambert—first year, Chemical Engineering.
F. L. Langshaw—second year, Mechanical Engineering.
E. J. Lee—first year, Applied Chemistry.
R. J. Limbert—second year, Radio Engineering.
J. J. Lucas—second year, Applied Chemistry.
B. J. McCauley—third year, Civil Engineering.
G. B. B. McCredie—third year, Civil Engineering.
W. C. McCredie—third year, Civil Engineering.
J. W. S. Mackenzie—third year, Applied Biology.
E. H. Maidment—fourth year, Chemical Engineering.
J. R. Manton—first year, Applied Physics.
W. A. Mathews—third year, Mechanical Engineering.
N. J. Montgomery—first year, Civil Engineering.
H. G. Moore—third year, Mechanical Engineering.
K. R. Mottram—second year, Building.
R. J. Mouat—first year, Industrial Chemistry.
P. Nash—second year, Chemical Engineering.
B. C. Newman—second year, Food Technology.
F. H. Newman—fourth year, Aeronautical Engineering.
R. G. Nicholls—second year, Applied Chemistry.
T. P. O'Rourke—first year, Applied Chemistry.
P. A. E. Pajor—first year, Applied Chemistry.
M. Parkee—first year, Applied Chemistry.
B. V. Passmore—fifth year, General Science.
C. M. de Plater—second year, Metallurgy.
J. A. Pullin—first year, Industrial Chemistry.
T. C. Punnett—second year, Civil Engineering.
H. G. Quail—first year, Optometry.
J. M. Quinn—second year, Applied Chemistry.

Commonwealth Scholarships.

Part-time Degree and Diploma Students (Continued).

R. M. Rabbidge—fourth year, Physics.
L. K. Rae—third year, Civil Engineering.
K. S. Reid—fifth year, Radio Engineering.
R. W. Richards—first year, Industrial Chemistry.
B. W. Roberts—third year, Mechanical Engineering.
R. J. Robinson—third year, Radio Engineering.
M. I. Rollins—first year, Applied Chemistry.
M. L. Rothwell—fifth year, Chemical Engineering.
S. Rytmeister—first year, Mechanical Engineering.
J. O. Sharpe—second year, Mechanical Engineering.
M. S. Shepherd—third year, Radio Engineering.
M. E. Silva—first year, Civil Engineering.
C. M. Simpson—first year, Chemical Engineering.
J. W. Smith—first year, Architecture.
T. G. Souter—third year, Applied Chemistry.
P. L. Spedding—sixth year, Chemical Engineering.
J. J. Stacey—fourth year, Civil Engineering.
A. A. Stapleton—first year, General Science.
F. R. Stead—third year, Radio Engineering.
D. D. Stevenson—first year, Industrial Chemistry.
M. G. Stevenson—third year, Production Engineering.
O. J. Stevenson—fifth year, Aeronautical Engineering.
M. J. Stewart—fourth year, Electrical Engineering.
P. S. B. Stewart—second year, Chemical Engineering.
J. A. Stinson—fifth year, Architecture.
V. J. Summersby—second year, Civil Engineering.
S. C. Symonds—fifth year, Architecture.
G. C. A. Tanner—fifth year, Architecture.
L. F. Taylor—second year, Radio Engineering.
R. P. Vickery—first year, Architecture.
B. Watson—fifth year, Civil Engineering.
R. A. Wells—first year, Industrial Chemistry.
J. D. Wild—third year, Chemical Engineering.
J. G. Williams—sixth year, Architecture.
C. J. Wilson—second year, Optometry.
D. P. Wilson—third year, Civil Engineering.
R. E. Wilson—first year, Chemical Engineering.
A. Wolfe—first year, General Science.
B. P. Wynne—second year, Architecture.

Commonwealth Scholarships.

Newcastle University College.

Full-time Degree Students.

Rosemary S. Babbage—first year, Arts.
M. L. Bailey—first year, Civil Engineering.
P. A. Bolte—second year, Arts.
R. D. Bowden—first year, Arts.
D. P. Chapman—fourth year, Civil Engineering.
Hilary E. Charker—first year, Arts.
E. S. Condon—first year, Civil Engineering.
J. L. Cook—second year, Science.
R. A. Cunningham—third year, Mechanical Engineering.
D. A. Evans—second year, Civil Engineering.
F. C. Evans—first year, Civil Engineering.
J. T. Flanagan—first year, Science.
Thea C. Firth—first year, Arts.
L. R. Gledhill—first year, Arts.
S. Gorbunow—second year, Civil Engineering.
Fay Griffiths—second year, Arts.
J. W. Hemmings—second year, Arts.
Margaret H. Henri—second year, Arts.
R. E. Hicks—second year, Arts.
D. C. Laycock—second year, Arts.
Rosemary Maskey—first year, Arts.
Jennifer M. Mills—first year, Arts.
G. D. Nelson—third year, Civil Engineering.
A. G. Newman—second year, Civil Engineering.
Colette Ormonde—second year, Arts.
T. L. Piggott—third year, Civil Engineering.
Anne D. Renwick—second year, Arts.
Raemah C. Reynolds—first year, Arts.
Margaret E. Saddington—first year, Arts.
Joan L. Sawyers—first year, Arts.
G. H. Simpson—second year, Arts.
Gwendoline M. Tucker—second year, Arts.
J. S. Waddell—second year, Civil Engineering.
J. H. Watson—third year, Mechanical Engineering.
C. A. Whitehead—first year, Arts.
Elaine M. Willets—second year, Arts.
L. R. Williams—fourth year, Mechanical Engineering.
A. C. Wilson—second year, Arts.
Robyn J. Wood—second year, Arts.

Part-time Degree and Diploma Students:

B. L. Adcock—first year, Architecture.
P. H. P. Allen—third year, Chemical Engineering.
A. R. Ambler—first year, Mechanical Engineering.

Commonwealth Scholarships.

Part-time Degree and Diploma Students (Continued).

A. S. Atkins—first year, Arts.
D. P. Buchhorn—first year, Mechanical Engineering.
M. J. Burns—first year, Chemical Engineering.
G. K. Butt—first year, Mechanical Engineering.
D. R. Carr—first year, Industrial Chemistry.
D. B. Cross—second year, Civil Engineering.
R. J. Delbridge—first year, Chemical Engineering.
R. L. Griffin—first year, Electrical Engineering.
J. R. Hammond—first year, Metallurgy.
P. J. Happ—third year, Chemical Engineering.
B. D. Henry—third year, Chemical Engineering.
R. E. Hodge—first year, Arts.
J. M. Kelly—first year, Electrical Engineering.
J. A. Lewis—fourth year, Metallurgy.
W. A. Matthews—third year, Mechanical Engineering.
P. J. Michel—second year, Civil Engineering.
B. E. Milton—first year, Mechanical Engineering.
H. G. Moore—third year, Mechanical Engineering.
J. J. O'Shea—first year, Mechanical Engineering.
B. W. Proudfoot—first year, Chemical Engineering.
C. Resevsky—third year, Mechanical Engineering.
B. J. Suters—first year, Architecture.
J. Wamsley—first year, Metallurgy.

APPENDIX IV.

Degrees Conferred at Kensington on 16th April, 1955.

FACULTY OF SCIENCE.

Doctor of Science Honoris Causa (D.Sc.)

The Honourable John Joseph Cahill, Hon.LL.D. Syd., M.L.A.
The Honourable Robert James Heffron, Hon.D. Litt. Syd., M.L.A.
Maurice Alan Edgar Mawby, F.S.T.C.
Frank Symonds Bradhurst, A.S.T.C.
Norman Edward Jones, A.S.T.C.

Doctor of Philosophy (Ph.D.)

SCHOOL OF APPLIED CHEMISTRY.

Clive Melville Harris, B.Sc., A.S.T.C.
Stanley Edward Mervyn Richard Livingstone, B.Sc., A.S.T.C.

SCHOOL OF CHEMICAL ENGINEERING.

Keith McGregor Bowling, B.Sc., A.S.T.C.
Robert Hawkins Buchanan, B.Sc. Corn.
Robert Charles Philip Cairns, B.Sc., A.S.T.C.
Ronald Kenneth Warner, B.Sc., A.S.T.C.

Master of Science (M.Sc.)

SCHOOL OF APPLIED CHEMISTRY.

Jagdish Chandar Anand, B.Sc. Lahore.
Peter Beckman, F.S.T.C.
Narinder Singh Kapur, M.Sc. Lahore.
David Henry Solomon, B.Sc., A.S.T.C.
Harihara Sreemulanathan, M.Sc. Travancore.
Galina Sugowdz, Dip.Chem.Eng. Kharkov.

SCHOOL OF APPLIED PHYSICS.

Ernest George Bendit, B.Sc. Lond.
Lindsay George Parry, B.Sc. Syd.

SCHOOL OF CHEMICAL ENGINEERING.

Mirza Meftahul Islam Mohsenuddin Ahmed, M.Sc. Dacca.
Robert George Robins, B.Sc.

SCHOOL OF MINING ENGINEERING AND APPLIED GEOLOGY.

Henry Arthur James Donegan, A.S.T.C.

Bachelor of Science (B.Sc.)

SCHOOL OF APPLIED CHEMISTRY.

HONOURS.

Kenneth Richard McDonald Hunt (Class II).
Harry David Locksley (Class II).

PASS.

Kenneth Spencer Basden, A.S.T.C.
Thomas Herbert Davies, A.S.T.C.
Thomas Desmond Flynn, A.S.T.C.
Colin Walter Roch George.
Robert Owen Hellyer, A.S.T.C.
Andrew Gordon Johnston.
Brian John Nickson, A.S.T.C.
Ludvick Peter Rossler.
Graeme Thomas See, A.S.T.C.

SCHOOL OF APPLIED PHYSICS.

HONOURS.

