The New South Wales

UNIVERSITY *of* TECHNOLOGY

CALENDAR, 1952

CALENDAR

OF THE

NEW SOUTH WALES UNIVERSITY OF TECHNOLOGY

1952

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NEW SOUTH WALES UNIVERSITY OF TECHNOLOGY.

ALMANAC FOR 1952.

February—	
Monday 18 ...	Enrolments begin all courses except 2nd year of Courses I, II, III, V, VI, VII, VIII and IX
Monday 25 ...	First term begins.
March—	
Monday 10	Council meets.
Tuesday 11	Professorial Board meets.
Wednesday 26 ...	Faculty of Engineering meets.
April—	
Wednesday 2	Faculty of Science meets.
Tuesday 8	Professorial Board meets.
Friday 11 to Monday 14.	Easter Holidays.
Tuesday 15	Enrolment and lectures commence 2nd year of Courses I, II, III, V, VI, VII, VIII and IX.
Wednesday 23 ...	Faculty of Architecture meets.
Friday 25	Anzac Day—Public Holiday.
Wednesday 30 ...	Faculty of Engineering meets.
May—	
Monday 12	Council meets.
Tuesday 13	Professorial Board meets.
Saturday 17	First term ends.
Monday 19 to Saturday 31.	Vacation (2 weeks).
June—	
Monday 2	Second term begins
Wednesday 4	Faculty of Science meets.
Monday 9	King's Birthday—Public Holiday.
Tuesday 10	Professorial Board meets.
Wednesday 18 ...	Faculty of Architecture meets
Wednesday 25 ...	Faculty of Engineering meets.
July—	
Monday 14	Council meets.
Tuesday 15	Professorial Board meets.
Wednesday 30 ...	Faculty of Science meets.
August—	
Monday 4	Bank Holiday—classes meet as usual.
Tuesday 12	Professorial Board meets.
Wednesday 20 ...	Faculty of Architecture meets.
Saturday 23	Second term ends.
Monday 25 to Saturday 6 September.	Vacation (2 weeks).
September—	
Monday 8	Third term begins. Council meets. Examinations commence—Two term courses except 2nd year of courses I, II, III, V, VI, VII, VIII and X.
Tuesday 9	Professorial Board meets.
Wednesday 17 ...	Faculty of Engineering meets.
Saturday 20	Examinations end—2-term courses.
Monday 22	Industrial training begins—2-term courses not engaged in Survey Camp.

September—*continued.*	
Monday 22 to Friday 26.	Survey Camp—1st year course VIII, 3rd year courses V, VI, VII and VIII, 4th year courses VII and VIII.
Wednesday 24 ...	Faculty of Science meets.
Monday 29	Industrial training begins—2-term courses attending Survey Camp except 3rd year of courses VII and VIII.
Monday 29 to Friday, October 3.	Geology Excursion for 3rd year of courses VII and VIII.
October—	
Wednesday 1	Faculty of Architecture meets.
Monday 6	Labour Day—Public Holiday.
Tuesday 7	Industrial training begins—3rd year courses VII and VIII.
Tuesday 14	Professorial Board meets.
Saturday 25	Lectures cease—2nd year courses I, V, VI, VII, VIII and IX.
November—	
Monday 3	Examinations commence—2nd year courses I, V, VI, VII, VIII and IX.
Monday 10	Council meets.
Tuesday 11	Professorial Board meets
Saturday 15	Examinations end—2nd year courses I, V, VI, VII, VIII and IX.
	Lectures cease—Diploma and 3-term degree courses.
Saturday 29	Third term ends.
December—	
Monday 1	Examinations begin—Diploma and 3-term degree courses.
Tuesday 9	Professorial Board meets.
Saturday 20	Examinations end—Diploma and 3-term degree courses.
	1953.
February—	
Tuesday 10	Professiorial Board meets.
Monday 16	Enrolments begin.
Monday 23	First term begins

LOCATION OF SCHOOLS AND STAFF.

The Administrative staff is located at the Sydney Technical College, Broadway.

The various Schools of the University and their teaching staff as from 1952, will be located as follows:—

The Schools of Applied Physics, Chemistry, Chemical Engineering, Metallurgy, Mechanical Engineering, Electrical Engineering, Mining Engineering, Civil Engineering, Mathematics, Architecture and Humanities and Social Sciences at the Sydney Technical College, Broadway.

The School of Wool Technology at East Sydney Technical College, Forbes-street, Darlinghurst.

The New South Wales University of Technology

HISTORY AND OBJECTIVES.

Incorporated by New South Wales Act of Parliament in April, 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, development and practical application of science to industry and commerce.

Provision is made for the government of the University by a Council representative of Parliament, industry and commerce, the trade unions, technical education, professional bodies, the University of Sydney, and of the University's own teaching staff and its undergraduates and graduates. The present membership of the Council is listed in 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 University of Technology instituted its first professional degree courses in Civil, Electrical, Mechanical and Mining Engineering in March, 1948. 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. These degree courses were planned to give students lecture and laboratory instruction in the University of Technology for approximately half the year, with practical experience of a planned nature in industry for the remainder of the year.

Degree courses in Applied Chemistry and Chemical Engineering, began in March, 1949. A degree course in Architecture was introduced in 1950, and degree courses in Applied Physics and Wool Technology in 1951.

Degree courses in operation are similar in content and in laboratory- and lecture-time to those of universities and higher technological institutions overseas. Courses are reviewed and approved by advisory panels, whose members include industrial executives and technologists from the related field, and educationists from recognised tertiary institutions.

Two features are emphasised in the planning of University of Technology courses. The first is the incorporation in the syllabus of industrial experience to supplement the laboratory and lecture-room work at the University. In the Faculty of Engineering this practical work amounts to five months a year, and is supervised and organised to suit the stage and syllabus of each course of study.

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 human affairs for which he is otherwise qualified.

The University also offers the customary club and social features of university life—sport and societies dealing with literature, art, music and public questions.

Facilities are available to students already in employment and enrolled in appropriate courses at Technical Colleges, to transfer at certain stages to degree courses at the University of Technology. Conversion courses, the first of which began in 1950, permit those who hold such qualifications from Technical Colleges and from other Universities to resume their studies and to secure the degree or higher degrees of the New South Wales University of Technology.

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. These diploma courses are in fields similar or closely related to those in which the University is conducting degree courses; they require matriculation standard of entrance and five or six years' part-time attendance concurrently with approved employment in industry. The Council of the University has also approved the principle of progression to a degree by way of a diploma course followed by a part-time conversion course. The diploma courses now administered by the University of Technology are—

Faculty of Applied Science: 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, Naval Architecture, Production Engineering, Radio Engineering, Mining Engineering.

Special investigations may be carried out on any problem of technology or applied science, at the request of any authority, institution, association or person; 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.

Several 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. The attendance of such students is also counted as part of their service for seniority grading and salary purposes.

In addition to the above, a number of scholarships have been granted, with liberal living allowances, particularly from the coal-mining and the metal trades industries.

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 a College of the University within the Newcastle Technical College and this College was opened on 3rd December, 1951.

Pending the completion of its own buildings and the acquisition of equipment the University has at its disposal the facilities of the Department of Technical Education. A site has been reserved for the University at Kensington and the Foundation Stone of the first building on this site was set on 25th February, 1950, by the Governor of New South Wales, Lieutenant-General Sir John Northcott, K.C.M.G., C.B., M.V.O. Work on the building has progressed satisfactorily and the contract for completion was let on 14th February, 1951. At the end of 1951, the foundations of the building and reinforced concrete floors for the ground floor had been completed, and brickwork from ground to first floor level was proceeding.

It is expected that the building, providing a floor space of 136,745 square feet, will be ready for occupation in 1953.

Seven light-framed permanent buildings are also under course of erection on the Kensington site and the School of Chemical Engineering will move into occupancy of these buildings in 1952.

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

PART III.

THE NEW SOUTH WALES UNIVERSITY OF TECHNOLOGY.

DIVISION 1.—Preliminary.

Commencement.

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 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;

(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;

(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) one shall be a person 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 Director 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.

(3) The person or persons to be nominated by the Minister for appointment pursuant to paragraph (d), (f) 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 Director 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 Director of the University shall hold office while he remains Director.

(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.

President and Vice-President.

21. (1) (a) The first President of the University shall be appointed by the Minister and shall hold office for a period of one year.

The person so appointed shall be a member of the Council.

(b) Whenever a vacancy in the office of President occurs, the Council shall elect one of its number to be President of the University.

(c) The President, other than the first President, shall hold office for such period and on such terms and conditions as may be prescribed by the by-laws.

(2) (a) The Council shall, at its first meeting and thereafter whenever a vacancy in the office of Vice-President occurs, elect one of its number to be Vice-President of the University.

(b) The Vice-President shall 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 President or, in his absence, the Vice-President shall preside as chairman, but if the President and Vice-President 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 Director 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 Director 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.

Director.

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

(2) The Director 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 Director 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 President and the Director.

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.

(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 Act 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.

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-one 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 twenty-two names submitted to him by the organisations specified in Part B 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.

For the purposes of this Regulation the four bodies grouped together at the end of Part B of the said Schedule shall be deemed to be one organisation.

(3) All names which any such organisation 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.

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

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
Primary Producers' Union	4 (Chosen conjointly.)
The Graziers' Association of New South Wales	
Farmers and Settlers' Association of New South Wales	
Wheat Growers' Union of New South Wales	

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 Director of the University and the members elected by the Legislative Council and Legislative Assembly 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.

The Director.

5. (1) The Director 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 Director 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 President or Vice-President.

The Regulations are amended—

(a) by *omitting* from clause one of Regulation four the words "elected by the Legislative Council and Legislative Assembly" and by *inserting* in lieu thereof the words "referred to in clauses two, three and four of this Regulation,";

(b) by *inserting* at the end of the same Regulation the following new clause:—

(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.

BY-LAWS.

CHAPTER I.—THE PRESIDENT AND VICE-PRESIDENT.

1. (a) The President shall hold office for a period of two years from the date of his election: Provided that the first President elected by the Council shall hold office for a period of one year from the date of his election.

(b) The Vice-President shall hold office for a period of two years: Provided that the first and second Vice-Presidents shall respectively hold office for a period of one year from the date of their election.

(c) Any retiring President or Vice-President shall be eligible for re-election.

2. (a) The President and Vice-President 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 President 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 President is absent or does not desire or is unable to act, or if the office of President is vacant, the Vice-President may preside at any such meeting and shall have the like rights and powers.

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

(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 President or, in his absence, the Vice-President or, in the absence of both, the Director 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 President or Vice-President or Director, 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, shall be elected by the three principal Faculties to be chosen by the Council at its May meeting in 1950 and in 1951 and in every alternate year after 1951.

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 May in 1950 and in 1951 and in every alternate year after 1951.

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, 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.

13. The election shall be held at a meeting of the professors and such other persons convened by the Registrar for the purpose in May in 1950 and in 1951 and in every alternate year after 1951.

14. The provisions of By-laws ten and eleven of this Chapter shall apply to and in respect of any such election.

Member Elected by Graduates.

15. The member 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, 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. 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.

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 President. 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.

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

(*f*) Where in the final count under By-law twenty-nine of this chapter two candidates shall 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 the said By-law twenty-nine, the candidate so selected shall be deemed to have received an additional vote.

In this paragraph 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.

(*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, 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.

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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 5 p.m. on the day appointed.

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

28. At any election the persons qualified to vote shall be registered students proceeding to a degree.

Method of Counting Votes.

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, that candidate amongst them who had the least number of votes at the last count at which they had not an equal number of votes, shall be excluded. And if such candidates had an equal number of votes at all preceding counts, the Registrar shall determine between them by lot which of them shall be excluded.

(3) In 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.

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 Director.

(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 Director 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 suspension or fine shall be reported in writing by the member to the Director 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 Director 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 Director) in respect of breach of discipline or misconduct may appeal to the Director, and in the case of disciplinary action by the Director, 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 President, or Director, 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, 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 Director, 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—Director.

1. The Director 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 President or Vice-President.

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.

NEW SOUTH WALES UNIVERSITY OF TECHNOLOGY.

THE COUNCIL.

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WALLACE CHARLES WURTH, C.M.G., LL.B., Chairman of the New South Wales Public Service Board.

VICE-PRESIDENT.

ROY WILLIAM HARMAN, M.Sc. (N.Z.), D.Sc. (Lond.), F.A.C.I., Past General President, Royal Australian Chemical Institute and President, Sydney Division of the Australian Institute of Management; General Manager, The Colonial Sugar Refining Co. Ltd.; Director, Courtaulds (Aust.) Ltd.

DIRECTOR.

ARTHUR DENNING, B.Sc., Dip.Ed., A.S.T.C., Director, Department of Technical Education.

MEMBERS.

JOHN PHILLIP BAXTER, O.B.E., B.Sc. (B'ham), Ph.D. (B'ham), Deputy Director, Professor of Chemical Engineering, N.S.W. University of Technology.

The Hon. JOHN SYDNEY JAMES CLANCY, LL.B., Justice of the Supreme Court and Chairman, Crown Employees Appeal Board.

WILLIAM EDWARD CLEGG, A.M.I.E. Aust., F.I.C.A., Chairman, Newcastle Technical Education District Council, and Director-Consultant, Commonwealth Steel Co. Ltd.; Senior Vice-President, Metal Trades Employers' Association of N.S.W.