Leslie Alan Cambey (Class I and University Medal).
Alec George Little, A.S.T.C. (Class I).
James Edwin Cleary (Class II).
John Rashleigh Cleary, A.S.T.C. (Class II).

PASS.

Vincent John Manners, A.S.T.C.

School of Chemical Engineering.

HONOURS.

Frank Lawson, A.S.T.C. (Class I and University Medal).
Roger Ernest Conran Beattie, A.S.T.C. (Class I and S.T.C. Union Medal).
William John Bliss, A.S.T.C. (Class II).
Barry Frederick Albert Collins, A.S.T.C. (Class II).
Anthony Edward Dalton (Class II).
John Raymond Harry, A.S.T.C. (Class II).
Richard Edmond Kennedy, A.S.T.C. (Class II).
Norman Thomas Stoddart, A.S.T.C. (Class II).

PASS.

William John Anderson.
Ernest Harold Brent.
Edward Alan Delafield Gwatkin, A.S.T.C.
John Dureau Harland.
Barry Leigh Harrison.
Vincent Lee.
Harold George Robins, A.S.T.C.
Tennyson Rodrigo.

School of Metallurgy.

PASS.

Charles Brian Belcher, A.S.T.C.

School of Wool Technology.

HONOURS.

Kenneth James Whitley (Class I and University Medal).
Geoffrey Hunter Ford (Class II).

PASS.

Donald Bruce Hughes.
Alan James Morrant.

FACULTY OF ENGINEERING.

Doctor of Philosophy (Ph.D.).

School of Electrical Engineering.

Edward Goodman Hopkins, B.E., A.S.T.C.

Bachelor of Engineering (B.E.).

School of Civil Engineering.

HONOURS.

Robert James Morgan (Class I and University Medal).
Kenneth Alan Faulkes (Class II).
Robert Falcon Warner (Class II).

PASS.

John Robert Kemmel Argue.
Peter William Casey.
Peter Chiswell.
Gilbert Douglass Cordingley.
Leslie James Davis.
Ronald Stewart Hunter Duncan.
David John Elliott.
Tautmilis Tom Jumkis.
Geoffrey Monk.
Brian Laurence Rea.
John Vivian Sugden.
Alan MacDonald Wallace.

SCHOOL OF ELECTRICAL ENGINEERING.

HONOURS.

Januzy Adam Dembecki (Class I and University Medal).
Donald Barrie Britten (Class II).
Gerard Gore, A.S.T.C. (Class II).
Heinz Richard Harant, A.S.T.C. (Class II).
Paul Heinz Hirschal, A.S.T.C. (Class II).
Brian William George Penhall (Class II).

PASS.

William Henry Bloxham.
John Erskine Faulks.
Paul Everard Garrity.
Frederick Charles Long.
Michael Richard Hallowes Mathews.
Donald John McBean.
Alan Arthur Partridge.
John William Ray.
Noel Aloysius Reidy.
Brian Philip Rheinberger.
Alfred Rozenauers.
Darrel Savage.
Gordon Brian Sharpe.
Geoffrey James Stutchbury.
Graham Roy Taylor.
Alfred James Widdup.

SCHOOL OF MECHANICAL ENGINEERING.

HONOURS.

George Crawford (Class I and University Medal).
Errol Bruce Hands (Class I).
Arthur Francis Allen, A.S.T.C. (Class II).
Robert Lindsay Home (Class II).
Royde Murray Uebel (Class II).
Arvi Vainomae (Class II).

PASS.

John Cady.
John Eric Moore.
Guntars Saiva.
Harry Lachlan Wallace.

SCHOOL OF MINING ENGINEERING AND APPLIED GEOLOGY.

PASS.

Phillip Edmond Cogar.
Desmond Joseph Hay.
Donald Sloman McCallum.
Piyasiri Senaratne Ranaweera.
Desmond Saunders.

FACULTY OF ARCHITECTURE.

Bachelor of Architecture (B.Arch.).

SCHOOL OF ARCHITECTURE AND BUILDING.

HONOURS.

Anita Barbara Greenslade (Class I and University Medal).
Kevin James Rice (Class I).

PASS.

Ian Davis McKay.
Ronald Meadows.
Kenneth Moreton Newman.

Degrees Conferred at Newcastle University College on 24th March, 1955.

FACULTY OF SCIENCE.

Doctor of Science Honoris Causa (D.Sc.).

William Edward Clegg, M.I.E. Aust., F.C.A.A.
James Kenneth MacDougall, M.I.E.E., A.M.I.E. Aust.

Master of Science (M.Sc.).

SCHOOL OF CHEMICAL ENGINEERING.

William George Kirchner, A.S.T.C.

Bachelor of Science (B.Sc.).

SCHOOL OF APPLIED CHEMISTRY.

HONOURS.

Mervyn Kenneth Cooper, A.S.T.C. (Class II).
James Stewart McNaught, A.S.T.C. (Class II).

PASS.

Frederick William Grahame. A.S.T.C.

School of Chemical Engineering.

HONOURS.

Edmund James Buckman, A.S.T.C. (Class II).

School of Metallurgy.

PASS.

John Barry Lean, A.S.T.C.
Vincent John Moran, A.S.T.C.
Eric Joseph Williams, A.S.T.C.
William James Keith Wright, A.S.T.C.

FACULTY OF ENGINEERING.

Bachelor of Engineering (B.E.).

School of Mechanical Engineering.

HONOURS.

James Norman Beath, A.S.T.C. (Class I).
Robert William Upfold, A.S.T.C. (Class II).

PASS.

Jack Stanley Ticehurst, A.S.T.C.

Degrees Conferred other than at Graduation Ceremonies.

Master of Science (M.Sc.).

School of Wool Technology.

Gopi Chand Taneja, B.V.Sc. Lahore (conferred 12th July, 1954).

Master of Engineering (M.E.).

School of Electrical Engineering.

Krishna Kumar Shrivastava, B.Sc., B.E., Saugar (conferred 9th May, 1955).

APPENDIX V.

Research Activities.

The following research projects were conducted in the various Schools of the University in 1954-55:

School of Applied Physics.

(*a*) As a requirement for the degree of Doctor of Philosophy:—
- (i) Metal spectroscopy—S. C. Baker (Newcastle).
- (ii) Nuclear magnetic resonance—L. O. Bowen (on study leave at St. Louis, U.S.A.).

(iii) Methods of mass spectrometry—L. A. Cambey.
(iv) Theoretical studies relating to the physics of the solid state—E. R. Lanczi.
(v) X-ray crystallographic studies—J. F. McConnell (on study leave at Manchester, England).
(vi) Condensation on and desorption from surfaces in vacuum—J. A. Milledge.
(vii) Sonic and ultrasonic characteristics of timber—H. F. Pollard.

(*b*) As a requirement for the degree of Master of Science:—
(i) Development of high temperatures by use of solar radiation—J. E. Giutronich.
(ii) X-ray application of proportional counters—N. R. Hansen.
(iii) Studies in physiological optics—J. Lederer.
(iv) Some visco-elastic properties of the wool fibre— B. L. Rigby.
(v) Computational aids for X-ray structure determination—A. Schwartz.
(vi) Electronic techniques applied to spectroscopy—W. G. Walker.
(vii) X-ray diffraction application of scintillation counters—J. B. S. Waugh.

(*c*) Other projects:—
(i) Design studies on optical instruments.
(ii) Optical systems for solar furnace.
(iii) Design studies on high vacuum pumps.
(iv) A bidirectional electronic counter.
(v) Spectrographic and X-ray diffraction analysis of materials.
(vi) Development of spectrographic analytical techniques (Newcastle).
(vii) X-ray diffraction in physical metallurgy (Newcastle).
(viii) Transient sounds in organ pipes.

(*d*) Publications:—
(i) A New Development in Aids for Sub-normal Vision. J. Lederer, *Nature*, 1954, *174*, 977.
(ii) A Device for Preparing Gas Mixtures. N. R. Hansen, *J. Sci. Instr.*, 1955, *32*, 75.
(iii) Oxidation Changes in Natural Ilmenite. C. E. Curnow and L. G. Parry, *Nature*, 1954, *174*, 1101.
(iv) Ilmenite from Beach Sands of New South Wales. C. E. Curnow and L. G. Parry, *Proc. Roy. Soc. N.S.W.* (in press).

School of Applied Chemistry.

Department of Physical Chemistry.

(*a*) As a requirement for the degree of Doctor of Philosophy:—

(i) Spectroscopic studies of inter- and intra- molecular association—R. L. Werner.

(ii) Studies in chemical kinetics of gaseous reactions—E. S. Swinbourne.

(iii) The effect of A.C. voltages in polarography—G. S. Buchanan.

(iv) Studies in the colloidal and biological properties of organic insecticides—G. T. Barnes.

(*b*) As a requirement for the degree of Master of Science:—

(i) Correlation between colloidal and mechanical properties of soils—A. Herzog.

(ii) Studies on the chemistry of esters of titanium—G. Winter.

(iii) Partition co-efficients of metal ions between butanol and aqueous hydrochloric acid solutions—R. W. Maclay.

(iv) Fundamental studies of emulsions and suspensions of biologically active compounds with special reference to D.D.T., benzene hexachloride and similar compounds—D. K. O'Neill.

(v) The supercontraction of wool—Miss J. Griffith.

(vi) Formation and properties of monodispersed sulphur soils—P. D. Lark.

(vii) The penetration of D.D.T. through the culticle of the cattle tick—W. J. Roulston.

(viii) Physico-chemical studies of dough—N. W. Tschoegl.

(ix) The absorption of polar organic compounds on titania and other solids—L. Dintenfass.

(*c*) Other projects:—

(i) The intensity of hydroxyl band in the infra-red region near 3 microns.

(ii) The influence of solvents on keot-enol tautomerism.

(iii) Infra-red studies of synthetic resins used in paints.

(iv) Infra-red studies of azo compounds.

(v) The thermotropy of the bis-spiropyrans.

(vi) Spectroscopic studies of boroxols and borates.

(vii) Infra-red spectroscopic studies of naphthylamines.

(viii) The infra-red spectra of organo-titanium compounds.

(ix) A.C. polarography.

(x) Electron microscopy.

(xi) The dielectric properties of complex salts.

(xii) Insect cuticle waxes.

(xiii) Study of the electrical resistance of pure metals as a function of temperature.

(xiv) Determination of wetting agents.

(xv) Preparation of charge controlled colloids.

(xvi) Application of distribution function to various physical properties.

(xvii) Investigation of crystal growth with special consideration of screw dislocations.

(xviii) Urea/formaldehyde resins.

(xix) Surface active agents.

(xx) Vitamin A analysis.

(*d*) Publications:—

(i) A Study of Monolayers at Low Surface Pressures. A. E. Alexander and A. J. G. Allan, *Trans. Faraday Soc.* 1954, *50*, 863.

(ii) Emulsions. A. E. Alexander, *J. Oil and Colour Chemists' Assoc.* 1955, *38*, 129.

(iii) Catalysis on Evaporated Metal Films. Part V. Reactions between cyclo hydrocarbons and deuterium. J. R. Anderson and C. Kemball, *Proc. Roy. Soc. Lond.* 1954, *226*, 472.

(iv) The Catalytic Reaction between Aliphatic Alcohols and Deuterium. J. R. Anderson and C. Kemball, *Trans. Faraday Soc.*, 1955 (in press).

(v) The Electrical Properties of Some Complex Compounds, Part I. P. E. Fielding, *J. Chem. Phys.*, 1954, *22*, 1153.

(vi) The Electrical Properties of Some Complex Compounds. Part II. P. E. Fielding, *J. Chem. Phys.*, 1954, *22*, 1155.

(vii) Electrolytic Engraving on Glass. F. Gutmann and L. W. O. Martin, *J. Sci. Instr.*, 1954, *31*, 221.

(viii) Analysis of Water Soluble Synthetic Soaps. N. W. Tschoegl, *Rev. Pure and Appl. Chem.*, 1954, *4*, 171.

(ix) Direct Current Polarography in the Presence of Alternating Voltages: Part I. Reversible Systems. G. S. Buchanan and R. L. Werner, *Aust. J. Chem.*, 1954, *7*, 239.

(x) Direct Current Polarography in the Presence of Alternating Voltages. Part II. Irreversible Systems. G. S. Buchanan and R. L. Werner, *Aust.J.Chem.*, 1954, *7*, 312.

(xi) The Infra-red Spectra of the Borate Esters. R. L. Werner and K. G. O'Brien, *Aust.J.Chem.*, 1955, (in press).

(xii) The Infra-red Spectroscopic Study of Naphthalene Substitution. R. L. Werner, W. Kennard and D. Rayson, *Aust.J.Chem.*, 1955 (in press).

(xiii) A Novel Method of Cyanoethylation. Part III. The Mechanism of the Reaction. J. Cymerman-Craig, A. Moyle, A. J. C. Nicholson and R. L. Werner, *J.Chem.Soc.*, 1955 (in press).

(xiv) The van der Waals Gas Equation. E. S. Swinbourne, *J.Chem.Educ.*, 1955 (in press).

Department of Inorganic Chemistry.

(*a*) As a requirement for the degree of Doctor of Philosophy:—

(i) Co-ordination compounds of groups IB and VIII with chelate compounds of sulphur—J. R. Backhouse.

(ii) Studies in magnetochemistry—B. N. Figgis.

(iii) Complex carbonyls of platinum—E. A. Magnusson.

(iv) Ditertiary arsine complexes of ruthenium and osmium—G. J. Sutton.

(*b*) As a requirement for the degree of Master of Science:—

(i) Stereochemistry of complexes of nickel—Miss T. Christie.

(ii) Infra-red spectra of inorganic complexes—V. Cranmer.

(iii) Studies of metallic complexes of amino-acids and peptides—B. M. Gatehouse.

(iv) Chemistry of platinum arsine compounds—D. A. Davies.

(v) Stereochemistry of complex compounds—L. C. Lock.

(vi) Co-ordination compounds of molybdenum—M. C. Steele.

(vii) A study of some gaseous reactions of ozone—I. K. Gregor.

(*c*) Other projects:—

(i) Complexes of vanadium.

(ii) Use of radio-isotopes in the study of metallic complexes.

(iii) Studies in the chemistry of metal carbonyl and nitrosyl compounds.

(iv) Investigations into polynuclear complexes.

(v) Crystal structures of compounds of ortho-phenylenebis-dimethyl arsine co-ordinated with metal halides.

(vi) Orbital contribution in magnetic moments of tetrahedral and octahedral cobalt II complexes.

(vii) Conductivities of co-ordination compounds in organic solvents.

(viii) Five and six-covalency in diarsine complexes of PdII, PtII, NiII, FeII and CoII.

(ix) 1, 10-phenanthroline complexes of CuII.

(x) Reaction of halide ions with bis (1, 10-phenanthroline) nickel II and cobalt II in non-aqueous solutions.

(xi) Application of infra-red spectroscopy to the study of the nature of bonds in co-ordination complexes.

(xii) Magnetochemistry of complex fluorides.

(xiii) Magnetic studies with the copper salts of organic acids.

(*d*) Publications:—

(i) Some New Stereochemical Arrangements of Uni- and Ter-valent Gold. C. M. Harris, R. S. Nyholm and N. C. Stephenson, International Conference on Co-ordination Compounds, Amsterdam, 1955.

(ii) The Activation Energy of Electrical Conductivity in Fused Electrolytes. R. L. Martin, *J.Chem.Soc.*, 1954, 3246.

(iii) Normal Alkoxides of Quinquevalent Tantalum. D. C. Bradley, W. Wardlaw and Miss A. Whitley, *J.Chem.Soc.*, 1955, 726.

Department of Analytical Chemistry.

(*a*) As a requirement for the degree of Doctor of Philosophy:—

(i) Paper partition chromatography—E. C. Martin.

(ii) Studies in chromatography—J. R. A. Anderson.

(iii) The effect of substitutents in the naphthalene ring—A. Bryson.

(*b*) As a requirement for the degree of Master of Science:—

(i) Studies on anti-fouling paints—W. E. Goodin.

(*c*) Other projects:—

(i) Chromatographic examination of permissible food dyes.

(ii) The chromatographic examination of metal complexes.

(iii) The application of automatic electronic control to electrode separations.

(*d*) Publications:—

(i) The Kinetics of Racemization of Optically Active Ions of Group VIII Elements. Part IV. N. R. Davies and F. P. Dwyer, *Trans. Faraday Soc.*, 1954, *50*, 820.

(ii) The Chromatographic Examination of Metallic Ions. Part I. J. R. A. Anderson and E. C. Martin, *Anal. Chim. Acta*, 1955 (in press).

(iii) The Chromatographic Examination of Metallic Ions. Part II. Stability of Antimony Halide Compounds. E. C. Martin, *Anal.Chim.Acta*, 1955 (in press).

(iv) The Separation of Zinc from other Elements by the use of Activated Copper. A. Bryson and S. Lenzer-Lowy, *Analyst*, 1954, *79*, 636.

Department of Organic Chemistry.

(*a*) As a requirement for the degree of Doctor of Philosophy:—

(i) Studies on polystictin—J. R. Tetaz.

(ii) The constituents of *Siphonodon australe*—J. L. Courtney.

(iii) The synthesis of organo-phosphorus compounds—Miss M. H. Maguire.

(iv) Oxidation processes in organic chemistry—E. R. Cole.

(v) Studies on the reduction of phenols and related compounds—D. J. McHugh.

(vi) Some studies in the chemistry of cyclitols—P. T. Gilham.

(vii) Investigation of the mechanism of reactions of unsymmetrical substituted phthalic acids and derivatives—K. A. Allen.

(viii) The synthesis of purines and pyrimidines—R. K. Ralph.

(ix) The chemistry of ants—D. L. Ford.

(x) Studies in the oxidation of carbonyl compounds—D. H. Solomon.

(xi) Organic compounds of boron—K. G. O'Brien.

(*b*) As a requirement for the degree of Master of Science:—

(i) Triterpenes from the latex of *Ficus* Spp.—C. J. Miller.

(ii) Some oxidations of sulphur compounds with lead tetra-acetate—H. E. Barron.

(iii) The composition of the essential oil of *Prosthanthera incisa*—L. H. Bryant.

(iv) Studies in the essential oil flora of Australia with special reference to physiological forms—H. C. McKern.

(v) Chemical studies on "stick" ants and related species—H. D. Locksley.

(*c*) Other projects:—

(i) Studies on the freezing point of milk.

(ii) Studies on purines, pyrimidines, glyoxalines and related compounds.

(iii) The chemistry of *Castanospermum australe* ("Black Bean").

(iv) The chemistry of *Emmenospermum alphitonioides* ("Bone Wood").

(v) The chemistry of *Sideroxylon pohlmanianum*.

(vi) Methyl ethers of *meso*inositol.

(vii) Investigations on plants poisonous to stock.

(*d*) Publications:—

(i) Ring-opening of Anhydrosugars of the Ethylene Oxide Type. S. J. Angyal, *Chemistry and Industry*, 1954, 1230.

(ii) The Sommelet Reaction. S. J. Angyal in Adam's *Organic Reactions*, John Wiley and Sons, New York, 1954, VIII, 197.

(iii) Cyclitols Part III Some Tosyl Esters of Inositols. Synthesis of a New Inositol. S. J. Angyal and N. K. Matheson, *J.Amer.Chem.Soc.*, 1955 (in press).