HAROLD GRAYDON CONDE, M.I.E. Aust., Manager, Electric Light and Power Supply Corp. Ltd., Electricity Commissioner, New South Wales.

GERALD KING CRANNY, Undergraduate, N.S.W. University of Technology.

The Hon. FRANCIS JOSEPH FINNAN, M.L.A., Minister for Labour and Industry and Social Welfare.

JOHN PATRICK GLASHEEN, Dip.Ec., A.C.I.S., Member, New South Wales Public Service Board.

ROBERT CARR HARRISON, Assistant Director, Department of Technical Education.

WILLIAM GEORGE KETT, F.S.M.C., F.I.O. (Lond.), Member, Board of Optometrical Registration and Director, Mark Foys Ltd.

The Hon. ROBERT ARTHUR KING, M.L.C., Secretary, Labor Council of New South Wales.

JAMES NORMAN KIRBY, Managing Director, James N. Kirby Pty. Ltd.; Technical Director, Nuffield (Aust.) Pty. Ltd. and International Products Ltd.

WILLIAM RAE LAURIE, B.Arch., F.R.I.B.A., F.R.A.I.A., Architect, Past President, Royal Australian Institute of Architects.

JAMES KENNETH MACDOUGALL, M.I.E.E. (Lond.), A.M.I.E. Aust., Manager, Rylands Bros. Australia, Pty. Ltd., Newcastle.

The Hon. JAMES JOSEPH MALONEY, M.L.C., Research Officer, Labor Council of New South Wales.

FRANCIS MACKENZIE MATHEWS, B.E., A.M.I.E. Aust., Chairman, Wollongong Technical Education District Council and Chief Engineer, Australian Iron & Steel Limited.

JOHN GORDON MCKENZIE, B.A., B.Ec., Director-General of Education in New South Wales.

ROBERT KENNETH MURPHY, Chem. E. (Columbia), Dr.Ing. (Darmstadt), M.I.Chem.E., A.S.T.C. (Chem.), F.A.C.I.

RICHARD GODFREY CHRISTIAN PARRY-OKEDEN, Managing Director, Lysaghts Works Pty. Ltd.; Senior Vice-President, Chamber of Manufactures of N.S.W.

STEPHEN HENRY ROBERTS, M.A., D.Sc., Litt.D., D.Sc.(Econ.), Vice-Chancellor, The University of Sydney.

GREGORY BEDE THOMAS, LL.B., B.Sc., B.E., Barrister.

FREDERICK EDWARD TOWNDROW, F.R.I.B.A., F.R.A.I.A., M.T.C.P.I. (Aust.), Professor of Architecture, N.S.W. University of Technology.

ROBERT JOSEPH WEBSTER, A.A.A., Past President, The Institute of Management; Chairman of Directors and Managing Director, Burlington Mills (Aust.) Limited; Managing Director, Bradford Cotton Mills Limited.

FRED WILSON, F.I.O.B., President, Building Industry Congress of N.S.W.; President, Federal Council, Building Industry Congress; and Director, Howie Moffat and Co. Pty. Ltd.

JOHN FELL DALRYMPLE WOOD, B.Sc., B.E. (Syd.), A.M.I.E. Aust., Assoc. Professor, Mechanical Engineering, N.S.W. University of Technology.

No graduate representative yet elected.

STANDING COMMITTEES OF COUNCIL.

Executive Committee.

Chairman—The President.

The Vice-President.

The Director.

Prof. S. H. Roberts.

Mr. W. G. Kett.

Mr. J. K. MacDougall.

Buildings and Equipment Committee.

Chairman—Mr. W. E. Clegg.

The Vice-President.

The Director.

The Hon. R. A. King.

Mr. J. N. Kirby.

Mr. W. R. Laurie.

Mr. F. Wilson.

Public Relations Committee.

Chairman—Mr. R. J. Webster.
The Director.
Mr. H. G. Conde.
Mr. J. N. Kirby.
The Hon. J. J. Maloney.
Mr. F. M. Mathews.

Library Committee.

Chairman—Mr. W. G. Kett.
The Hon. J. J. Maloney.
Mr. G. B. Thomas.

NEW SOUTH WALES UNIVERSITY OF TECHNOLOGY.

ADMINISTRATIVE STAFF.

DIRECTOR.

A. Denning, B.Sc., Dip. Ed., Syd., A.S.T.C.

DEPUTY DIRECTOR.

J. P. Baxter, O.B.E., B.Sc., Ph.D., Birm.

REGISTRAR.

G. L. Macauley, B.Ec., Syd.

ASSISTANT REGISTRAR AND SECRETARY TO COUNCIL—J. S. Fraser.

ACCOUNTANT—E. H. Davis, A.I.C.A., A.C.I.S.

LECTURING STAFF.

FACULTY OF APPLIED SCIENCE.

SCHOOL OF APPLIED CHEMISTRY.

PROFESSOR OF APPLIED CHEMISTRY—A. E. Alexander, M.A., B.Sc., Reading, Ph.D., Sc.D., Camb., F.R.A.C.I.

Senior Lecturers.

A. Bryson, M.Sc., B.App.Sc., Qld.
G. W. K. Cavill, M.Sc., Syd., Ph.D., Liv.
E. R. Cole, M.Sc., Syd.
J. B. Forster, M.Sc., Leeds.
L. W. O. Martin, B.Sc., Syd.
R. S. Nyholm, M.Sc., Syd., Ph.D., Lond., F.R.A.C.I.
B. J. F. Ralph, B.Sc., Tas., Ph.D., Liv.
F. H. Reuter, Dr.Phil., Berl., F.R.I.C. F.R.A.C.I.

Lecturers.

J. R. A. Anderson, B.Sc., A.S.T.C., F.R.A.C.I.
J. R. Backhouse, M.Sc., Syd., F.C.S., Lond.
R. G. H. Barbour, B.Sc.Agr., Syd.
G. A. Barclay, B.Sc., Dip.Ed., Syd.
D. J. Barke, B.Sc., Lond., F.C.S.
G. S. Buchanan, B.Sc., Syd.
J. L. Courtney, B.Sc., A.S.T.C.
N. R. Davies, B.Sc., Lond., F.R.I.C.
W. J. Dunstan, M.Sc., Syd.
R. A. Eade, M.Sc., Syd.
I. M. Fraser, Ph.D., B.Sc.
R. M. Gascoigne, M.Sc., Syd., Ph.D., Liv.
C. M. Harris, B.Sc., A.S.T.C.

F. H. Hempel, B.Sc., Melb.
C. H. Hunt, A.S.T.C.
P. D. Lark, B.Ec., Syd., B.Sc., A.S.T.C.
S. E. M. R. Livingstone, B.Sc., A.S.T.C.
E. C. Martin, A.S.T.C., F.C.S.
B. S. Morris, M.Sc., Syd.
O. P. Nicholson, B.Sc., Manc., A.M.C.T., Manc.
J. N. Phillips, M.Sc., Syd.
G. Shaw, B.Sc., Ph.D., Lond.
E. Shipp, B.Sc., Syd.
J. J. H. Simes, M.Sc., Dip.Ed., Syd.
G. J. Sutton, B.Sc., A.S.T.C., F.R.A.C.I.
J. Sutton, B.Sc., Manc.
E. S. Swinbourne, B.Sc., A.S.T.C.
C. R. Taylor, B.Sc., Syd.
R. L. Werner, B.Sc., A.S.T.C.

SCHOOL OF APPLIED PHYSICS.

ASSOCIATE PROFESSOR OF APPLIED PHYSICS—G. H. Godfrey, M.A., B.Sc., Syd., F.Inst.P.

Senior Lecturers.

J. Lederer, B.Sc., Syd., A.S.T.C., F.I.O.
W. L. Price, B.Sc., B.E., Syd., F.I.P.

Lecturers.

L. O. Bowen, B.E., B.Sc., W. Aust.
C. R. Brown, A.S.T.C., F.I.O.
R. S. Caddy, B.Sc., Dip. Ed., Syd.
C. E. Curnow, M.Sc., Syd.
G. P. Falls, B.A., B.Sc., W. Aust.
N. R. Hansen, B.Sc., Dip.Ed., Syd.
E. Lanczi, B.A., B.Sc., Melb.
R. E. Lishmund, B.Sc., Ph.D., St. And.
J. F. McConnell, M.Sc., Syd.
J. A. Milledge, M.Sc., Dip.Ed., Syd.
L. G. Parry, B.Sc., Dip.Ed., Syd.
H. F. Pollard, M.Sc., W. Aust.

SCHOOL OF CHEMICAL ENGINEERING.

PROFESSOR OF CHEMICAL ENGINEERING—J. P. Baxter, O.B.E., B.Sc., Ph.D., Birm., M.I.Chem.E., Dean of the Faculty of Applied Science.

Lecturers.

F. W. Ayscough, B.Sc., Syd.
R. H. Buchanan, B.Sc., Corn.
F. L. Connors, A.S.T.C.
F. O. Howard, B.E., Syd.

E. R. McCartney, B.Sc., Syd.
G. H. Roper, A.S.T.C.
J. D. Smith, B.Sc., A.S.T.C.
R. K. Warner, B.Sc., A.S.T.C.

SCHOOL OF MATHEMATICS.

PROFESSOR OF APPLIED MATHEMATICS—G. Bosson, M.Sc., Lond.

Senior Lecturers.

C. B. Kirkpatrick, M.Sc., Syd.
S. A. Senior, M.Sc., Dip.Ed., Leeds.
A. F. T. Tillott, B.Sc., Syd.

Lecturers

J. H. Clarke, B.Sc., N.Z.
J. B. Douglas, B.A., B.Sc., Melb.
M. A. Eggar, M.Sc., D.Sc., Dip.Ed., Berl.
G. E. Ferris, B.Sc., Syd.
J. L. Griffith, B.A., M.Sc., Dip.Ed., Syd.
C. M. Groden, M.Sc., Zur.
J. St. A. Sandiforth, B.Sc., Syd.
H. Weiler, Lic. es Sc., Paris, A.S.T.C.

SCHOOL OF METALLURGY.

PROFESSOR OF METALLURGY—R. H. Myers, M.Sc., Ph.D., Melb.

SCHOOL OF WOOL TECHNOLOGY.

PROFESSOR OF WOOL TECHNOLOGY—P. R. McMahon, M.Agric.Sc., N.Z., Ph.D., Leeds.

Lecturer.

C. L. Goldstone, B.Agric.Sc., N.Z., R.C.A., N.Z.

FACULTY OF ARCHITECTURE.

SCHOOL OF ARCHITECTURE AND BUILDING.

PROFESSOR OF ARCHITECTURE—F. E. Towndrow, F.R.I.B.A., F.R.A.I.A., M.T.C.P.I. (Aust.), Dean of Faculty of Architecture.

Senior Lecturer.

G. H. B. McDonell, B.Arch., Syd., F.R.A.I.A.

Lecturers.

N. J. Anderson, B.Arch., Syd., Dip. T.P., Lond.
N. F. Bazeley, A.S.T.C. (Arch.)
E. Daniels, A.S.T.C. (Arch.)
M. J. Dunphy, F.R.A.I.A.
D. P. Kirkland, A.A.Dip., Lond.

D. Lennon, B.Arch., Syd., M.T.C.P.I.
E. C. Parker, A.S.T.C. (Arch.)
P. Spooner, A.S.T.C. (Arch.)
F. Woolard, A.S.T.C. (Arch.), M.R.San.I., Lond.
D. F. Wrigley, D.Arch., Manc.

FACULTY OF ENGINEERING.

SCHOOL OF CIVIL ENGINEERING.

ASSOCIATE PROFESSOR OF CIVIL ENGINEERING—C. H. Munro, B.E., Syd., M.R.I.San.I.

Senior Lecturers.

A. S. Hall, B.Sc., Lond.
H. Hodson, B.Sc., B.E., Syd.
H. W. Holdaway, B.Sc., B.E., Syd.
H. R. Vallentine, B.E., Syd., A.S.T.C.

Lecturers.

P. Balint, B.E., Bud.
H. J. Brettle, B.E., Syd., A.S.T.C.
W. S. Butcher, B.E., Syd.
A. J. Carmichael, B.E., A.S.T.C.
J. L. Jenkins, B.E., Syd., A.S.T.C.
K. E. Johnson, B.E., Syd.
A. F. S. Nettleton, B.Sc., B.E., Syd.
E. E. Peacock, B.E., Syd.

SCHOOL OF ELECTRICAL ENGINEERING,

PROFESSOR OF ELECTRICAL ENGINEERING—(Vacant).

Senior Lecturers.

A. P. Blake, B.Sc., B.E., Syd.
G. C. Dewsnap, M.E.E., Melb.
R. M. Huey, B.Sc., B.E., Syd.
W. F. Lovering, M.Sc., Birm.
E. L. Mortimer, B.Sc., Lond.
G. J. Parker, B.Sc., B.E., Syd.

Lecturers.

W. H. Arnold, A.S.T.C.
R. H. J. Clarke, B.E., A.S.T.C.
D. J. Cole, B.E.E., Melb.
H. N. Edwards, B.Sc., B.E., Syd.
W. W. T. H. Ehlers, Dr. Nat. Scs., Ham.
F. Gutmann, Ph.D., Vienna.
H. R. Harrington
E. G. Hopkins, B.E.