(iv) Organic Oxidation Processes Part I. The Oxidation of Some Methylphenols with Lead Tetra-acetate. G. W. K. Cavill, E. R. Cole, P. T. Gilham and D. J. McHugh, *J.Chem.Soc.*, 1954, 2785.

(v) Organic Oxidation Processes Part II. The Reaction of Lead Tetra-acetate with Toluene and Related Compounds. G. W. K. Cavill and D. H. Solomon, *J.Chem.Soc.*, 1954, 3943.

(vi) The Oxidation of Chromanones and Flavanones with Lead Tetra-acetate. G. W. K. Cavill, F. M. Dean, A. McGookin, Miss B. M. Marshall and A. Robertson, *J.Chem.Soc.*, 1954, 4573.

(vii) Organic Oxidation Processes Part III. The Reactions of Lead Tetra-acetate with some Phenyl Ethers. G. W. K. Cavill and D. H. Solomon, *J.Chem.Soc.*, 1955, 1404.

(viii) The Lactose-Chloride Contribution to the Freezing Point Depression of Milk. E. R. Cole and M. Mead, *J.Dairy Research*, 1955 (in press).

(ix) Synthetic Plant Hormones Part II. Some Glucosides and Aldehydes. Miss M. H. Maguire and G. Shaw, *J.Chem.Soc.*, 1954, 3669.

(x) Synthetic Plant Hormones Part III. Aryloxymethyl Phosphonates. Miss M. H. Maguire and G. Shaw, *J.Chem. Soc.*, 1955, 1756.

(xi) The Reaction of Triethyl Phosphite with Phenyl Magnesium Bromide. Miss M. H. Maguire and G. Shaw, *J.Chem.Soc.*, 1955, 2039.

(xii) Purines, Pyrimidines and Glyoxalines Part I. A New Synthesis of some Glyoxalines and Pyrimidines. G. Shaw and Mrs. G. Sugowdz, *J.Chem. Soc.*, 1955, 1834.

Department of Biological Sciences.

(*a*) As a requirement for the degree of Master of Science:—

(i) Submerged culture techniques and the metabolism of fungi —J. Armstrong.

(ii) The relationship between chemical structure and anti-microbial activity—R. G. H. Barbour.

(iii) Mineral nutrition of fungi—B. R. Hewitt.

(iv) The cytology of the higher fungi—J. Sutton.

(v) Terminal oxidase systems in fungi—L. Faulkner.
(vi) The "greening" bacteria of processed meat—Miss S. Smith.

(*b*) Other projects:—
(i) Agistation-aeration problems in the culture of micro-organisms.
(ii) Aromatic biosynthesis in the higher fungi.
(iii) Physico-chemical aids to the classification of fungi.
(iv) Studies on precursors of azoles and purines.
(v) Synthesis and biological properties of purines and pyrimidines.
(vi) The excretion of purines by spiders.
(vii) The characteristic minor constituents of blue-vein cheeses.
(viii) The effect of salt concentration on the growth of lucerne.
(ix) Anatomical changes in dune plants due to salt spray.
(x) Studies on the *Drosophilidae* of New South Wales.
(xi) Nutritional studies on *Drosophila.*
(xii) Investigations of the pineal apparatus of Australian reptiles.
(xiii) The processing of animal gut.
(xiv) Preservative and anti-fouling treatments for rope shark-nets.

(*c*) *Publications*:—
(i) A New Metabolite of *Polyporus tumulosus Cooke.* G. F. J. Moir and B. J. Ralph, *Chemistry and Industry,* 1954, 1143.
(ii) The Chemistry of Fungi. Part XXIII. Tumulosic Acid. L. A. Cort, R. M. Gascoigne, J. S. E. Holker, B. J. Ralph, Alexander Robertson and J. J. H. Simes, *J.Chem.Soc.,* 1954, 3713.
(iii) Triazoles. Part V. Derivatives of 3-Amino-1:2:4-Triazoles. M. R. Atkinson, A. A. Kimzak, E. A. Parkes, and J. B. Polya, *J.Chem.Soc.,* 1954, 4508.
(iv) The Morphological Status of the New Zealand Geckos, Nautinus and Haplodactylus. E. M. Stephenson and N. G. Stephenson, *Trans.Roy.Soc.N.Z.* (in press).

School of Chemical Engineering.

(*a*) As a requirement for the degree of Doctor of Philosophy:—
(i) The extraction of uranium from uranium ores using nitric acid leach—R. E. C. Beattie.
(ii) The industrial processing of thermoplastics—F. L. Connors.
(iii) Studies in the mass transfer of liquid metals to fused salts —F. Lawson.

(iv) Studies in the use of ion exchange diaphrams for concentrating salt solutions—G. Madgwick.

(v) The effect of conditions of growth on crystal form—E. R. McCartney.

(vi) Gas absorption accompanied by chemical reaction—G. H. Roper.

(vii) Studies in ion exchange and absorption—P. Souter.

(viii) The development of fluorination processes—J. D. Smith.

(ix) Kinetic studies in the complete gasification of coal—N. Stoddart.

(x) Absorption of zinc vapour in molten lead—N. A. Warner.

(xi) Studies in the utilization of gypsum for the production of heavy chemicals—M. S. Zahid.

(*b*) As a requirement for the degree of Master of Science:—

(i) Studies in the polymerisation of vinyl chloride—P. Antoniades.

(ii) The fluidised roasting of sulphide ores—F. W. Ayscough.

(iii) Phase equilibrium and solid state reaction in the system Al_2O_3-ZrO_2-SiO_2—H. Fowler.

(iv) The design of stirrer shafts—C. H. Hopkins.

(v) The causes and mitigation of the corrosion of a town's gas distribution systems—T. M. Hughes.

(vi) Studies in the fluo-solid conversion of gypsum to its dehydration products—C. H. Hunt.

(vii) Studies in fluorination—J. Macmillan.

(viii) Studies in heat transfer and sublimation at low pressure—J. Norman.

(ix) Side-chain chlorination of toluene—J. S. Ratcliffe.

(x) The application of optical methods to crystal nucleation and growth—C. Samways.

(xi) Studies on the extrudability of thermoplastic resins—N. T. Sorokin.

(xii) Atmospheric pollution in N.S.W. industrial areas—J. L. Sullivan.

(xiii) The formation of resin-alum size on paper—N. A. Whiffen.

(xiv) The science of spray drying—J. Willis.

(*c*) Other projects:—

(i) Investigation of scale formation in alcohol distilleries.

(ii) Studies in the electro-fluorination of pyridine and its homologues.

(iii) The motion of single bubbles rising in liquids.

(iv) The gasification of high-sulphur coal.

(*d*) Publications:—

(i) Largest Welded Polythene Pipe Line in Australia. F. L. Connors, *Aust. Plastics J.*, November, 1954.

(ii) Agricultural Uses for Polythene Pipe. F. L. Connors, *Aust. Plastics J.*, December, 1954.

(iii) Cracking of Stressed Polythene due to Chemical Environment. F. L. Connors, *Aust. Plastics J.*, December, 1954.

(iv) Polythene Film for Packaging. Part I. F. L. Connors, *Aust. Plastics J.*, December, 1954.

(v) Polythene Film for Packaging, Part II. F. L. Connors, *Aust. Plastics J.*, January, 1955.

(vi) Properties and Engineering Applications of Nylon. F. L. Connors, *Aust. Plastics J.*, January, 1955.

(vii) Polyester Resins. Part I. F. L. Connors, *Aust. Plastics J.*, February, 1955.

(viii) Glass Fibre Materials. Part II. F. L. Connors, *Aust. Plastics J.*, March, 1955.

(ix) Fabrication Methods. Part II. F. L. Connors, *Aust. Plastics J.*, April, 1955.

(x) Engineering Properties. Part IV. F. L. Connors, *Aust. Plostics J.*, June, 1955.

(xi) Calcul des pertes de charge dans les tubes en polyetheylene. F. L. Connors, Industrie des Plastiques Mod. (Paris), May, 1955, 7, 5.

Department of Food Technology.

As a requirement for the Degree of Master of Science:—

(i) Some aspects of the bleaching of fats—M. S. Chaudhri.

(ii) Some aspects of dehydration—V. G. Hatwalne.

SCHOOL OF METALLURGY.

(*a*) As a requirement for the degree of Doctor of Philosophy:—

(i) A study of problems relating to the production of reactive metal alloy powders—R. C. Robins.

(*b*) As a requirement for the degree of Master of Science:—

(i) An investigation of some of the factors affecting the welding of titanium—J. M. Newburn.

(ii) The technical development and prospects of the Australian copper industry—L. A. Lyons.

(iii) The use of copper as an additive to, and as a substitute for, nickel in some stainless steels—C. G. H. Cooke.

(iv) A study of gas-metal recation kinetics—S. E. Coalstad.

(v) Some aspects of the recovery of manganese from open hearth furnace slags—J. A. Gregory.

(vi) The detection by metallographic means of small amounts of plastic strain in metals, with particular reference to the effect of temperature—M. Hatherly.

(vii) The effect of aluminium and prior structure on spheroidisation of cementite in relation to plain carbon steels—M. W. Tayler.

(viii) The effect of "barriers" such as slip lines, deformation bands and low angle boundaries on the propagation of martensite plates—T. W. Barnes.

(ix) Deformation of body-centred cubic metals—J. E. McLennan.

(x) Research work in the field of electro-plating—B. W. Armstrong.

(*c*) Other projects:—

(i) Crystallographic relationships in body-centred cubic to orthorhombi transformations, e.g., titanium.

SCHOOL OF MECHANICAL ENGINEERING.

(*a*) As a requirement for the degree of Doctor of Philosophy:—

(i) The derivation and evaluation of design data for rubber components under shear, compressive and complex loading systems—A. J. Carmichael.