A. S. Plowman, A.S.T.C.
C. A. Stapleton, B.Sc., B.E., Syd.
H. J. A. Turner, B.Sc., F.I.E.S., Lond.

SCHOOL OF MECHANICAL ENGINEERING.

PROFESSOR OF MECHANICAL ENGINEERING (RESEARCH)— A. H. Willis, B.Sc.Eng., Ph.D., Lond., Wh.Sc.

ASSOCIATE PROFESSOR OF MECHANICAL ENGINEERING—J. F. D. Wood, B.Sc., B.E., Syd.

Senior Lecturers.

T. M. Baylis, A.S.T.C.
R. E. Corbett, A.S.T.C.
J. Hirschhorn, B.E., Vienna.
J. Munro, B.E., Syd.
N. Rosenauer, M.E., St. Petersburg, Dr.Ing., Riga.

Lecturers.

A. F. Allen, A.S.T.C.
J. R. Allen, B.E., Syd.
P. S. Barna, B.E., Bud.
H. Brock, Dipl.Ing., Vienna.
R. A. A. Bryant, A.S.T.C.
A. J. Carroll, B.E., Syd.
E. W. Dodds, A.F.R.Ae.S.
M. Forsythe.
T. W. Girdler, B.Sc., B.E., Syd.
M. J. Hallinan, A.S.T.C.
A. K. James, A.S.T.C.
A. Kahane, Dip.Ing., Vienna.
H. McD. McLachlan, B.E., Syd., A.S.T.C.
J. O. Muiznieks, Deg.Mech.Eng., Latvia, Dr.Aer.Eng., Rome.
A. D. Owens, A.S.T.C.
R. G. Robertson, B.A., Oxon., A.F.R.Ae.S.
C. M. Sapsford, B.Sc.
H. Selinger, Dipl.Ing., Berl.
R. J. Tuft, A.S.T.C. (Mech.), A.S.T.C. (Nav. Arch.)
R. C. P. Walters, A.S.T.C.
K. Weiss, Dipl.Ing., Vienna.
H. E. Wulff, Dipl.Ing., Cologne.

SCHOOL OF MINING ENGINEERING.

PROFESSOR OF MINING ENGINEERING—D. W. Phillips, B.Sc., Wales, Ph.D., Camb., Dip.Met.Min., M.I.Min.E., F.G.S., Dean of the Faculty of Engineering.

Senior Lecturer.

J. C. Webb, M.Sc., Wales, Dip.Met.Min., F.G.S., M.I.Min.E.

Lecturers.

R. G. Burdon, A.S.A.S.M.
A. S. Danchev, B.Sc., Leeds.
A. V. Jopling, B.Sc., B.E., Syd.
L. E. Koch, Dr. phil habil, Cologne.
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PROFESSOR OF ECONOMIC HISTORY—R. M. Hartwell, M.A., Dip.Ed., Syd.

Senior Lecturers.

J. J. Auchmuty, M.A., Ph.D., Dublin.
P. K. Elkin, B.A., Syd., B.Litt., Ox.
J. B. Thornton, B.A., B.Sc., Syd.

Lecturers.

Miss Ruth Atkins, B.A., B.Ec., Syd.
G. A. Cranfield, B.A., Camb.
R. G. Geering, B.A., Dip.Ed., Syd.
A. M. Ginges, B.A., Syd.
T. T. Hague, B.Ec., Syd.
S. M. Ingham, M.A., Melb.
N. B. Nairn, B.A., Syd.
N. Runcie, B.Ec., Syd.
D. C. Stove, B.A., Syd.

NEWCASTLE UNIVERSITY COLLEGE.

WARDEN—R. Basden, B.Sc., Lond., Dip.Ed., M.E.D., Melb., A.S.T.C. (Chem.).

SCHOOLS OF APPLIED CHEMISTRY, CHEMICAL ENGINEERING AND METALLURGY.

Senior Lecturer.

G. A. Noellat, A.S.T.C.
F. L. Ward, M.Sc., Q'ld., A.S.T.C. (Chem.).

Lecturers.

K. A. Allen, M.Sc., N.Z.
H. Bardsley.
A. May, M. A. Berl, Ph.D., Prague.
J. S. Ratcliffe, A.S.T.C. (Chem. Eng.), A.S.T.C. (Mech. Eng.).
W. R. Walker, B.Sc., Dip.Ed., Syd.

School of Applied Physics.

Senior Lecturer.

S. C. Baker, M.Sc., Syd.

School of Civil Engineering.

Lecturer.

G. J. Haggarty, B.E., Syd.

School of Electrical Engineering.

Senior Lecturer.

H. G. Middlehurst, A.S.T.C.

School of Mathematics.

Senior Lecturer.

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

Lecturer.

M. Temple, M.A., Dublin.

School of Mechanical Engineering.

W. M. S. Gower, A.S.T.C. (Mech.) Head of School.

Senior Lecturer.

A. K. Johnston, B.E., Syd.

Lecturers.

K. R. Bridger, A.S.T.C.
H. S. Craddock, B.E., Syd.

School of Mining Engineering.

Lecturer.

A. S. Ritchie, A.S.T.C. (Sc.).

WOLLONGONG.

School of Applied Chemistry.

Lecturers.

T. W. Barnes, A.S.T.C. (Metallurgy).
P. Beckman, F.S.T.C. (Chem..), F.C.S.
F. M. Hall, A.S.T.C. (Chem.).
M. C. Steele, A.S.T.C. (Chem.).

School of Electrical Engineering.

Lecturer.

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

SCHOOL OF MATHEMATICS.

Lecturer.

A. Keane, M.Sc., Syd., F.R.A.S.

SCHOOL OF MECHANICAL ENGINEERING.

J. McA. Carswell, A.S.T.C., Head of School.

Lecturers.

H. A. Borchhardt, Dip.Ing.Eth., Zur.
J. N. Hool, B.E., Syd., A.S.T.C. (Mech.), A.S.T.C. (Civil).

BROKEN HILL.

SCHOOL OF APPLIED CHEMISTRY.

Lecturer.

G. C. Curthoys, B.Sc., Syd.

SCHOOL OF ELECTRICAL ENGINEERING.

Lecturer.

D. W. George, B.Sc., B.E., Syd.

SCHOOL OF MECHANICAL ENGINEERING.

Lecturer.

S. E. Bonamy, A.S.T.C., B.E., Syd.

SYDNEY TECHNICAL COLLEGE.

(Staff approved to conduct courses on behalf of the New South Wales University of Technology.)

DEPARTMENT OF APPLIED PSYCHOLOGY.

Heal of Department—L. M. Haynes, B.A., Syd.

Lecturers.

E. Davis, B.A., Syd.
G. Fitzgerald, M.A., Col.
C. P. Kenna, B.A., B.Sc., Syd.
R. T. Martin, Dip.Pub.Admin., Syd.
J. D. Murray, B.A., Syd.
A. K. Olley, B.A., Syd.

GENERAL INFORMATION.

Location.

The temporary accommodation for the New South Wales University of Technology is mainly in the buildings of the Department of Technical Education, Broadway, Sydney. The school of Wool Technology is located at the East Sydney Technical College, Forbes Street, Darlinghurst, and from approximately June, 1952, the School of Chemical Engineering will be located on the University site, High Street, Kensington.

The offices of the Director and the Registrar are in the Administrative Building of the Department of Technical Education, Mary Ann Street, Broadway, Sydney.

Degrees.

The University provides undergraduate courses leading to Bachelor Degrees in Science (Applied Physics, Applied Chemistry, Chemical Engineering and Wool Technology), Engineering (Mechanical, Electrical, Mining and Civil), and Architecture.

Post-graduate courses are also provided, leading to the degrees of Master of Science or Engineering.

Special, short, intensive post-graduate courses are provided from time to time according to demand.

Diplomas.

By arrangement with the Department of Technical Education the University provides the undermentioned diploma courses leading to the award of the Associateship of the 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: 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 and Naval Architecture.

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

Examinations.

In assessing students' progress in the University courses, consideration will be 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.

Fees.

The fee for each year of Courses I, V, VI, VII and VIII is £30. For any year of Courses II, III and XI in which full-time daily attendance is required, the fee will be £30. For any year of Courses II, III and XI in which part-time attendance only is required, the fee is £15.

Higher Degrees.

Master of Science or Master of Engineering:

Qualifying Examination, £5 5s.

Registration, £2 2s.

Annual fees, Full-time student, £30; part-time student, £15; external student, £10.

Final Examination, £15.

Doctor of Philosophy:

Qualifying Examination, £5 5s.

Registration, £2 2s.

Annual fee, £30.

Final Examination, £21.

No refund shall be payable to students who discontinue their studies or who fail to qualify for a degree.

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Fees for other post-graduate courses will be according to a scale to be fixed by the Council of the University.

Industrial Training.

Every student must complete satisfactorily the course of approved industrial training each year as prescribed for the course in which he is enrolled.

The staff of the University will assist students to obtain employment either as sponsored students or as trainees employed on a temporary basis in order to gain the necessary practical experience.

Private students may make their own arrangements for industrial training during their course. 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 the 31st March following the training period.

Undergraduate Courses of Study.

The undermentioned courses are available in Applied Science, Engineering and Architecture. Other courses will be introduced in later years as the work of the University expands. In most of these courses, leading to a Bachelor's Degree, options or electives in professional subjects will be available in the final year, thus enabling the student to select a schedule of subjects best adapted to his special interests, abilities and objectives.

In order to qualify for continued attendance at the New South Wales University of Technology, students must be regular in attendance at all lectures and laboratory work.

In the following list each course is indicated by its name and the Roman numeral associated with it.

Applied Science.

Applied Physics	Course I.
Applied Chemistry	Course II.
Chemical Engineering	Course III.
Wool Technology	Course IX.

These courses lead to the degree of Bachelor of Science (B.Sc.).

Engineering.

Mechanical Engineering	Course V.
Electrical Engineering	Course VI.
Mining Engineering	Course VII.
Civil Engineering	Course VIII.

These courses lead to the degree of Bachelor of Engineering (B.E.).

Architecture.

Architecture .. .. Course XI.

This course leads to the degree of Bachelor of Architecture (B.Arch.).

* * * * * * * *

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 aspects of the course chosen and such subjects in allied professional fields as are considered necessary;

(*c*) a close link with industry and the practical aspects of the profession throughout the course;

(*d*) 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.

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 applicants for conversion courses who received their diplomas prior to 1945 (completed their courses in 1944), and may require such students to enter the normal undergraduate courses with such advanced standing as it prescribes. 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 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 under the following headings:—

Full name, and address for correspondence.

Date and place of birth.

Details of passes in Matriculation, Leaving Certificate or Diploma Entrance examination, with dates, school and passes in each subject.

Full details of academic career and awards granted, with dates and college.

(Additional subjects to those normally included in the course should be given, and details of prizes, credits, honours, etc., gained.)

Professional and trade experience.

Research work undertaken and technical articles published.

Course in which applicant wishes to graduate.

Although each applicant will be considered on his merits, the following is an indication of the amount of work required of students who have completed a normal diploma course at the standard set out in the current Handbook of the Department of Technical Education and have no other special qualifications or experience for which credit can be granted. The Professorial Board may, however, prescribe such other work as it considers necessary in each case.

Associates in Mechanical Engineering or *Civil Engineering*—One year part-time work in prescribed subjects, followed by the fourth year of the degree course at the University of Technology. From 1953 it is planned to provide the final year of the degree course in two parts each of which conversion students may take by part-time attendance.

Associates in Electrical Engineering—Two years part-time work in prescribed subjects, followed by the fourth year of the degree course at the University of Technology.

Associates in Radio Engineering—One year part-time work in prescribed subjects, followed by the third and fourth years of the degree course of the University of Technology.

Associates who hold diplomas in both Electrical and Radio Engineering will, in general, be required to complete the fourth year of the degree course at the University of Technology.

Associates in Metalliferous Mining from Broken Hill—Two full-time academic years, the first covering prescribed subjects, the second the final year of the Mining degree course.

Associates in Chemistry or Chemical Engineering—The equivalent of one academic year's attendance at the University of Technology covering prescribed work. This requirement may be met by attendance over two part-time years.

Applicants who have completed diploma courses other than those set out in the current Handbook of the Department of Technical Education, may be required to take a longer course than those specified above, according to the content of the courses at the time of receiving their diplomas.

CONDITIONS FOR THE AWARD OF DEGREE OF MASTER IN THE FACULTIES OF APPLIED SCIENCE AND ENGINEERING.

1. Applications to register for the degree of Master of Science or 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 2s.;

(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.

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 DOCTOR OF PHILOSOPHY (Ph.D.).

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 a distinct 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. Where the Professorial Board is not satisfied with the qualifications submitted by a candidate in compliance with the provisions of clause 2 above, the Board may require such candidate, 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 engaged in teaching in the University, may proceed to the Degree after a period of not less than 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 terms.

6. The course must be pursued continuously, unless by special permission of the Board.

7. The course 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. The candidate shall during his course of study pay a fee to the University.

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

10. Each candidate shall demonstrate his ability to read in at least one foreign language the scientific literature of his field of specialisation.

Thesis.

11. 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 an important and original contribution to the knowledge of the subject.

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

12. 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.

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

14. A candidate may not be permitted to submit as the main content of his thesis, material which he has previously submitted for a University Degree.

15. 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.

16. The candidate shall give in writing one month's notice of his intention to submit himself for examination and such notice shall be accompanied by—

(i) three copies of the candidate's thesis;

(ii) the appropriate fee;

(iii) a certificate from the Supervisor appointed in terms of clause 7 above that the candidate has completed the course of study prescribed in his case.

17. The thesis shall be in double-spaced typescript. One of the copies of the thesis 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 bound in a cover supplied by the University.

18. The candidate may also submit any work he has published whether or not bearing on the subject of the thesis.

Examination.

19. On receiving the application, the Board on the recommendation of the Faculty concerned, shall appoint two 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 examine the candidate 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. The Examiners at the conclusion of the examination will submit 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 guineas.

25. An approved candidate shall pay—

(i) a registration fee of 2 guineas;

(ii) a laboratory and supervision fee of £30 per annum;

(iii) a fee of 20 guineas on application for the examination.

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

SCHOLARSHIPS AND CADETSHIPS.

Many industrial organisations and Government Departments are sponsoring students in the New South Wales University of Technology. Such students are generally employed as cadets, have their fees paid and receive the cadet rate of pay during training. Particulars of Government Cadetships can be obtained from the Secretary, Public Service Board, 19 O'Connell Street, Sydney.

Mining Scholarships.

Fifteen scholarships tenable in Mining Engineering are offered each year. Twelve of these are given by the Joint Coal Board and three by the Combined Colliery Proprietors' Association.

The values of the scholarships are as follows:—

	J.C.B.	C.C.P.A.
	£ s. d.	£
While living at home—		
1st year ..	175 10 0	182 per annum
2nd year ..	201 10 0	208 per annum
3rd year ..	227 10 0	234 per annum
4th year ..	253 10 0	260 per annum
While living away from home—		
1st year ..	240 10 0	260 per annum
2nd year ..	266 10 0	286 per annum
3rd year ..	292 10 0	312 per annum
4th year ..	318 10 0	338 per annum

Payment is made in equal fortnightly instalments. In addition, an allowance of £42 per annum is provided for fees and books, and £10 for the purchase of instruments in the first year.

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

Commonwealth Scholarships.

Students attending full-time courses at the New South Wales University of Technology are eligible for Commonwealth scholarships.

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.

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 £149 10s. per annum for a student living with his parents, and £214 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 £450 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 dependant 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 £450 the amount of living allowance payable abates at the rate of £3 for every £10 by which the adjusted family income exceeds £450.

Full particulars and application forms may be obtained from the Officer-in-Charge, University Branch Office, Department of Education, University Grounds, University of Sydney.

New South Wales Public Service Board Scholarships.

From 1951 the Public Service Board offer six scholarships, on a competitive basis, to Associates of the Sydney Technical College, or holders of an equivalent qualification awarded by some other approved institution, who wish to attempt appropriate conversion courses at the New South Wales University of Technology.

The scholarships will be made available annually subject to the following conditions:—

(1) That the officer has served for at least three years in the Public Service;

(2) That he is prepared to enter into a bond to complete successfully the course of study and to serve for four years following resumption of duties, the bond being equal to the cost to the State in each case in which it is imposed; and

(3) That evidence is produced that the University of Technology is prepared to admit the applicant to the course.

The benefits which will accrue from the award of such scholarships are that students will not be required to pay fees and successful applicants will receive half pay during the period in which they are undertaking full-time studies.

The N.S.W. Public Service Board also 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—

£156 per annum if living at home,

£216 per annum if living away from home.

3rd and subsequent years—

£166 per annum if living at home,

£235 per annum if living away from home.

On reaching the age of 21 years, the trainee receives an allowance at the rate of £235 per annum if living at home or £325 per annum if living away from home.

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. A bursary similarly exempts the student from payment of fees and includes an allowance for living expenses and books. Bursaries are awarded subject to the applicant holding an exhibition and satisfying a means test.

John Heine Memorial Scholarship.

The Scholarship is awarded annually at the discretion of the Directors. It has a total value of £250 to encourage the recipient to undertake—

(*a*) The final two years of the Degree Course in Mechanical, Electrical or Chemical Engineering or Applied Chemistry.

(*b*) The Conversion Course in Mechanical, Electrical or Chemical Engineering or Applied Chemistry.

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Qualifications of Applicants:

Applicants for the Scholarship will be required to be, and furnish evidence of being—

(*a*) an employee of a member of the Metal Trades Employers' Association,

(*b*) of good character, personality and address,

(*c*) medically fit,

(*d*) (i) a student who is qualified for admission to the 3rd year of the Degree Course in Mechanical, Electrical or Chemical Engineering or Applied Chemistry; or

(ii) a student who is qualified for admission to the Conversion Course in Mechanical, Electrical or Chemical Engineering or Applied Chemistry.

Table of Payments.

If qualifying under clause (*d*) (i) above—

1st year of tenure (3rd year of course) £100
2nd year of tenure (4th year of course) £150

If qualifying under clause (*d*) (ii) above—

	Year of Tenure.		
	1st Year.	2nd Year.	3rd Year.
	£	£	£
Mechanical or Electrical Engineering:			
One part-time year plus one full-time year	50	200	...
Three part-time years	50	50	150
Applied Chemistry or Chemical Engineering:			
Two part-time years	100	150	...
One full-time year...	250	...	...

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

ICIANZ Research Fellowship.

Imperial Chemical Industries of Australia and New Zealand has undertaken to provide a sum of £600 annually to establish a Fellowship to be known as the ICIANZ 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 £600 per annum.
8. Where no suitable candidate applies in any year, the University may carry the grant forward.

Monsanto Research Scholarship.

Monsanto Chemicals (Australia) Ltd. has established a scholarship for research in Chemical Engineering to the value of £600 per annum.

The scholarship will be awarded under the following rules:—

1. The scholarship shall be known as the Monsanto Research Scholarship, and
2. Shall be open for award each year, normally in February, from applications lodged 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 £600, of which a minimum of £450 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. 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.
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.

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, or Mathematics II.

(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 along 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.

(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.

(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 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 and the Qualifying (Deferred) Examination 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, or Qualifying 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, 1953.

(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 the 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.

ADMISSION WITH ADVANCED STANDING.

It is possible for certain students to enter courses with advanced standing. Students who have completed a prescribed amount of part-time study in approved courses conducted by the Department of Technical Education may be granted exemption, on application, from one or more years of the degree courses.

Applied Science Courses.

Applied Chemistry and Chemical Engineering.

Arrangements are in hand to permit students to proceed to a degree by means of part-time courses. The preferred method will be by enrolling in the appropriate diploma course of the Department of Technical Education and having gained the diploma to take the additional courses prescribed. However, students will be permitted to transfer from diploma courses to degree courses at approved stages after completing such additional part-time studies as are required to bring them to the standard of the advanced year of the degree course in which it is desired to enrol.

Engineering Courses.

Students who are enrolled in diploma courses and who have completed the subjects indicated below, may be considered for exemption from the first year of the Engineering degree courses of the New South Wales University of Technology.

> Diploma Mathematics I and II, Chemistry 1a-b, Mechanical Engineering I and II, Diploma Physics I, Engineering Drawing and Descriptive Geometry, Materials and Structures I, or Strength of Materials I, Mechanical Engineering and Materials Laboratory I, Workshop Processes and Practice I, course in Language and Literature and Scientific Method.

Students who have been granted exemptions from the first year of the University degree courses may be permitted to undertake additional special part-time study (normally extending for two more years) and then gain exemption from the second year of the degree course. This period of special part-time study will not be the normal diploma course, but will be in specified subjects, as set out below.

Exemption Courses for Part-time Students—Second Year Engineering.

(A) MECHANICAL ENGINEERING, COURSE V.

Based on the Mechanical Engineering Diploma Stages I and II.

Year 2a:	Hours per week.	
Diploma Physics II	3	
Applied Mathematics III	2	
Materials and Structures II (1st Term)	2	
Engineering Design I	3	
Workshop Processes and Practice II	1	
	11	(1 term)
	9	(2 terms)
Year 2b:		
Applied Mathematics IV	2	
Engineering Design IIA (1st and 2nd Terms)	5	
Mechanical Engineering IIIE and F (3rd Term)	2½	
Mechanical Engineering IIIE and F, Tutorial (3rd Term)	1½	
*English, Scientific Method	2½	
	9½	(2 terms)
	8	(1 term)

(B) ELECTRICAL ENGINEERING, COURSE VI.

(i) Based on the Electrical Engineering Diploma Stages I and II.

Year 2a:	Hours per week.	
Diploma Physics II	3	
Diploma Mathematics III	2	
Materials and Structures II (1st Term)	2	
Engineering Design I	3	
C4a-b: Technology for Engineers	2½	
	12½	(1 term)
	10½	(2 terms)
Year 2b:		
Diploma Mathematics IV	2	
Engineering Design IIA (1st and 2nd Terms)	5	
Mechanical Engineering IIIE and F (3rd Term)	2½	
Mechanical Engineering IIIE and F Tutorial (3rd Term)	1½	
Electrical Engineering II	2½	
*English, Scientific Method	2½	
	12	(2 terms.)
	10½	(1 term.)

* These subjects are not normal diploma subjects, but are provided specially for students seeking admission with advanced standing to the appropriate degree work.

(ii) Based on the Radio Engineering Diploma Stages I and II.

Year 2a:	Hours per week.
Diploma Mathematics III	2
Mechanical Engineering II	1
Materials and Structures I	1
Mechanical and Materials Laboratory I	2
C4a-b: Technology for Engineers	2½
Engineering Design I	3
	11½

Year 2b:	
Diploma Mathematics IV	2
Engineering Design IIA (1st and 2nd Terms)	5
Mechanical Engineering IIIE and F (3rd Term)	2¼
Mechanical Engineering IIIE and F Tutorial (3rd Term)	1¼
Materials and Structures II (1st Term)	2
Electrical Engineering II	2½
*English, Scientific Method	2½
	14 (1 term.)
	12 (1 term.)
	10½ (1 term.)

(C) MINING ENGINEERING, COURSE VII.

Based on the Mechanical Engineering Diploma Stages I and II.

Year 2a:	Hours per week.
Diploma Physics II	3
Applied Mathematics III	2
Materials and Structures II (1st Term)	2
Engineering Design I	3
Geology for Engineers	2
	12 (1 term.)
	10 (2 terms.)

Year 2b:	Hours per week.
Applied Mathematics IV	2
Engineering Design IIA (1st and 2nd Terms)	5
Mechanical Engineering IIIE and F (3rd Term)	2¼
Mechanical Engineering IIIE and F Tutorial (3rd Term)	1¼
*Mining (1st and 2nd Terms)	2
*English, Scientific Method	2½
	11½ (2 terms.)
	8 (1 term.)

* Ibid.

(D) CIVIL ENGINEERING, COURSE VIII.

Based on the Civil Engineering Diploma Stages I and II.

Year 2a:	Hours per week.	
Physics II	3	
Applied Mathematics III	2	
Materials and Structures II (1st Term)	2	
Engineering Design I	3	
Geology for Engineers	2	
	12	(1 term.)
	10	(2 terms.)

Year 2b:		
Applied Mathematics IV	2	
Engineering Design IIA (1st and 2nd Terms)	5	
Mechanical Engineering IIIE and F (3rd Term)	2½	
Mechanical Engineering IIIE and F Tutorial (3rd Term)	1½	
*English, Scientific Method	2½	
	9½	(2 terms.)
	8	(1 term.)

APPLIED CHEMISTRY (COURSE II).

Alternative Part-time Course.

Students who enrolled prior to 1951 and who are in suitable employment and are otherwise eligible, may be granted permission to do the final year of the normal degree course in two years of part-day-part-evening study.

CHEMICAL ENGINEERING (COURSE III).

Alternative Part-time Course (Four-Year Course).

Students who enrolled in the Chemical Engineering Course III prior to 1951, who are in suitable employment and are otherwise eligible, may, until 1953, complete the final full-time year of the four-year course in Chemical Engineering by taking two years of part-day-part-evening study. The details of this course will in general follow the lines set out on page 54 of the 1950 Calendar.

* Ibid.

SYLLABUSES FOR UNDERGRADUATE COURSES.

In 1952, all four years of the Courses II, V, VI, VII and VIII will be available.

The first, second, third and fourth years of Course III in Chemical Engineering and the first, second and third years of course XI in Architecture will also be available in 1952.

The first and second years of Course I, Applied Physics, and Course IX, Wool Technology, will be available in 1952.

The first year syllabuses for Engineering Courses V, VI, VII and VIII are identical, as also are the syllabuses for the first year of Courses II and III in Applied Chemistry and Chemical Engineering. A student, therefore, may change his course of study in the Engineering Faculty at any time before the beginning of the second year, or may change from Applied Chemistry to Chemical Engineering, or vice versa, before the beginning of second year.

A student wishing to change his course of study must make written application to do so. The decision of the University in such cases must be accepted as final.

Subject Numbering System.

Subjects are numbered according to the school in which the instruction is given, each school utilizing a distinguishing Roman numeral as set out below. A course is a programme of study made up of subjects selected from several schools, and leads to a degree in a given field. The Arabic subject numbers are derived in the following manner:

(*a*) The number before the decimal point corresponds with the Roman numeral of the school providing the subject.