(ii) The design, construction and testing of a mechanical pumping plant for handling liquid sodium—J. Hirschhorn.

(iii) Hydraulic model studies related to erosion problems at Stockton Beach—A. K. Johnston (Newcastle).

(iv) Automatic control applied to steam power plant—R. J. O'Connor.

(*b*) As a requirement for the degree of Master of Engineering:—

(i) The mechanical properties of rubber under slow cyclic loading conditions—E. Betz

(ii) Technical problems in "make-ready" printing—H. A. Borchardt.

(iii) The design, construction and experimental testing of a high pressure quick-steaming boiler—K. Bridger.

(iv) Improvement and application of the gas dynamics analogy—R. A. Bryant

(v) Transitory conditions in flow processes involving energy transfer—R. E. Corbett

(vi) Dispersal of dust particles from industrial stacks—G. Csanady.

(vii) The performance of extended surface heat exchangers—R. A. Dane.

(viii) Heat transfer in evaporative heat exchanger—R. T. B. McKenzie.

(ix) The application of advanced photographic techniques to engineering research—R. G. Robertson.

(x) Small scale utilisation of solar energy—C. M. Sapsford.

(xi) Surface finish standards—H. Selinger.

(xii) Water and/or pilot injection for diesel machines—D. Weiss.

(*c*) Other projects:—

(i) Philosophical studies in kinematics of mechanisms.

(ii) Study of tillage implements; farm mechanisation.

(iii) Research on fan performance.

(iv) Construction of electronic computer.

(*d*) Publications:—

(i) Acceleration Centre Curves. N. A. Rosenauer, *Aust.J.Appl. Sci., June* 1954, *5,* 2.

(ii) Complex Variable Method for Synthesis of Four-bar Linkages. N. A. Rosenauer, *Aust.J.Appl.Sci.,* December 1954, *5,* 4.

(iii) Determination of the State of Velocity and Acceleration in the Stephenson's Link Motion. N. A. Rosenauer, *J.Inst.Eng.* (*Aust.*), March 1955, *27,* 3.

(iv) Druckverteilung und Abnutzung von Backenbremsen. J. Hirschhorn, Dissertation submitted to the Vienna University of Technology, February 1955.

(v) Instruction and Research in Mechanical Engineering with special reference to Fluid Mechanics. R. E. Corbett, Dissertation submitted to Imperial College of Science and Technology, London, July 1954.

(vi) Stereo a Century Ago. R. G. Robertson, *J.Phot.Soc.Amer.,* 1954, *20,* 12, 36.

(vii) Lesser-known Methods for Single-lens Stereoscopy. R. G. Robertson, *J.Phot.Soc.Amer.,* 1955, *21,* 3, 42.

School of Electrical Engineering.

(*a*) As a requirement for the degree of Doctor of Philosophy:—

(i) A study of non-linear control systems—R. M. Huey.

(*b*) As a requirement for the degree of Master of Engineering:—

(i) The impulse testing of transformers and associated phenomena—E. G. Williams.

(ii) The application of electronic techniques to metrology—H. A. Ross.

(iii) Some effects of control grid current in radio receiving valves on associated circuits—E. Watkinson.

(iv) Applications of magnetic modulation—R. G. Smart.

(v) A study of metadynes—W. H. Arnold.

(vi) Some aspects of magnetic amplifiers—B. S. Omelchuk.
(vii) A transistor-operator frequency standard—G. J. Parker.
(viii) Design of protective fittings for string insulators—E. Buckler.
(ix) Investigation of ferro-electric materials—P. T. Bason.

(*c*) Other projects:—
(i) The construction of an electronic analogue computer for the solution of linear and non-linear differential equations.
(ii) The construction of a simulator to facilitate the design of nuclear reactors.
(iii) Development of an electrical analogue for a synchronous machine under grant from the Electrical Research Board.
(iv) The application of thermionic valves to automatic control problems.
(v) Development of recurrent surge generator.

(*d*) Publications:—
(i) Self-Heating Triode for Voltage Stabilisation. E. G. Hopkins, *Wireless Engineer*, July, 1954.
(ii) An Automatic Course Plotter. D. J. Cole and R. V. Single, *Aust. J. Appl. Sci.*, September, 1954, *5*, 3, 221.
(iii) R-F Filters and Tuning of Transmitters with Amplitude Modulation. R. Guertler, *Telefunken J.*, June, 1955, *28*, 108.

School of Mining Engineering and Applied Geology.

(*a*) As a requirement for the degree of Doctor of Philosophy:—
(i) The nature and genesis of the ore deposits of the Mole Tableland with special reference to tin and tungsten—L. J. Lawrence.
(ii) An investigation into the causes of landslides and their relationship to geological formations and structures, with special reference to conditions in the Illawarra District—F. N. Hanlon.
(iii) A gravity survey of the Sydney Basin—H. N. Hancock.
(iv) Problems associated with the cleaning of fine coal and related aspects in connection with dust suppression in coal mines—R. G. Burdon.

(*b*) As a requirement for the degree of Master of Engineering:—
(i) Petrographic studies of New South Wales building stones with special reference to physical properties—H. G. Golding.
(ii) Correlation of the Permian Horizons of New South Wales—H. O. Fletcher.

(iii) Deutric mineralisation of the Prospect Intrusion—R. O. Chalmers.

(iv) A comparative study of the trace elements and accessory minerals of the coal seams of the Hunter Valley and their significance—A. S. Ritchie.

(v) Geology of radio-active deposits with special reference to New South Wales—E. O. Rayner.

(*c*) Other projects:—

(i) Investigation of uranium mineralisation in the Mt. Isa-Cloncurry District, Qld.

(ii) Investigation of the mineralogy of some rare uranium ores from Mt. Isa, Qld.

(iii) A gravitational investigation of earth tidal effects at Sydney, N.S.W.

(iv) An investigation of the mineralogy and physical properties of the ceramic clays of New South Wales.

(v) Determination of the mineralogy of some triassic shales of New South Wales as a possible means of correlation.

(vi) A determination of the heavy mineral distribution in current bedded sandstones.

(vii) Investigation of air-flow problems and dust suppression measures at Coal Cliff Colliery, N.S.W.

(viii) Investigation and solution of air-flow problems at the State Mine, Lithgow, N.S.W.

(ix) Studies in the methods of concentration of uranium ores for the Australian Atomic Energy Commission.

(x) Concentration tests on copper ores from New Guinea.

(xi) Field and laboratory investigation of pyrophyllite and related economic minerals.

(xii) Investigation on spontaneous cracking of basalt.

(xiii) Occurrence of millerite (nickle sulphide) in Permian shales near Gosford, N.S.W.

(xiv) Occurrence of vivianite (iron phosphate) in alluvials near Cobargo, N.S.W.

(*d*) Publications:—

(i) Permian Coal Measures of the Stroud-Gloucester Trough. F. C. Loughnan, *Proc. Roy. Soc. N.S.W.* (in press).

(ii) Concretions and Associated Mineralisation in Triassic Beds near Gosford. H. G. Golding, *Aust. J. Sci.*, 1955, *17*, 4.

(iii) Uranium Mineralisation in the Mt. Isa-Cloncurry District. L. J. Lawrence, *Proc. Roy. Soc. Qld.* (in press).

School of Civil Engineering.

(*a*) As a requirement for the degree of Doctor of Philosophy:—

(i) Investigations of stresses in concrete members—H. Hodson.

(ii) The interaction of superstructure and its foundation— G. J. Haggarty.

(iii) The analysis of stress in flat slabs—A. S. Hall.

(iv) Characteristics of orifice flow—H. R. Vallentine.

(*b*) As a requirement for the degree of Master of Engineering:—

(i) The construction and design of thin concrete shells using pre-stressing methods—H. J. Brettle.

(ii) Analysis and application of thin concrete slabs pre-stressed in two directions with special reference to deck systems and roof shells—P. S. Balint.

(iii) Photo-elastic methods for the investigation of stresses in soils—A. G. Douglas.

(iv) The investigation of laminated timber structural members—J. L. Jenkins.

(v) Stress analysis by experimental methods—D. Axelrad.

(vi) Behaviour of slabs—R. Woodhead.

(vii) Investigations into electro-chemical hardening of soils, and its effect upon shear characteristics—A. F. S. Nettleton.

(viii) Techniques in civil engineering construction—P. W. S. Ryan.

(ix) Screening of aggregates—B. W. Gould.

(x) The effect of natural pozzolans and the properties of mortars and concretes—G. B. Welch.

(xi) Improved methods of urban drainage design—I. R. Wood.

(xii) Aerodrome drainage design—J. R. Burton.

(xiii) Estimation of flood flow on small rural catchments—G. Coulter.

(xiv) Short range flood forecasting—P. Armstrong.

(xv) Adequacy of hydrologic data in New South Wales—J. R. Learmonth.

(xvi) Relation of long term yield to climatic characteristics of catchments—E. Laurenson.

(xvii) Synthetic unit graphs—P. Fekete.

(xviii) Pore pressures in earth structures—B. Slavin.

(*c*) Other projects:—

Hydrology.

(i) Methods of flood estimation.

(ii) Relationship between rainfall and runoff on small experimental catchments.

Materials.

(i) Physical and chemical properties of soils.
(ii) Use of fly-ash as a pozzolan for concrete.
(iii) Non-reactance of cement with local soils used for cement-stabilised road pavements.
(iv) Electro-chemical hardening in soil stabilisation.
(v) Lateral pressure on retaining walls exerted by stabilised backfill.
(vi) Methods of testing for concrete durability.
(vii) Mechanical and petrological properties of Australian rocks (in conjunction with School of Mining Engineering and Applied Geology).
(viii) Analysis of curved rib and roof design for underground power station structures by means of analytical and mathematical methods (in conjunction with Snowy Mountains Hydro-Electric Authority).
(ix) Critical forces for anisotropic plates and plates beyond the elastic range.
(x) Cement deterioration.

Structures.

(i) Determination of stresses in deep beams by photo-elastic methods.
(ii) Torsional properties of polygonal shafting and corresponding hub connections.
(iii) Flexural properties of pre-stressed concrete beams.
(iv) Load testing of pre-stressed concrete structures.
(v) Buckling of rectangular plates uniformly compressed in two perpendicular directions with one free edge and elastically restrained against rotation along opposite edge.
(vi) Buckling of rectangular plates with two free edges.
(vii) General method of obtaining deflection curve of beams.

Surveying.

(i) Elastic properties of steel measuring bands.

Hydraulics.

(i) Sediment entrainment in closed conduits.
(ii) Air water mixtures.
(iii) Simplified methods of channel profile computation.

Publications:—

(i) Basic Principles of Urban Drainage Design. C. H. Munro, *J. Inst. Eng.* (*Aust.*), (in press).
(ii) Areal Coverage of Pluviometers. J. R. Learmonth, *J. Inst. Eng.* (*Aust.*), 1954, *26*, 10-11, 224.
(iii) Derivation of Infiltration Indices. E. Laurenson, *J. Inst. Eng.* (*Aust.*), 1954, *26*, 10-11, 225.

(iv) Automatic Integrator for Calculation of Excess Rainfall. J. R. Learmonth, *J. Inst. Eng. (Aust.)*, 1954, *26*, 10-11, 230.

(v) Development of Unit Hydrographs. P. Fekete, *J. Inst. Eng. (Aust.)*, 1954, *26*, 10-11, 234.

(vi) Buckling of Rectangular Plates Uniformly Compressed in the Vertical Direction with the Upper Edge Free. P. Shuleshko, *J. Inst. Eng. (Aust.)*, *25*, 4-5, 58.

(vii) High-Lift Construction of Concrete Dams. P. W. S. Ryan, *Commonwealth Engr.* (in press).

(viii) Reinforced Concrete Columns in Bending and Compression. A. S. Hall, *Commonwealth Engr.*, 1955, *42*, 11, 432.

(ix) Hydraulic Research in the U.S.A. H. R. Vallentine, *Australasian Engr.*, July, 1954, 80.

(x) Sand Transportation in a Pipe. H. R. Vallentine, *Commonwealth Engr.*, 1955, *42*, 9, 349.

(xi) Civil Engineering Construction. J. M. Anthill and P. W. S. Ryan (in press), Angus & Robertson Ltd., Sydney.

SCHOOL OF WOOL TECHNOLOGY.

(*a*) As a requirement for the degree of Doctor of Philosophy:—

(i) Practical application of methods of selection promising to yield the greatest improvement in wool production—E. M. Roberts.

(ii) Nature and causes of dental irregularities in sheep—C. L. Goldstone.

(*b*) As a requirement for the degree of Master of Science:—

(i) The importance of differences between observers in some criteria used in sheep breeding experiments—S. S. Y. Young.

(ii) An investigation into stripping problems in dipping—G. H. Ford.

(iii) A chemical and histological study of fellmongering—K. J. Whiteley.

(iv) Investigations of the relationship between fibre length and fibre diameter amongst several breeds of sheep, and at high and low levels of nutrition—K. Ozcan.

(*c*) Other projects:—

(i) Fleece measurement for flock improvement.

(*d*) Publications:—

(i) A Sheep Ear Clip. E. M. Roberts, *Aust. Vet. J.* (in press).

(ii) Flock Testing, A Means of Wool Improvement. E. M. Roberts, *Keyline Foundation Journal*, 1955 (in press).

(iii) Flock Testing. E. M. Roberts, pamphlet, June, 1955.

(iv) *Wool Technology*, Vol I, 1954.

(v) *Wool Technology*, Vol. II, 1955 (in press).

School of Mathematics.

(*a*) As a requirement for the degree of Doctor of Philosophy:—

(i) A problem in non-linear strain and its possible geophysical application—A. Keane.

(*b*) As a requirement for the degree of Master of Science:—

(i) Some new types of quality control charts designed to reduce the amount of inspection and the sensitivity to non-normality of the parent distribution—H. Weiler.

(ii) The flexure of beams on an elastic foundation—I. L. Rose.

(iii) Wave propagation in a stratified medium—B. E. Clancy.

(*c*) Other projects:—

(i) Wave propagation in anistropic media.

(ii) Use of booster fans in mine airways and related problems (in collaboration with the School of Mining Engineering and Applied Geology).

(iii) The solution of certain non-linear ordinary and partial differential equations.

(iv) In connection with the research work of this and other Schools, the following topics have been dealt with in the Computation Laboratory:

Electron density calculations;
Magnetic field of a rectangular coil;
Lattice calculations (crystal structure);
Factor analysis of psychotic patients' test results;
Concrete shell structure calculations;
Specific heat curve fitting;
Matrix inversions;
Ventilation in mines;
Construction of tables for Australian Standards Specifications.

(*d*) Publications:—

(i) On a Paper by J. L. Griffith. G. Bosson, *Proc. Roy. Soc. N.S.W.*, 1954, *88*, 12.

(ii) A Theorem Concerning the Asymptotic Behaviour of Hankel Transforms. J. L. Griffith, *Proc. Roy. Soc. N.S.W.*, 1954, *88*, 61.

(iii) On the Asymptotic Behaviour of Hankel Transforms. J. L. Griffith, *Proc. Roy. Soc. N.S.W.*, 1954, *88*, 71.

(iv) On Hankel Transforms of Functions Zero Outside a Finite Interval. J. L. Griffith, *Proc. Roy. Soc. N.S.W.* (in press).

(v) The Gravitational Compression of an Elastic Sphere. A. Keane, *Aust. J. Phys.*, 1955, *8*, 167.

(vi) The Effect of Leakage on Mine Ventilation. A. Keane (with W. Peascod), *Colliery Eng.*, 1955, *32*, 207.

(vii) The Use of a Booster Fan to Reduce Leakage in Mine Ventilation, Part II. A. Keane (with W. Peascod), *Colliery Eng.* (in press).

(viii) Tests of Statistical Hypotheses. J. B. Douglas, *Aust. J. Psych.*, June, 1955, *7*, 1.

(ix) Fitting the Neyman Type A (Two Parameter) Contagious Distribution. J. B. Douglas, *Biometrics*, June, 1955, *11*, 2.

School of Architecture and Building.

(*a*) As a requirement for the degree of Master of Architecture:—

(i) The influence of sunlight and daylight on the design of buildings—R. O. Phillips.

(ii) The critical analysis and evaluation of contemporary design—P. Spooner.

(iii) Economy of materials in multi-storey structures—F. Woolard.

(iv) Design of auditoria with particular reference to acoustics—Miss A. Greenslade.

(*b*) Publications:—

(i) The Future of Architectural Education. F. E. A. Towndrow, *Architectural Design*, 1955, *25*, 219.

(ii) The Natural Lighting of Classrooms. G. H. B. McDonell, *Architecture*, 1955, *44*, 1, 24.

(iii) Revision and Revaluation of European Architecture. F. E. A. Towndrow, paper to R.A.I.A., on 12th April, 1955.

School of Humanities and Social Sciences.

Economics and Economic History.

(i) The Yorkshire woollen and worsted industry, 1800-1850—R. M. Hartwell. (Thesis submitted to the University of Oxford, for the award of Degree of Doctor of Philosophy (D.Phil)., 1955.)

(ii) Economics of hire purchase in Australia, 1945-55—N. Runcie.

(iii) Bond yields in Australia, 1945-55—N. Runcie.

(iv) Special Accounts as a means of central bank control, 1941-55—N. Runcie.

(v) Popular political economy in Australia, 1927-37—H. F. Cruise.

(vi) Co-operatives in the South Pacific Area—H. F. Cruise.

(vii) The theory of industrial location—D. Donaldson.

(viii) Bibliography of industry studies by economists and economic historians—D. Donaldson.

(ix) The economics of the sheep and wool industries—F. M. Dunn.

(x) Theory of rent—F. M. Dunn.

Publications:—

(i) The Pastoral Ascendancy 1820-1850. R. M. Hartwell, in *Australia, A Social and Political History,* Sydney, 1955.

(ii) Reviews of N. Nixon's *The Pioneer Bishop in Van Diemen's Land, 1843-1863* and K. H. Dougherty's *A Story of a Pioneering Family in Van Diemen's Land.* R. M. Hartwell, *J. Roy. Hist. Soc.,* November, 1954, *40,* II.

(iii) Hire Purchase in Australia. N. Runcie and P. S. Shrapnell, *Economic Society of Australia and New Zealand Monograph, 180,* 1955.

(iv) Hire Purchase—Benefit or Danger to the National Economy? N. Runcie, O. D. Bisset and J. Ellis, *Electrical Weekly, 39,* 22.

(v) Review of J. H. Adler, E. R. Schlesinger and E. Van Westerborg's *The Pattern of United States Import Trade since 1923.* N. Runcie, *The Economic Record, 29,* 56.

(vi) Review of Agatha L. Chapman's *Wages and Salaries in the United Kingdom, 1920-1938.* N. Runcie, *The Economic Record, 29,* 57.

(vii) Fisheries Co-operatives. H. F. Cruise, *South Pacific Commission Quarterly Bulletin* (accepted for publication).

English.

(i) Joyce Cary, Novelist—R. G. Geering. (Thesis submitted to the University of Sydney for the award of Degree of Master of Arts, 1955.)

(ii) Work for Diploma in Speech and Drama, Sydney Conservatorium, 1955 (phonetics, speech therapy, voice production, speech technique, dramatic history, etc.)—O. N. Burgess.

(iii) A critical account of the novels of D. H. Lawrence—O. N. Burgess.

(iv) The history of English criticism in the 19th and 20th centuries—O. N. Burgess.