(*b*) The final figure indicates, unless otherwise stated, the year of the course in which the subject is taken.

(*c*) The remaining figure or figures with the combination of (*a*) and (*b*) provide the distinguishing number of the subject.

School.	Distinguishing Numeral.	Subject Numbers.
Physics	I	1.00 to 1.94
Chemistry	II	2.00 to 2.94
Chemical Engineering	III	3.00 to 3.95
Metallurgy	IV	4.00 to 4.94
Mechanical Engineering	V	5.00 to 5.94
Electrical Engineering	VI	6.00 to 6.94
Mining Engineering	VII	7.00 to 7.94
Civil Engineering	VIII	8.00 to 8.94
Wool Technology	IX	9.00 to 9.94
Mathematics	X	10.00 to 10.94
Architecture	XI	11.00 to 11.95
Humanities	..	G1 to G99

The time given to each subject is shown in two parts, the first figure representing lecture hours per week, the second, laboratory 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.

Faculty of Applied Science.

The courses in Applied Chemistry and Chemical Engineering extend over four and five years respectively as follows:—

First Year—36 weeks over three terms from late February to November (excluding examinations and vacations) full-time day study, 5 days each week.

Second and Third Years—36 weeks over three terms from late February to November (excluding examinations and vacations) part-day-part-evening course of 12 to 15 hours per week, involving attendance on two evenings per week and one full day or two half days per week.

Fourth and Fifth Years—as for first year.

The courses in Applied Physics and Wool Technology extend over four years as follows:—

First Year—36 weeks over three terms from late February to November (excluding examinations and vacations) full-time day study, 5 days per week.

Second and Third Years—24 weeks over two terms from late February to September (excluding examinations and vacations) full-time day study, 5 days per week. Twenty-two weeks training in industry.

Fourth Year—as for first year.

Faculty of Engineering.

The Engineering courses extend over four years full day time instruction as follows:—

First Three Years—24 weeks from late February to September (excluding examinations and vacations) full time study, 5 days per week, at the University of Technology, followed by 22 weeks in industry gaining approved industrial experience.

Students may gain exemption from the first one or two years by part time study in the Department of Technical Education.

Fourth Year—36 weeks from late February to November (excluding examinations and vacations) full time day attendance at the University of Technology.

Faculty of Architecture.

A revised course in Architecture will operate from 1952. This revision does not involve any major alterations in syllabus but merely in method of taking the course. For students enrolled prior to 1952 the course in Architecture extends over five years as follows:—

First Year—24 weeks from late February to September (excluding examinations and vacations) full time study, at the University. In the third term students will attend for part time study at the University while they are gaining experience in building work or similar approved employment.

Second Year—36 weeks from late February to November full time study at the University.

Third and Fourth Years—36 weeks from late February to November part time study at the University while the student is engaged in suitable professional employment in architecture.

Fifth Year—36 weeks from late February to November full time study at the University.

For students enrolling in 1952 the course will extend over six years involving full time attendance in only two terms in the first year and one term in the sixth year. The course will be arranged as follows:—

First Year—24 weeks over two terms (excluding vacations and examinations) full time study at the University. In the third term students will attend for part-time study at the University while gaining experience in building work or similar approved employment.

Second, Third and Fourth Years—36 weeks over three terms (excluding vacations and examinations) part-time study at the University concurrent with approved employment in Architecture.

Sixth Year—12 weeks (one term) full-time study followed by 24 weeks (excluding vacations and examinations) part-time study at the University, the part-time study being concurrent with approved employment in Architecture.

COURSE I—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 will provide a thorough training in the fundamentals of physical science and in mathematics, and particular emphasis will

be 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 six months 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 of industrial experimentation.

First Year.

(36 weeks' day course.)

		Hours per week. Term 1 lec. lab.	Term 2 lec. lab.	Term 3 lec. lab.
1.11	Physics	4 — 3	4 — 3	4 — 3
10.11	Mathematics	6 — 0	6 — 0	———
10.11B	Mathematics	0 — 0	0 — 0	4 — 0
2.41A	General Chemistry	3 — 3	3 — 3	3 — 6
2.21	Chemical techniques	0 — 3	———	———
1.21	Physical techniques I	0 — 2	0 — 4	———
5.101	Eng. drug. and Materials	1 — 0	1 — 0	1 — 3
G.10	English	2 — 0	2 — 0	0 — 0
G.20	History	1 — 0	1 — 0	0 — 0
		17—11	17—10	12—12

Second Year.

(24 weeks' day course.)

		Hours per week. Term 1 lec. lab.	Term 2 lec. lab.
1.12	Physics	4 — 3	4 — 3
10.12	Mathematics	5 — 0	5 — 0
2.32A	Physical chemistry	2 — 0	1 — 2
4.12	Metallurgy	1 — 2	1 — 0
5.21*	Workshop practice	0 — 3	0 — 3
1.22	Physical techniques II	0 — 3	0 — 3
G.20	History	2 — 0	0 — 0
G.1	Scientific Method	0 — 0	2 — 0
		14—11	13—11

* Taken in 2nd year of Course I.

THIRD YEAR.

(24 weeks' day course.)

		Hours per week. Term 1 lec. lab.	Term 2 lec. lab.
1.13	Physics	7 — 3	6 — 3
10.13	Mathematics	5 — 0	5 — 0
1.23A	Physical techniques III	———	0 — 3
1.23B	Physical techniques IV or	0 — 3	0 — 3
1.23C	Physical techniques V.		
1.23D	Physical techniques VI	0 — 2	0 — 2
6.93	Electrical machinery	0 — 3	0 — 3
G2	Social science	2 — 0	0 — 0
	Minor Elective (Humanities)	0 — 0	2 — 0
		14—11	13—14

FOURTH YEAR.

(36 weeks' day course.)

The fourth year course will be much more flexible in its time-table arrangements than those of the earlier years, and the formal instruction will be interspersed with colloquia and study group work. The following time-table would be typical:

		Hours per week. Term 1 lec. lab.	Term 2 lec. lab.	Term 3 lec. lab.
1.14	Physics	4/6—9+	4/6—9+	4+—9+
1.34	Mathematical physics	5/6—0	5/6—0	5/6—0
	Major Elective (Humanities)	3—0	3—0	0—0
		12/15—9+	12/15—9+	9/10—9+

COURSES II AND III—APPLIED CHEMISTRY AND CHEMICAL ENGINEERING.

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 course 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 the final year of the course, 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 course in Chemical Engineering, which is planned to afford students broad training in the fundamentals of science, chemistry and engineering. The work in chemistry, physics and mathematics is the same as given to Applied Chemistry students in the first year, so that students may delay making their choice as to which course to complete until they are about to enter the second year. Thereafter, the student in Chemical Engineering is given, in addition to his fundamental studies, work in mechanical, electrical and chemical engineering and industrial chemistry.

The courses in Applied Chemistry and Chemical Engineering are closely linked with practical training in industry. They are arranged so that two years in the middle of the courses are spent in combined academic study and works practice. In order to ensure sufficient time for study and reading, a maximum of two evenings per week is stipulated, the remainder of the study time each week being spread over two half days.

The Chemical Engineering course was revised in 1951 and the new course extends over five years instead of four. Students who completed the first or second years in 1950 will, in general, continue to follow the original syllabus which is being replaced by the revised syllabus stage by stage commencing in 1951.

COURSE II—APPLIED CHEMISTRY.

First Year.

(36 weeks' day course.)

		Term 1 Th.	Term 1 Pr.	Term 2 Th.	Term 2 Pr.	Term 3 Th.	Term 3 Pr.
2.41	General Chemistry	3	3	3	9	3	6
1.11A	Physics	3	3	3	3	3	3
10.11	Mathematics	4	2*	4	2*	0	0
10.11B	Mathematics	0	0	0	0	2	2*
5.101	Drawing and Materials	1	0	1	0	1	3
5.21	Workshop Practice	0	3	0	0	0	0
2.21	Chemical Techniques	0	3	0	0	0	0
G10	English	2	0	2	0	0	0
G20	History	1	0	1	0	2	0
		14	14	14	14	11	14

* Tutorials, etc.

Second Year.

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

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	Applied Maths. for Chemists	1 — 0	1 — 0	1 — 0
1.92	Physics	1 — 0	1 — 2	2 — 1*
G1	Scientific Method	2 — 0	0 — 0	0 — 0
G2	Social Science	0 — 0	1 — 0	1 — 0
		8 — 5	7 — 7	8 — 6

* Tutorials.

Third Year.

(36 weeks of 2 half days and 2 evenings 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	Applied Maths. for Chemists	1 — 0	1 — 0	1 — 0
3.14A	*Industrial Chemistry ..	2 — 0	2 — 0	2 — 0
	Minor Elective (Humanities)	1 — 0	1 — 0	0 — 0
		7 — 7	7 — 7	6 — 7

* Taken in third year of course II.

Fourth Year.

(36 weeks' day course.)

		Term 1 Th.	Term 1 Pr.	Term 2 Th.	Term 2 Pr.	Term 3 Th.	Term 3 Pr.
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	Organic Chemistry	1	4½	1	4½	1	4½
	Major Elective (Humanities)	3	0	3	0	0	0
	Electives (two to be chosen from the following).						
2.84	Adv. Organic Analysis ..	2	3	2	3	2	3
2.94	General Biochemistry ..	2	3	2	3	2	3
2.914	General Biology	2	3	2	3	2	3
4.14	General Metallurgy	2	2	2	3	2	3
7.94A	Geology and Mineralogy ..	2	3	2	3	2	3
		10	19½	10	19½	7	19½

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

CONVERSION COURSE IIc—APPLIED CHEMISTRY.

Holders of a diploma in Chemistry or Chemical Engineering who have completed the course of study set out in the current Handbook of the N.S.W. Department of Technical Education are required to complete the following additional subjects in order to qualify for the degree of Bachelor of Science:—

	Hours per week.
Diploma Mathematics II	2
Diploma Physics II	3
Conversion Humanities (English, History *or* Philosophy *and* Psychology, Economics *or* Politics)	3
	8

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.

COURSE III—CHEMICAL ENGINEERING.

First Year.

(36 weeks' day course.)

		Hours per week.		
		Term 1	Term 2	Term 3
		lec. lab.	lec. lab.	lec. lab.
2.41	General Chemistry	3 — 3	3 — 9	3 — 6
1.11A	Physics	3 — 3	3 — 3	3 — 3
10.11	Mathematics I	4 — 2	4 — 2	0 — 0
10.11B	Mathematics	0 — 0	0 — 0	2 — 2
5.101	Drawing and Materials ..	1 — 0	1 — 0	1 — 3
5.21	Workshop Practice	0 — 3	0 — 0	0 — 0
2.21	Chemical Techniques	0 — 3	0 — 0	0 — 0
G10	English	2 — 0	2 — 0	0 — 0
G20	History	1 — 0	1 — 0	2 — 0
		14—14	14—14	11—14

Second Year.

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

		Hours per week. Term 1 lec. lab.	Term 2 lec. lab.	Term 3 lec. lab.
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
1.12A	Physics	3 — 2½	3 — 0	4 — 2
10.22	Mathematics II	1 — 0	1 — 0	1 — 0
8.132	Materials and Structures ..	0 — 0	2 — 1	2 — 1
G1	Scientific Method	2 — 0	0 — 0	0 — 0
G2	Social Science	0 — 0	1 — 0	1 — 0
		9 — 5	10 — 3½	7 — 5½

Third Year.

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

		Hours per week. Term 1 lec. lab.	Term 2 lec. lab.	Term 3 lec. lab.
2.33	Physical Chemistry	1 — 2	1 — 3	1 — 3
2.52A	*Quantitative Analysis ..	1 — 3	1 — 2	1 — 0
2.63A	Organic Chemistry	1 — 2	1 — 2	1 — 3
10.23	Mathematics III	2 — 0	2 — 0	2 — 0
	Minor Elective (Humanities) .	1 — 0	1 — 0	0 — 0
		6 — 7	6 — 7	5 — 6

* Taken in third year of Course III.

Fourth Year.

(36 weeks' day course.)

		Hours per week. Term 1 lec. lab.	Term 2 lec. lab.	Term 3 lec. lab.
3.14†	Industrial Chemistry	1½— 2½	1½— 2½	1½— 2½
3.24	Chemical Engineering I ..	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 I	2 — 0	2 — 0	2 — 0
5.94	Mechanical Engineering ..	2 — 1	2 — 1	2 — 1
6.94	Electrical Engineering I ..	1 — 2	1 — 2	1 — 2
	Major Elective (Humanities)	3 — 0	3 — 0	0 — 0
		16½—11½	16½—11½	13½—11½

†Includes Factory visits.

FIFTH YEAR.

(34 weeks' day course.)

		Hours per week. Term 1 lec.	lab.	Term 2 lec.	lab.	Term 3 lec.	lab.
3.25	Chemical Engineering II ..	2	3	2	3	2	3
3.25A	Chemical Engineering III ..	2	0	2	0	2	0
3.55	Chemical Engineering Materials II	1	0	1	0	1	0
3.35	Advanced Chemical Engineering Design ..	2	3	2	3	2	3
6.95	Electrical Engineering II ..	2	3	2	3	2	3
3.75	Chemical Engineering Project	0	7	0	7	0	7
3.65	Chemical Engineering (Thermo Dynamics and Statics) ..	3	0	3	0	3	0
		12	16	12	16	12	16

CONVERSION COURSE IIIc—CHEMICAL ENGINEERING.

Holders of a diploma in Chemical Engineering who have completed the course of study set out in the current 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 Science.

	Hours per week.
Diploma Maths II	2
Conversion Physics (or Diploma Physics II)	3
Conversion Humanities (English, History or Philosophy and Psychology, Economics or Politics)	3
	8

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.

COURSE V. MECHANICAL ENGINEERING.

The course in Mechanical Engineering is 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 specialized knowledge of the product of any one industry. On the contrary, undergraduates are expected to obtain their practical experience by direct service in industry.

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.

In general, instruction by lectures is paralleled by laboratory work in which the student is given opportunity, not only to familiarize himself with materials, engines and machinery, but also to develop his ability to apply theory to the analysis of their characteristics.

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 realize how fully the knowledge he has gained during his course is used in engineering development and practice. The preparation of a thesis on the elective chosen provides a training in report writing and in technical exposition.

COURSE V—MECHANICAL ENGINEERING.

First Year.

(Common for Courses V, VI, VII and VIII.)

(24 weeks—day course.)

		Hours per week. Term 1. Lect.	Lab.	Term 2. Lect.	Lab.
1.41	Physics	3	3	3	3
2.111	Chemistry	3	3	3	0
*5.41	Descriptive Geometry	2	3	2	3
*8.11	Mechanics and Graphics	0	0		
5.11	Engineering Drawing and Materials	1½	3	1½	3
5.21	Workshop Processes and Practice	0	0	0	2½
10.11	Mathematics	6	0	6	0
G10	English	2	0	2	0
G20	History	1	0	1	0
		18½	12	18½	11½

*Time to be divided by mutual arrangement between the schools of Mechanical and Civil Engineering.

Second Year.

(24 weeks—day course.)

		Hours per week. Term 1. Lect.	Lab.	Term 2. Lect.	Lab.
1.42	Physics	2	2½	2	2½
2.122	Engineering Chemistry	1½	2	1½	2
4.122	Engineering Metallurgy				
5.12	Mechanical Engineering, Design I	1	2	1	2
5.32A	Mechanical Engineering 1A (Theory of Machines and Elem. Fluid Mechanics)	1	1½	1	1½
5.32B	Mechanical Engineering 1B (Heat Engines)	1	1½	1	1½
5.22	Engineering Processes	1	0	1	2
8.112	Strength of Materials	1½	3	1½	0
8.122	Structural Drawing and Design	1	2	1	2
10.12	Mathematics	5	0	5	0
G20	History	2	0	0	0
G1	Scientific Method	0	0	2	0
		17	14½	17	13½

Third Year.

(24 weeks—day course.)

		Hours per week. Term 1. Lect. Lab.	Term 2. Lect. Lab.
5.13	Mechanical Engineering Design II	1 — 3	1½— 4
5.33A	Mechanical Engineering IIA (Theory of Machines)	2 — 2	2 — 2
5.33B	Mechanical Engineering IIB (Heat Engines)	2 — 2	2 — 2
5.53	Fluid Machanics	1 — 2	1 — 2
6.83	Electrical Engineering	2 — 3	2 — 3
8.123	Structures	1½— 2	0 — 2
8.33	Engineering Computations ..	0 — 1½	0 — 1½
G2	Social Science	2 — 0	0 — 0
	Minor Elective (Humanities) ..	0 — 0	2 — 0
		11½—15½	10½—16½

N.B.—A Survey Camp of one week's duration will be conducted between second and third terms.

Fourth Year.

(36 weeks—day course.)

		Hours per week. Term 1. Lect. Lab.	Term 2. Lect. Lab.
5.14	Mechanical Engineering Design III	1½— 3	0 — 3½
5.34	Automatic Control Engineering ..	0 — 0	2 — 3
5.54	Fluid Mechanics II	1½— 3	1½— 3
5.64	Production Engineering Design ..	1½— 3	1½— 3
6.84	Electrical Engineering	1½— 2½	0 — 0
8.43*	Surveying	2 — 2	2 — 2
	Seminars	2	2
	One Professional Elective Subject	3	3
	Major Elective (Humanities) ..	3 — 0	3 — 0
		29½	29½

*Taken in fourth year of Course V.

THIRD TERM.

Wholly devoted to directed laboratory and research work on one Professional Elective Subject, with special reading and study associated with the preparation of a thesis.

Professional Elective Subjects.

Steam Engineering.
Internal Combustion and Hot Air Engines.
Electric Power Generation and Utilization.

Other specialised branches as announced from time to time, or by special arrangements with the Head of the Department.

Work will be carried out individually under a tutor system. Specialists from industry will be called in from time to time to give special talks to ensure that students are kept well abreast of current developments and problems.

CONVERSION COURSE Vc—MECHANICAL ENGINEERING.

Holders of a diploma in Mechanical Engineering who have completed the course of study set out in the current Handbook of the N.S.W. Department of Technical Education are required to complete the following additional work in order to qualify for the B.E. degree.

1. Satisfactorily complete the following subjects in the evening as one year courses over three terms.

	Hours per week.
Conversion Mathematics	3
Conversion Physics	3
Strength of Materials (Conversion)	1
Conversion Humanities (English History *or* Philosophy and Psychology, Economics or Politics)	3
	10

2. On completion of the work prescribed under (1) above, the student may—

(*a*) enrol for the fourth year of the normal degree course with the substitution of 8.33 Engineering Computations for 5.14 Mechanical Engineering Design III, or

(*b*) enrol for the following programme of part-time study over two years.

FIRST YEAR.

	Hours per week.
Fluid Mechanics	3
*Engineering, Surveying I	1
†Automatic Control, Engineering	2
†Engineering, Computations	1
Major Elective (Humanities)	3
	10

*Plus seven periods of six hours spent in Surveying Fieldwork.

SECOND YEAR.

	Hours per week.
One Professional Elective Subject	3
†Production Engineering Design	3
†Electrical Engineering	1½
Seminars	2
	9½

† Subjects marked thus will be given in special evening classes for conversion students.

Note.—A thesis will be required of conversion students. In determining its nature and content the student's diploma thesis will be taken into consideration.

COURSE VI—ELECTRICAL ENGINEERING.

In preparation for a career in any branch of electrical engineering the student must develop a working mastery 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 that scientific outlook and approach so important to the development of science.

There are three main branches of electrical engineering, viz:—(a) Electric Power—concerned mainly with electrical machinery, power generation, transmission and distribution and public power utilities; (b) Electronics and High Frequency—concerned mainly with radio communications, radar and other navigational devices, television, and a growing range of industrial applications and measuring instruments;

(c) Line Communications—concerned with telegraph and telephone public utilities. By allowing the student to choose, with the approval of the Professor, two major elective subjects in his Fourth Year, from a range of five, covering all three branches, the curriculum has been made flexible enough to meet the growing demands of this modern age and to meet the student's individual needs. However, the first three years of the course allow no choice, thus ensuring that all students receive a grounding in the fundamentals of circuit work, electric power work and electronics.

Further, the subject Industrial Electronics and Control is compulsory for all students in the fourth year. This subject is a link between electronics and electric power work, covering as it does motor controls, servomechanisms, special machines such as amplidynes, special electronic tubes such as polyphase mercury arc rectifiers, and other common subjects such as regulators, speed control, welding control, etc.

In the final year each student is given an individual project (a professional elective subject) which he studies himself with guidance from the staff. He is encouraged to set up his own experimental apparatus and carry out his own tests. Each student is required to submit a thesis on his project. The aim is to allow the student to take responsibility for a particular job of work as he will later do in industry, and to throw upon him the necessity of desinging and building a working unit. In some larger projects a team is allocated to the one project, with individual responsibilities allocated for each portion of the work.

COURSE VI—ELECTRICAL ENGINEERING.

First Year.

(Common for Courses V, VI, VII and VIII.)

(24 weeks—day course.)

		Hours per week. Term 1. Lect.	Lab.	Term 2. Lect.	Lab.
1.41	Physics	3	3	3	3
2.111	Chemistry	3	3	3	0
*5.41	Descriptive Geometry	2	3	2	3
*8.11	Mechanics and Graphics	0	0		
5.11	Engineering Drawing and Materials	1½	3	1½	3
5.21	Workshop Processes and Practice	0	0	0	2½
10.11	Mathematics	6	0	6	0
G10	English	2	0	2	0
G20	History	1	0	1	0
		18½	12	18½	11½

*Time to be divided by mutual arrangements between the schools of Mechanical and Civil Engineering.

Second Year.

(24 weeks—day course.)

		Hours per week. Term 1. Lect. Lab.	Term 2. Lect. Lab.
1.12	Physics	4 — 3	4 — 3
4.122 2.122	Engineering Metallurgy Engineering Chemistry	1½— 2	1½— 2
5.32A	Mechanical Engineering 1A (Theory of Machines and Elem. Fluid Mechanics)	1 — 1½	1 — 1½
5.32B	Mechanical Engineering 1B (Heat Engines)	1 — 1½	1 — 1½
6.12	Electric Circuit Theory	1½— 0	1½— 2
8.112	Strength of Materials	1½— 3	1½— 0
8.122	Structural Drawing and Design	1 — 2	1 — 2
10.12	Mathematics	5 — 0	5 — 0
G20	History	2 — 0	0 — 0
G1	Scientific Method	0 — 0	2 — 0
		18½—13	18½—12

Third Year.

(24 weeks—day course.)

		Hours per week. Term 1. Lect. Lab.	Term 2. Lect. Lab.
5.33B	Heat Engines	2 — 2	2 — 2
5.53	Fluid Mechanics	1 — 2	1 — 2
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
10.33	Mathematics	2 — 0	2 — 0
G2	Social Science	2 — 0	0 — 0
	Minor Elective (Humanities)	0 — 0	2 — 0
		16 —13	16 —13

Note.—A survey camp of one week will be held after the examinations at beginning of third term.

Fourth Year.

(36 weeks—day course.)

First Two Terms.

	Two Major Elective Subjects	14
6.304	Industrial Electronics and Control	3 — 4
	One Professional Elective Subject	3
	Major Elective (Humanities)	3 — 0
		27

Third Term.

Wholly devoted to directed laboratory and reasearch work on an approved professional elective subject, with special reading and study associated with the preparation of a thesis.

Major Elective Subjects.	Hours per week. Lect.	Lab.
6.214 Electric Power Engineering A	3	4
6.224 Electric Power Engineering B	3	4
6.314 High Frequency Engineering A	4	4
6.324 High Frequency Engineering B	3	4
6.334 Line Communication Engineering	3	4

Professional Elective Subjects.

Each student will be allocated a specific topic at the commencement of the year for individual study and experiment and on which a thesis will be required.

NOTE.—Opportunity is given to final year students to attend practical wiring classes towards qualifying for an Electrician's Licence

CONVERSION COURSE VIc—ELECTRICAL ENGINEERING.

COURSE VI C1—(For Diplomates in both Electrical and Radio Engineering).

Holders of a diploma in both Electrical and Radio Engineering who have completed the course of study set out in the current Handbook of the N.S.W. Department of Technical Education are required to complete the normal fourth year of the Electrical Engineering degree course in order to qualify for the degree of Bachelor of Engineering.

COURSE VI C2—(For Diplomates in Electrical Engineering).

Holders of a diploma in Electrical Engineering who have completed the course of study set out in the current 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.

1. Complete the following subjects given in the evening, as one year courses over three terms.

	Hours per week.
Conversion Mathematics	3
Conversion Course in Physics	3
Strength of Materials (Conversion)	1
Humanities (Conversion) English, History *or* Philosophy and Psychology, Economics *or* Politics	3
Fluid Mechanics—Lecture	1
Fluid Mechanics—Laboratory & Tutorial	2
Electric Circuit Theory (Conversion)	3
	16

This work should normally be spread over two years, each of three terms, about half of the subjects being taken in one year and the remainder in the second year. However, if the majority of subjects are completed in one year, the student may be permitted to carry the remaining few subjects while attending the full-time course.

The subjects which may be taken simultaneously with the full-time work are:—Fluid Mechanics and Strength of Materials.

2. On completion of the work prescribed under (1) above the student may seek enrolment in the normal fourth year of the Electrical Engineering degree course.

COURSE VI C3—(For Diplomates in Radio Engineering).

Holders of a diploma in Radio Engineering who have completed the course of study set out in the current 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.

1. Complete the following subjects given in the evening as one year courses over three terms.

	Hours per week.	
C4a-b Technology for Engineers	2½	
Fluid Mechanics—Lecture	1	
Fluid Mechanics—Laboratory and Tutorials ..	2	
Mechanical Engineering II	1	
Materials and Structures I	1	
Mechanical Engineering IIIE	2¼	(1 term)
Mechanical and Materials Laboratory I	2	
Materials and Structures II	2	(1 term)
Engineering Design I	3	
Electric Circuit Theory (Conversion)	3	
Humanities (Conversion), English, History, *or* Philosophy and Psychology, Economics, *or* Politics	3	

2. On completion of the work prescribed in (1) above the student may seek enrolment in the normal Fourth year of the Electrical Engineering degree course.