(v) Satire—P. K. Elkin.

(vi) A comparative study in modern fiction—George Orwell and Arthur Koestler—R. G. Geering.

(vii) Jargon in the social sciences—A. M. Ginges.

(viii) The Australian novel: a study of the developments and directions of the Australian novel between the Wars, and more recently, with special attention to the novelists of social criticism—A. M. Ginges.

Publications:—

(i) An Anthology of Australian Narrative Passages. P. K. Elkin and O. N. Burgess (in press), Shakespeare Head Press, Sydney.

(ii) Stories Within Stories. P. K. Elkin, *Southerly*, 1954, 2.

(iii) Comment on R. G. Howarth's *Literature of the Theatre: Marlowe to Shirley*. P. K. Elkin, *Southerly*, 1955, 1.

(iv) Review of Brent of Bin Bin's *Cockatoos*. P. K. Elkin, *J. Roy. Aust Hist. Soc.*, April, 1955, *40*, V.

(v) Edition of Shakespeare's *Henry IV, Part I*. O. N. Burgess (in press), Consolidated Press, Sydney.

History and Government.

(i) Political groupings in New South Wales, 1872-89: a study in the workings of responsible government—A. W. Martin. (Thesis submitted to the Australian National University for the award of Degree of Doctor of Philosophy, June, 1955.)

(ii) New South Wales Labour Movement, 1870-1900. N. B. Nairn. (Thesis submitted to the University of Sydney for the award of Degree of Master of Arts, 1955.)

(iii) The late eighteenth century—G. A. Cranfield.

(iv) The development of the provincial newspaper, 1700-1760—G. A. Cranfield.

(v) The structure of Victorian politics, 1860-90—S. M. Ingham.

(vi) Aspects of late nineteenth century politics in New South Wales—A. W. Martin.

(vii) New South Wales Labour Movement, 1900-1940—N. B. Nairn.

(viii) W. G. Spence and the 1890 Maritime Strike in New South Wales—N. B. Nairn.

(ix) Australia, New Zealand and the South-West Pacific—K. W. Robinson. (Book in preparation for London University Press.)

(x) Historical geography of the Sydney District, 1820-1850—K. W. Robinson.

(xi) Research on Australian Federal Parliamentary History—with special reference to Speakership, Parliamentary Procedure, etc.—Miss R. E. Atkins.

Publications:—

(i) The Concept of the Just War. G. A. Cranfield, *The Australian Outlook, 9*, 2, 1955.

(ii) The Teaching of History in a University of Technology. G. A. Cranfield, paper to the History Teachers' Association of New South Wales, April, 1955.

(iii) William McMillan—A Merchant in Politics. A. W. Martin, *J. Roy. Aust. Hist. Soc.*, March, 1954, *40*, IV.

(iv) Freetrade and Protection Parties in New South Wales. A. W. Martin, *Historical Studies, Australia and New Zealand, 6*, 23.

(v) Rural New Zealand. K. W. Robinson, *Current Affairs Bulletin, 15*, 3, 1954.

(vi) South-Western Australia. K. W. Robinson, *Current Affairs Bulletin, 14*, 10, 1954.

(vii) Cattle in Tropical Australia. K. W. Robinson, *New Zealand Post-Primary School Bulletin, 8*, 7.

(viii) Sydney in the 1954 Census—A Preliminary Survey. K. W. Robinson, Geographical Society of New South Wales, Paper 54/3, 1954.

Philosophy.

(i) The work of Michael Faraday, with special reference to the *field* concept—J. B. Thornton.

(ii) The functions and forms of scientific explanations—J. B. Thornton.

(iii) A study of the concept of "occupancy" of space (as a consequence of the definition of an individual by its position in space-time)—D. C. Stove.

(iv) A study of substance and causality, in relation particularly to the concept of activity—R. S. Walters.

Publications:—

(i) George Simon Ohm. J. B. Thornton, *Aust. J. Sci.*, 1954, *17*, 2, 43.

(ii) Chemical Explanations. J. B. Thornton, *New South Wales University of Technology Engineering Faculty Yearbook*, 1954-55, 31.

(iii) Science in Schools, Part I.. J. B. Thornton, *The Australian Highway*, 1955, *37*, 1. (Parts II and III in press.)

(iv) Two Problems about Individuality. D. C. Stove, *Aust. J. Phil.*, 1955, *18* (in press).

(v) Review of N. Goodman's *Fact, Fiction and Forecast*. D. C. Stove, *Aust. J. Phil.*, 1955, *18* (in press).

THE NEW SOUTH WALES

STATUTORY ACCOUNT FOR FINANCIAL YEAR

GENERAL

EXPENDITURE.

	£	s.	d.	£	s.	d.
Salaries and Staff Charges	877,644	11	7			
Payroll Tax	21,949	18	2			
Employers' Superannuation Contribution	37,480	12	0			
				937,075	1	9
Teaching Departments—General Maintenance and Purchase of Apparatus				89,285	12	4
Books, Periodicals and Pamphlets				20,172	1	10
Repairs and General Maintenance of Buildings				19,343	8	3
Power, Lighting and Heating				9,806	3	8
Printing, Stationery, Postages, etc.				8,703	16	2
Plant				6,109	3	7
Administrative Travelling and Other Expenses				5,461	11	2
Study Leave—Grants Towards Travelling Expenses				5,452	5	7
Telephones, Advertising				5,071	8	11
Examination Expenses				5,046	17	5
Expenses of New Appointments				4,964	19	0
Rates and Insurances				3,605	9	2
Transfer of Schools to Kensington				2,277	13	2
Expenses of Motor Vehicles				1,112	8	2
Contribution to Vice-Chancellors' Secretariat				550	0	0
Contribution to Applied Arts Fund				500	0	0
Contribution to Vice-Chancellors' Committee for Inter-Universities Conference				500	0	0
Contribution to the Chair of Town and Country Planning—Sydney University				375	0	0
Furniture				244	5	9
Bursaries				236	6	8
Miscellaneous Expenses				1,830	14	7
				£1,127,724	7	2

SPECIAL PURPOSES
(As per Schedule "A"

	£	s.	d.
Expenditure	77,911	0	3
Balances 30th June, 1955—*Carried forward*	222,532	17	9
	£1,428,168	5	2

J. P. BAXTER, Vice-Chancellor.

The books and accounts of the New South Wales University of Technology have
and New South Wales University of Technology Act, 1949–1955.

In my opinion the above is a correct statement of the income and expenditure of
special purposes grants as at 30th June, 1955, according to the best of my information

Sydney, 11th November, 1955.

UNIVERSITY OF TECHNOLOGY

1st JULY, 1954, TO 30th JUNE, 1955.
FUNDS.

INCOME.

	£ s. d.	£ s. d.
Fees ...	94,454 0 3	
Other Income ...	3,649 0 1	
		98,103 0 4
Commonwealth Assistance Grants—		
Basic Grant ...	79,529 0 0	
Second Level Grant ...	77,076 0 0	
		156,605 0 0
State Grants (Consolidated Revenue) ...		873,016 6 10
		£1,127,724 7 2

GRANTS.
attached.)

Balances, 1st July, 1954—*Brought forward* ...	180,215 5 3
Income Received ...	120,228 12 9
	£1,428,168 5 2

E. H. DAVIS, Accountant.

been audited in accordance with the provisions of Section 43 of the Technical Education

the University for the year ended 30th June, 1955, and of the unexpended balances of and explanations given to me and as shown by such books and accounts.

(Sgd.) W. J. CAMPBELL,
Auditor-General of New South Wales.

THE NEW SOUTH WALES

STATEMENT OF BALANCES AND

LIABILITIES.

	£ s. d.	£ s. d.
CAPITAL FUNDS—		
Treasury General Loan Account—		2,645,921 4 2
Provided to 30th June, 1954	1,845,921 4 2	
Provided in 1954–55	800,000 0 0	
VESTMENTS—		
Vestment from Commissioner for Government Transport of an Area of 6 Acres, 3 Roods, 16 Perches for Hostel in Anzac Parade, Kensington		1,795 0 0
		£2,647,716 4 2
TREASURY GRANTS FOR WORKING CAPITAL ...		5,500 0 0
SPECIAL PURPOSES GRANTS (as per Schedule "A" attached)		222,532 17 9
INVESTED FUNDS		850 0 0
Frank W. Peplow Prize Fund	250 0 0	
Sydney Technical College Award Fund	600 0 0	
(See Contra)		
		£2,876,599 1 11

J. P. BAXTER, Vice-Chancellor.

UNIVERSITY OF TECHNOLOGY

ASSETS AS AT 30th JUNE, 1955.

ASSETS.