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. Mining subjects 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 dealt with 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.

COURSE VII—MINING ENGINEERING.

First Year.

(Common for Courses V, VI, VII, and VIII.)

(24 weeks—day course.)

		Hours per week. Term 1. Lect.	Lab.	Term 2. Lect.	Lab.
1.41	Physics	3	3	3	3
2.111	Chemistry	3	3	3	0
*5.41	Descriptive Geometry	2	3	2	3
*8.11	Mechanics and Graphics	0	0		
5.11	Engineering Drawing and Materials	1½	3	1½	3
7.21	Mining Processes and Practice	0	0	0	2½
10.11	Mathematics	6	0	6	0
G10	English	2	0	2	0
G20	History	1	0	1	0
		18½	12	18½	11½

* Time to be divided by mutual arrangement between the schools of Mechanical and Civil Engineering.

Second Year.

(24 weeks—day course.)

		Hours per week. Term 1. Lect.	Lab.	Term 2. Lect.	Lab.
1.42	Physics	2	2½	2	2½
2.122	Engineering Chemistry	1½	2	1½	2
4.122	Engineering Metallurgy				
5.32A	Mechanical Engineering 1A (Theory of Machines and Elem. Fluid Mechanics)	1	1½	1	1½
5.32B	Mechanical Engineering 1B (Heat Engines)	1	1½	1	1½
7.32	Mining	2	0	4	0
8.112	Strength of Materials	1½	3	1½	0
8.122	Structural Drawing and Design	1	2	1	2
7.92	Geology	2	0	2	0
10.12	Mathematics	5	0	5	0
G20	History	2	0	0	0
G1	Scientific Method	0	0	2	0
		19	12½	21	10½

N.B.—Field excursions will be arranged on several Saturdays in connection with the instruction in Geology.

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Third Year.

(24 weeks—day course.)

		Hours per week. Lect.	Lab.	
5.53	Fluid Mechanics	1	2	
6.83	Electrical Engineering	2	3	
7.33	Mining	2	3	
7.43	Metalliferous Mining	2	0	
8.43	Surveying	2	2	
7.93	Geology	2	3	
G2	Social Science	2	0	(Term 1)
	Minor Elective (Humanities) ..	2	0	(Term 2)
	First Aid	1	0	
		15	13	

N.B.—A Survey Camp of one week's duration will be conducted immediately after the examinations at the beginning of third term and will be followed by a Geology excursion also of one week's duration.

Fourth Year.

(36 weeks—day course.)

		Hours per week. Term 1. Lect.	Lab.	Term 2. Lect.	Lab.
6.84	Electrical Engineering	2	0	0	0
7.34	Mining	2	0	3	0
7.54	Coal Mining	2	3	2	3
	or				
7.44	Metalliferous Mining				
7.64	Preparation of Minerals	2	3	2	3
8.44	Surveying	1½	2	1½	2
7.94	Geology	1	2	1	2
	Major Elective (Humanities) ..	3	0	3	0
		13½	10	12½	10

N.B.—A Survey Camp of one week's duration will be conducted between second and third terms. Practical work connected with Astronomy and Geodesy will be conducted on several evenings during the course. A Geology excursion will be conducted during the vacation at the end of the first term.

Third Term.

Additional time is to be spent in first and second terms on reading and preparation for thesis work on an elective mining subject. The whole of the third term will be devoted to work on the elective subject and relevant investigations leading to the presentation of a thesis. The head of the department will discuss assignments for this work with each student during the third year.

N.B.—References to Mining Acts and Regulations will be made throughout the course in the mining lectures to which such Acts and Regulations apply.

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 1952 Handbook of the New South Wales Department of Technical Education, are required to complete the following additional work:—

Satisfactorily complete—

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 till 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	Structural and Mechanical Drawing and Design	3
5.53	Hydraulics	3
7.32	Mining	2
7.33	Mining	5
10.12	Mathematics	5
	Humanities (Conversion) English, History *or* Philosophy and Psychology, Economics *or* Politics	3
		25½

The second year syllabus will be the normal course set out for the fourth year of the degree course.

COURSE VIII—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, hydroelectric works, 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 organizational in their nature.

The course in Civil Engineering is 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, heat engines, engineering chemistry and the like.

Included in the fourth year is provision 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 upon 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.

Students in the first, third and fourth years of the course are obliged to attend a survey camp of one week's duration after the examinations at the end of the 2nd term and before commencement of the practical experience period.

Field excursions will be arranged on Saturdays in connection with the instruction in Geology and in addition third year students are expected to attend a Geology camp of one week's duration at the conclusion of the survey camp.

COURSE VIII—CIVIL ENGINEERING.

First Year.

(Common for Courses V, VI, VII and VIII.)

(24 weeks—day course.)

		Hours per week. Term 1. Lect.	Lab.	Term 2. Lect.	Lab.
1.41	Physics	3	3	3	3
2.111	Chemistry	3	3	3	0
*5.41	Descriptive Geometry	2	3	2	3
*8.11	Mechanics and Graphics	0	0		
5.11	Engineering Drawing and Materials	1½	3	1½	3
5.21A	Workshop Processes and Practice	0	0	0	2½
10.11	Mathematics	6	0	6	0
G10	English	2	0	2	0
G20	History	1	0	1	0
		18½	12	18½	11½

*Time to be divided by mutual arrangement between the Schools of Mechanical and Civil Engineering.

A Survey Camp of one week's duration will be conducted after the examinations at the end of the second term and before the student commences his practical experience.

Second Year.

(24 weeks—day course.)

		Hours per week. Term 1. Lect. Lab.	Term 2. Lect. Lab.
1.42	Physics	2 — 2½	2 — 2½
2.122	Engineering Chemistry	1½— 2	1½— 2
4.122	Engineering Metallurgy		
5.32B	Heat Engines	1 — 1½	1 — 1½
8.112	Strength of Materials	1½— 3	1½— 0
8.122	Structural Drawing and Design	1 — 2	1 — 2
8.92	Properties of Materials	0 — 0	0 — 3
5.12	Mechanical Engineering, Design I	1 — 2	1 — 2
7.92A	Geology	2 — 1	2 — 1
10.12	Mathematics	5 — 0	5 — 0
G20	History	2 — 0	0 — 0
G1	Scientific Method	0 — 0	2 — 0
		17 —14	17 — 14

N.B.—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. Lect. Lab.	Term 2. Lect. Lab.
8.53	Fluid Mechanics	2 — 0	2 — 3
8.73	Soil Mechanics	1 — 3	0 — 0
6.83	Electrical Engineering	2 — 3	2 — 3
8.23	Materials of Construction	2 — 2	2 — 2
8.113	Structures	1½— 2	1½— 2
8.43	Surveying	2 — 2	2 — 2
8.63	Civil Engineering	2 — 0	2 — 0
8.33	Engineering Computations	0 — 1½	0 — 1½
10.43	Mathematics	1½— 0	1½— 0
G2	Social Science	2 — 0	0 — 0
	Minor Elective (Humanities)	0 — 0	2 — 0
		16 —13½	15 —13½

A Survey Camp of one week's duration will be conducted at the beginning of third term and will be followed by a Geology excursion also of one week's duration.

Fourth Year.

(36 weeks—day course.)

First Two Terms.

		Lect. Hours per week.	Lab.
8.114	Structures	2 —	3
8.44	Surveying	1½ —	2
8.64	Civil Engineering	6 —	0
11.44	History of Architecture and Structural Aesthetics	1 —	0
8.84	City Planning	1 —	0
	Professional Elective Subjects ..	10	
	Major Elective (Humanities) ..	3 —	0
		29½	

N.B.—A Survey Camp of one week's duration will be conducted between second and third terms.

Third Term.

Mainly devoted to directed laboratory and research work on Professional Elective Subjects, with special reading and study associated with the preparation of a thesis.

Professional Elective Subjects.

Each student is required to pursue work adapted to his special interests 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. Specialists from industry will be called in from time to time to give special lectures and to ensure that students are kept well abreast of current developments and problems. The elective subjects listed may be added to as occasion demands. Students may be instructed to attend certain lectures given by learned societies and other educational authorities during the year.

Option 1—Civil Engineering Design.

(*a*) Theory and design of structures.

(*b*) Soil Mechanics and Foundation Engineering.

(*c*) Hydrology and Hydraulics.

(*d*) Advanced Mathematics.

(*e*) 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—Surveying and Investigations.

(*a*) Astronomy and Geodesy.
(*b*) Topographical Surveying, Aerial Surveying and Photogrammetry.
(*c*) Soil Mechanics.
(*d*) Hydrology and Hydraulics.
(*e*) Geology.

CONVERSION COURSE VIIIc—CIVIL ENGINEERING.

Holders of a diploma in Civil Engineering who have completed the course of study set out in the current Handbook of the New South Wales Department of Technical Education are required to complete the following additional work for the degree of Bachelor of Engineering:—

1. Complete the following subjects given in the evening as one year courses over three terms.

	Hours per week.
Conversion Mathematics	3
Conversion Course in Physics	3
Strength of Materials (Conversion)	1
Fluid and Soil Mechanics (Conversion) ..	1
Humanities (Conversion): English, History *or* Philosophy and Psychology, Economics *or* Politics	3
	11

2. On completion of the work prescribed under (1) above, the student may seek enrolment in the fourth year of the degree course with the following amendments:

Additional Subjects: 8.33 Engineering Computations and 10.43 Mathematics.

Exemptions: 8.114 Structures, 8.44 Surveying (Final exam. to be taken), Sections of 8.64 Civil Engineering already completed.

COURSE IX—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 recent report, prepared by an expert of the Australian Wool Realisation Commission, emphasises 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. Students

are thus required to spen dat least twelve months on approved properties during second and thir years and diaries and reports are required covering this period.

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 Department, 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.

FIRST YEAR.

(36 weeks—day course.)

		Hours per week. Lect.		Pract.	
1.11A	General Physics	3	—	3	
2.41B	General Chemistry	3	—	6	
2.911	Biology	2	—	3	
10.11A	Mathematics	6	—	0	
G10	English	2	—	0	Terms 1&2 only.
G20	History	1	—	0	Terms 1&2 only.
		17	—	12	

SECOND YEAR.

(24 weeks—day course.)

		Hours per week. Lect.		Pract.	
2.912	Biology II (Physiology)	2	—	3	
2.92	Biochemistry	2	—	3	
9.12	Sheep Husbandry I (Breeds and Management)	2	—	0	
9.22	Agronomy I	3	—	0	
9.32	Economics	2	—	0	
9.42	General Textiles I	1	—	2	
9.52	Wool I	1	—	6	
G20	History	2	—	0	(Term 1)
G1	Scientific Method	2	—	0	(Term 2)
		15	—	14	

21 weeks for remainder of year to be spent in activities concerned with wool production.

THIRD YEAR.

(24 weeks—days course.)

		Hours per week. Lect.	Pract.	
9.13	Sheep Husbandry II:			
	(a) Physiology II	3	— 6	
	(b) Sheep Health, including Microbiology	3	— 0	
9.43	General Textiles II	1	— 3	
9.63	Statistics	1	— 1	
9.53	Wool II	0	— 9	
G2	Social Science	2	— 0	(Term 1)
	Minor Elective (Humanities) ..	2	— 0	(Term 2)
		10	— 19	

21 weeks for remainder of year to be spent in activities concerned with wool production.

FOURTH YEAR.

(36 weeks—day course.)

		Hours per week. Lect.	Pract.
9.74	Wool Science	2	— 2
9.84	Project	0	— 5
	Major Elective (Humanities) ..	3	— 0
		5	— 7

Plus elective subjects of either Option I or Option II.

Option I:

		Hours per week. Lect.	Pract.
9.94	Genetics	2	— 1
9.104	Nutrition	3	— 2
9.114	Farm Livestock	2	— 0
9.24	Pastoral Agronomy	2	— 2
9.124	Farm Management and Mechanisation	3	— 0
		12	— 5

Option II:

		Hours per week. Lect. and Pract.
9.134	Accountancy	2
9.34	Banking, Currency, Foreign Exchange ..	1½
9.144	Commercial Law	1½
9.44	Yarn Manufacture (Wool)	6
9.54	Wool III	5
9.154	Synthetic Fibres	1
		17

COURSE XI—ARCHITECTURE.

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, ability to analyse accurately the requirements in specific cases, 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 the lectures in the Humanities and the Fine Arts are an integral part of the course.

COURSE XI—ARCHITECTURE.

The course in Architecture was revised as from 1952. The revised course will replace the original course stage by stage 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 12 weeks part-time course of two half days and two or three evenings per week covering third term.)

		Hours per week.					
		Term 1		Term 2		Term 3	
		Lect.	Pract.	Lect.	Pract.	Lect.	Pract.
11.81	A series of lectures by the Professor of Architecture entitled "Introduction to Architecture and Building.						
11.11	Descriptive Geometry	0	2	0	2	0	2
11.21	Freehand Drawing and Presentation	0	5½	0	5½	0	2½
11.31	Architectural Studies and Design	1	0	1	0	1	0
11.41	History of Architecture I ..	1	0	1	0	1	0
11.51	Building Science I	0	0	1	0	0	0
11.61	Building Trades and Crafts (Equiv. time)	0	1½	0	1½	0	1½
11.71A	Building Construction Theory I .	1	0	1	0	1	0
11.71B	Building Construction Drawing I	0	4	0	3	0	2
11.101	Theory of Structures I ..	1	0	1	0	1	0
1.91	Physics	2	2	2	2	0	0
2.131	Chemistry	2	2	2	2	0	0
10.51	Mathematics	2	0	2	0	0	0
G20	History	1	0	1	0	0	0
G10	English	2	0	2	0	0	0
	Total hours per week	13	17	14	16	4	8

For the subject "Building Trades and Crafts," groups of students will be formed, studying for the equivalent time stated.