	£ s. d.	£ s. d.
BUILDINGS (AT COST)		1,694,426 12 11
On Land Vested for University Purposes	1,409,447 17 0	
On Department of Technical Education Land—Contribution toward Cost of Construction and/or Reconstruction	225,469 0 9	
Transport Migrant Hostel, Anzac Parade, Kensington ...	59,400 0 0	
Manly Hydraulics Laboratory	109 15 2	
LAND (AT COST)		1,795 0 0
PLANT AND EQUIPMENT (AT COST)		768,301 7 9
FURNITURE (AT COST)		115,850 5 6
		£2,580,373 6 2
RURAL BANK OF N.S.W.—DAKING HOUSE		290,002 15 9
General Loan Account	67,342 18 0	
Special Purposes Funds	222,532 17 9	
Advances	127 0 0	
RURAL BANK OF N.S.W.—NEWCASTLE		4,000 0 0
SPECIAL DEPOSITS ACCOUNT 1228		1,000 0 0
SUNDRY ADVANCES		373 0 0
INVESTMENTS (AT COST)		850 0 0
Inscribed Stock—M.W.S. & D. Board, Sydney—		
Loan No. 129 4½% 1st March, 1965	250 0 0	
Loan No. 134 4½% 1st June, 1965	600 0 0	
(See Contra)		
		£2,876,599 1 11

E. H. DAVIS, Accountant.

THE NEW SOUTH WALES

SCHEDULE

SPECIAL PURPOSES GRANTS EXPENDITURE

Source of Grant, etc.	Balance Brought Forward.			Income, 1954–1955.			Total.		
	£	s.	d.	£	s.	d.	£	s.	d.
Applied Arts Fund	500	0	0	552	10	0	1,052	10	0
Australian Atomic Energy Commission Grant for Research in School of Chem. Engineering on Liquid Metals Heat Transfer Problems	400	0	0	....			400	0	0
Australian Atomic Energy Commission Research School of Metallurgy	....			8,500	0	0	8,500	0	0
Australian Atomic Energy Commission Research Studentship in Metallurgy	500	0	0	1,719	13	0	2,219	13	0
Australian Leather Research Association Fellowship Grant	547	15	5	650	0	0	1,197	15	5
Australian Merchandise and Enterprise Pty. Ltd.—Research Grant on Development of New Physical and Chemical Testing Methods for the Wool Industry	....			286	8	11	286	8	11
Bentley Bros.—Investigation of Problems of Gut Manufacture	....			578	1	3	578	1	3
B.R.E.I.F. Club Scholarship	63	0	0	....			63	0	0
Chemistry Kit Deposits Trust Fund	2,641	0	0	1,945	0	0	4,586	0	0
Commonwealth Bank Grant from the Economic and Financial Research Fund for Research into Significance of Tax Concessions on Commonwealth Bonds	100	0	0	....			100	0	0
Commonwealth Bank Grants from Rural Credits Development Fund for Research	3,692	1	2	3,740	0	0	7,432	1	2
Commonwealth Bank Grant from Rural Credits Development Fund for Research and C.S.I.R.O. Projects—Studies on the Composition of Australian Fruits and Fruit Products	251	7	2	910	0	0	1,161	7	2
Commonwealth Grant for the Training of Colombo Plan Students in Food Technology	9,869	1	10	8,130	18	2	18,000	0	0
Commonwealth Wool Industry Fund Scholarship ...	119	6	7	1,000	0	0	1,119	6	7
Commonwealth Scientific and Industrial Research Organization Grant for Wool Research	1,101	5	5	4,172	0	0	5,273	5	5
Commonwealth Scientific and Industrial Research Organization Projects	935	6	6	6,649	0	11	7,584	7	5
Donations from Members of the Plastics Institute for Equipping School of Chemical Engineering Plastics Laboratory	800	2	9	510	0	0	1,310	2	9
Electricity Meter and Allied Industries Ltd. Donation towards Equipping School of Applied Physics Research Laboratory	2,588	14	3	....			2,588	14	3
Food Technology Association Grant for Investigation into the Uses of Anti-oxidants in Food	27	6	3	....			27	6	3
Imperial Chemical Industries of Australia and New Zealand Grant for Purchase of Books for School of Chemical Engineering Library	7	11	0	....			7	11	0
Imperial Chemical Industries of Australia and New Zealand Grant for Research in Production of Vinyl Chloride	8	13	1	....			8	13	1
Carried Forward £	24,152	11	5	39,343	12	3	63,496	3	8

UNIVERSITY OF TECHNOLOGY

"A."

AND INCOME 1954–1955 FINANCIAL YEAR.

Expenditure 1954–1955.					30th June, 1955, Balance Carried Forward.
Salaries and Staff Charges.	Maintenance.	Furniture and Equipment.	Other.	Total.	
£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
....	....	....	615 2 0	615 2 0	437 8 0
....	....	....	....	....	400 0 0
....	....	....	....	....	8,500 0 0
....	....	....	1,133 6 3	1,133 6 3	1,086 6 9
....	....	31 2 10	665 5 10	696 8 8	501 6 9
....	....	....	....	....	286 8 11
555 17 5	....	....	22 3 10	578 1 3	....
....	....	....	63 0 0	63 0 0	....
....	....	....	2,738 0 0	2,738 0 0	1,848 0 0
....	....	....	....	....	100 0 0
386 9 5	101 14 1	980 10 4	....	1,468 13 10	5,963 7 4
862 9 3	30 4 0	16 10 0	....	909 3 3	252 3 11
8,692 12 7	2,573 11 0	6,703 7 3	....	17,969 10 10	30 9 2
....	....	....	684 2 11	684 2 11	435 3 8
4,812 14 7	113 17 5	161 16 5	184 17 0	5,273 5 5	....
3,052 3 5	90 9 5	534 16 1	....	3,677 8 11	3,906 18 6
....	....	44 10 3	....	44 10 3	1,265 12 6
....	....	2,588 14 3	....	2,588 14 3	....
....	....	....	27 6 3	27 6 3	....
....	....	....	....	....	7 11 0
....	....	....	....	....	8 13 1
18,362 6 8	2,909 15 11	11,061 7 5	6,133 4 1	38,466 14 1	25.029 9 7

THE NEW SOUTH WALES

SCHEDULE

SPECIAL PURPOSES GRANTS EXPENDITURE

Source of Grant, etc.	Balance Brought Forward.			Income, 1954–1955.			Total.		
	£	s.	d.	£	s.	d.	£	s.	d.
Brought Forward	24,152	11	5	39,343	12	3	63,496	3	8
Imperial Chemical Industries of Australia and New Zealand Research Fellowship Grant	499	14	6	....			499	14	6
Joint Coal Board Grant towards Equipping School of Mining Engineering	2,736	1	4	....			2,736	1	4
Joint Coal Board Grant for Experimental and Research Work in Carbonisation of High Sulphur Coal ...	5,000	0	0	....			5,000	0	0
†Joint Coal Board Scholarships Trust Fund	1,887	0	0	3,500	0	0	5,387	0	0
†Joint Coal Board Scholarships Trust Fund—Books for Library	59	19	1	....			59	19	1
H. Jones & Co.—Grant for Department of Food Technology	....			100	0	0	100	0	0
Monsanto Scholarship	382	19	10	100	0	0	482	19	10
Nuffield Foundation Grant towards Research Chair of Mech. Engineering	3,675	0	11	3,125	0	0	6,800	0	11
N.S.W. University of Technology Prize Fund... ...	....			25	0	0	25	0	0
*Frank W. Peplow Prize Fund	....			250	0	0	250	0	0
Rural Bank of N.S.W. Grant for Research in Agricultural Engineering	1,200	0	0	....			1,200	0	0
School of Applied Physics—Optometry Research Fund	36	11	0	30	17	0	67	8	0
School of Civil Engineering Research Fund	52	1	5	36	15	0	88	16	5
School of Wool Technology General Research Fund ...	60	8	9	25	0	0	85	8	9
Grant for Purchase of Plant for Nuclear Engineering Research	125,000	0	0	100	0	0	125,100	0	0
Students' Hostel	13,285	4	0	34,332	17	0	47,618	1	0
Students' Sports Association Fees Trust Fund ...	70	0	0	1,557	0	0	1,627	0	0
Students' Union Fees Trust Fund	880	19	0	3,354	17	0	4,235	16	0
Sulphuric Acid Ltd. Grant for Investigation into Unstable Constituent in Nairne Pyrites Concentrate	480	17	11	....			480	17	11
Suspense Accounts	755	16	1	33,648	11	6	34,404	7	7
*Sydney Technical College Union Award Fund ...	....			699	3	0	699	3	0
	....			....			....		
	£180,215	5	3	£120,228	12	9	£300,443	18	0

* Investments. ‡ Credit to expenditure for 1953–54.

† Balances shown in this statement for the first time. Previously held in Special Deposits A/c.

UNIVERSITY OF TECHNOLOGY

"A."—continued

AND INCOME 1954–1955 FINANCIAL YEAR—continued.

Expenditure 1954–1955.					30th June, 1955, Balance Carried Forward.
Salaries and Staff Charges.	Maintenance.	Furniture and Equipment.	Other.	Total.	
£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
18,862 6 8	2,909 15 11	11,061 7 5	6,133 4 1	38,466 14 1	25,029 9 7
382 5 3	....	....	....	382 5 3	117 9 3
....	....	1,786 1 8	....	1,786 1 8	949 19 8
....	....	232 19 9	....	232 19 9	4,767 0 3
....	....	....	4,366 8 2	4,366 8 2	1,020 11 10
....	....	....	5 14 4	5 14 4	54 4 9
....	....	6 12 8	....	6 12 8	93 7 4
....	....	....	482 19 10	482 19 10	....
‡ *Cr.* 88 7 9	....	....	....	*Cr.* 88 7 9	6,888 8 8
....	....	....	....	....	25 0 0
....	....	....	*250 0 0	250 0 0	....
....	....	....	....	....	1,200 0 0
....	....	....	....	....	67 8 0
....	....	....	....	....	88 16 5
....	....	7 10 0	....	7 10 0	77 18 9
....	....	....	....	....	125,100 0 0
10,130 9 0	4,623 6 8	112 12 8	10,857 18 6	25,724 6 10	21,893 14 2
....	....	....	148 0 0	148 0 0	1,479 0 0
....	....	....	678 14 0	678 14 0	3,557 2 0
320 2 10	12 12 0	....	....	332 14 10	148 3 1
....	....	....	4,473 8 0	4,473 8 0	29,930 19 7
....	....	54 18 7	* 600 0 0	654 18 7	44 4 5
....	....	....	....	....	....
£29,106 16 0	£7,545 14 7	£13,262 2 9	£27,996 6 11	£77,911 0 3	£222,532 17 9

INDEX

Sydney: A. H. Pettifer, Government Printer—1956.

THE N.S.W. UNIVERSITY OF TECHNOLOGY, CALENDAR, 1956