Second Year.

(36 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		Term 2		Term 3	
		Lect.	Pract.	Lect.	Pract.	Lect.	Pract.
11.22	Freehand Drawing and Presentation	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
11.82	Theory of Architecture A	1	0	1	0	1	0
11.52	Building Science II	1	0	0	0	0	0
11.72A	Building Construction Theory II	1	0	1	0	1	0
11.72B	Building Construction Drawing II	0	1	0	2	0	2
11.102	Theory of Structures II	1	0	1	0	1	0
8.42	Land Surveying (Equiv. time)	1	0	0	1	0	1
8.22	Materials of Construction	0	2	0	2	0	2
G20	History	2	0	0	0	0	0
G1	Scientific Method	0	0	2	0	0	0
	Total hours per week	8½	6½	6½	8½	4½	8½

For the subject "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.

(36 weeks part-time course requiring attendance for two half days or one full day and three evenings per week.)

		Hours per week. Term 1 Lect.	Term 1 Pract.	Term 2 Lect.	Term 2 Pract.	Term 3 Lect.	Term 3 Pract.
11.43	History of Architecture III ..	1	0	1	0	1	0
11.83	Theory of Architecture B ..	1	0	1	0	1	0
11.73	Building Construction III ..	1	1	1	1	1	1
11.93	Architectural Design and Construction A	0	5	0	5	0	5
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
7.83	Geology	1	0	1	0	0	4
G2	Social Science	2	0	0	0	0	0
	Minor Elective (Humanities)	0	0	2	0	0	0
		8	6	8	6	5	6

Fourth Year.

(36 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.	Term 1 Pract.	Term 2 Lect.	Term 2 Pract.	Term 3 Lect.	Term 3 Pract.
11.44	History of Architecture IV ..	0	0	1	0	1	0
11.94	Architectural Design and Construction B	0	3	0	3	0	3
11.114	Architectural Research or 8.124 Structurial Design A ..	0	2	0	2	0	2
11.154	Interior Furnishing and Decoration	0	0	0	0	1	0
11.164	Acoustics & Sound Insulation	1	0	0	0	0	0
11.204	Building Services and Equipment B	2	0	2	0	2	0
11.144 / G60	Building Research Review .. or Painting, Sculpture and Allied Arts	0	0	1	0	0	0
	Major Elective (Humanities)	3	0	3	0	0	0
	Total hours per week ..	6	5	7	5	4	5

Subject No. 11.144 consists of 10 lectures and a thesis and with subject G60 alternates in a two year cycle. A student must take both subjects during his 4th and 5th years.

Fifth Year.

(36 weeks' part-time course requiring attendance for three evenings per week.

		Hours per week. Term 1 Lect.	Term 1 Pract.	Term 2 Lect.	Term 2 Pract.	Term 3 Lect.	Term 3 Pract.
11.95	Architectural Design and Construction C	0	3	0	3	0	3
11.125	Professional Practice ..	1	0	1	0	1	0
11.135	Specifications	1	0	1	0	1	0
11.215	Estimating	1	0	1	0	1	0
11.115	Planning Research or 8.125 Structural Design B ..	0	2	0	2	0	2
11.144	Building Research Review or G60 Painting, Sculpture and Allied Arts	0	0	1	0	0	0
	Total hours per week ..	3	5	4	5	3	5

Subject No. 11.144 consists of 10 lectures and a thesis and with subject No. G60 alternates in a two year cycle. A student must take both subjects during his years 4 and 5.

Sixth Year.

(36 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 normal attendance at the school. They do not give the total hours involved on the research or design projects.

		Hours per week. Term 1 Lect.	Term 1 Pract.	Term 2 Lect.	Term 2 Pract.	Term 3 Lect.	Term 3 Pract.
11.96	Architectural Design and Construction D	0	3	0	0	0	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
11.126	Professional Practice (Advanced)	0	0	0	0	2	0
	Total hours per week	3	27	0	5	2	0

HUMANITIES.

The School of Humanities and Social Sciences is responsible for the teaching of general courses in English, History, Philosophy, Psychology, Economics and Politics.

Students in all other Schools must attend the undergraduate lectures in these courses, and pass the necessary examinations in order to qualify for their degrees.

In the first three years, all students study the same courses. In addition, in Third Year, students elect one of the minor courses provided. In Fourth Year students elect, as their sole course, one of the major courses not associated with the same subject as already elected in Third Year.

Though the distribution differs with the various Schools, the standard pattern for Four-year full-time students is as follows:—

First Year: English (G10) *and* History (G20).

Second Year: History (G20—continuation of course) *and* Philosophy (G1 Scientific Method).

Third Year: Philosophy—Social Sciences (G2) *and* Minor Elective (one of G4, G12, G22, G31, G41, G51).

Fourth Year: Major Elective only (one of G3, G11, G21, G30, G40, G50—not being a subject already chosen as a minor elective).

The full range of subjects is:

G1 Philosophy—Scientific Method.

G2 Philosophy—Social Sciences.

G10 English.

G20 History.

Electives:

Major.	*Minor.*
G3 Philosophy.	G4 Philosophy.
G11 English.	G12 English.
G21 History.	G22 History.
G30 Politics.	G31 Politics.
G40 Psychology.	G41 Psychology.
G50 Economics.	G51 Economics.

DESCRIPTION OF SUBJECTS OF INSTRUCTION.

The description of subjects given below is meant to give a general idea of the type of work dealt with under the various subdivisions of the syllabuses. A full detailed syllabus for each subject is normally prepared and held by the New South Wales University of Technology and these are available for examination by any person entitled to inspect such details.

The list given below is necessarily subject to change.

Physics.

Subjects 1.00 to 1.04.

1.11 AND 1.11A PHYSICS.

Mechanics and properties of matter.

Mass, length, time, derived units. Elementary statics. Elementary dynamics of a particle, circular motion, simple pendulum. Elementary rigid dynamics. Friction. Stress, strain, moduli. Elements of hydrostatics, surface tension, capillarity, viscosity, Bernoulli's theorem. Periodic motion and propagation of waves.

Light.

Elements of geometrical optics, simple optical instruments, the eye. Elements of physical optics, absorption, dispersion, interference, diffraction. Photometry.

Magnetism and electricity.

Elementary magnetism. The earth as a magnet. Electric currents, magnetic, thermal, mechanical and chemical effects of currents. Elementary circuits and measurements. Electro-magnetic induction. Introduction to electrostatics: potential, capacity, dielectrics.

Heat.

Temperature, thermometry. Expansion. Gas laws. Calorimetry. Mechanical equivalent of heat. Vapour pressure, humidity, hygrometry. Heat transference. Introductory kinetic theory.

Advanced mechanics and properties of matter.

Elements of dimensional analysis. Surface tension. Viscosity: Poisseuille's and Stokes' laws. Bending and torsion. Rigid dynamics. Gyroscopic motion, precession. Newton's law of gravitation, elements of planetary motion. Rockets. Elementary stress analysis, and measurements of strain.

Sound.

Vibration of strings, rods, columns or air. Velocity of sound. Resonance. Pitch. Generation, transmission and reception of sound. Doppler effect. Beats and interference.

1.12 AND 1.12A PHYSICS.

Electricity and magnetism.

Potential, Gauss theorem, Laplace equation. Systems of conductors, condensers, dielectrics. Resistivity, effects of temperature and strain, condition of media. Kirchhoff's laws, Campbell and Thevenin equivalence theorems. Magnetic effects of currents, self and mutual inductance. Galvanometers. Ferromagnetism. Theory of varying currents. Thermoelectricity; elementary electronics.

Light.

Wave theory, Huyghen's principle. Interference, elementary theory of grating. Polarization, double refraction. Circular and elliptical polarization. Strain birefringence and elements of photoelasticity. Rotation of plane of polarized light.

Introduction to atomic physics.

Elementary particles, conduction through gases, charge and mass of electron. Ions. Cathode and positive rays. Isotopes, mass spectrograph. Quanta. Thermo- and photo-electricity. Rutherford-Bohr atom and radiation. X-rays. Radioactivity.

Heat and thermodynamics.

Elementary kinetic theory. First law of thermodynamics, energy considerations. Second law: efficiency of heat engines, absolute temperature scale, entropy. Radiation and pyrometry.

1.13 PHYSICS.

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.

Electronics.

Phenomena and laws of electronic emission. Diode, triode, tube characteristics. Amplification. Multielectrode tubes, oscillators, voltmeters. CRO multiplier tubes, X-ray tubes, betatron, cyclotron, electron microscope, Geiger tubes. Generation, transmission and reception of radio waves.

Advanced wave motion and radiation.

Analytical treatment of plane and spherical waves. Velocity of propagation. Waves in elastic media. Genesis and propagation of electromagnetic waves. Reflexion, refraction, dispersion, group velocity.

Light.

Interference, multiple reflexions, thin films, coated surfaces, interferometry. Fraunhofer and Fresnel diffraction phenomena. Diffraction by circular and rectangular apertures. Babinet's principle, coronas. Resolving powers. Brewster's law, double refraction. Stressed media, optical rotation.

Advanced thermodynamics and radiation.

Thermodynamic functions of state. Joule-Thomson experiment. Application of thermodynamic principles. The phase rule. Stefan-Boltzmann and Wiess laws of radiation. Quantum theory. Introduction to statistical theory.

Introduction to physics of solid state.

Fundamentals of crystallography. Stereographic projection. X-ray diffraction. Determination of structure and texture. Constitution of metals and alloys. Elastic and plastic properties of crystals and aggregates.

1.14 PHYSICS.

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.

Radiation from point sources pistion, horns. Theory of tranducers. Reciprocity. Measurements in sound field. Reflection and absorption of sound. Acoustics of buildings.

Theory and application of ferromagnetism.

Langevin-Weiss and Heisenbery 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.

Introduction of 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.

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 propagation.

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.

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 II: 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: Photometric Photography.

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.

1.34 MATHEMATICAL PHYSICS.

Selected topics in Mathematical Physics including some of the following: tensors, elasticity, boundary value problems, hydrodynamics, calculus of variations, numerical methods.

1.41 PHYSICS.

Mechanics and properties of matter.

Mass, length, time, derived units. Elementary statics. Elementary dynamics of a particle, circular motion, simple pendulum. Elementary rigid dynamics. Friction. Stress, strain, moduli. Elements of hydrostatics, surface tension, capillarity, viscosity, Bernoulli's theorem. Periodic motion and propagation of waves.

Light.

Elements of geometrical optics, simple optical instruments, the eye. Elements of physical optics, obsorption, dispersion, interference, diffraction. Photometry.

Magnetism and electricity.

Elementary magnetism. The earth as a magnet. Electric currents, magnetic, thermal, mechanical and chemical effects of currents. Elementary circuits and measurements. Electromagnetic induction. Introduction to electrostatics: potential, capacity, dielectrics.

Heat.

Temperature, thermometry. Expansion. Gas laws. Calorimetry. Mechanical equivalent of heat. Vapour pressure, humidity, hygrometry. Heat transference. Introductory kinetic theory.

1.42 PHYSICS.

Electricity and magnetism.

Potential, Gauss theorem, Laplace equation. Systems of conductors, condensers, dielectrics. Resistivity, effects of temperature and strain, condition in media. Kirchhoff's laws, Campbell and Thevenin equivalence theorems. Magnetic effects of currents, self and mutual inductance. Galvanometers. Ferromagnetism. Theory of varying currents. Thermoelectricity; elementary electronics.

Light.

Wave theory, Huyghen's principle. Interference, elementary theory of grating. Polarization, double refraction. Circular and elliptical polarization. Strain birefringence and elements of photoelasticity. Rotation of plane of polarized light.

Heat and thermodynamics.

Elementary kinetic theory. First law of thermodynamics, energy considerations. Second law: efficiency of heat engines, absolute temperature scale, entropy. Radiation and pyrometry.

1.91 PHYSICS.

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.

Electricty 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.

1.92 PHYSICS.

Light.

(a) Wave theory, Huyghen's principle—interference and elementary theory of the grating.

(b) Polarization, double refraction—rotation of the plans of polarized light.

Radiation.

Electromagnetic radiation—electromagnetic spectrum surveyed. Absorption and emission of radiation. Stefan-Boltzmann law. Emission of a black body—Wien law, Planck's law (without proofs)—elements of pyrometry.

Electricity and magnetism.

(a) Magnetic effects of currents—self and mutual induction, the transformer, units of inductance; capacitance, units of capacitance; measurement of capacitance and inductance (briefly).

(b) Alternating current—vector representation of A.C.—current and voltage relations in simple L, C, R, circuits—power in A.C. circuits.

(c) Galvanometers—characteristics of moving coil types only.

(d) Thermoelectricity—Seebeck effect—thermocouples and their application to temperature measurement; changes in resistance with temperature—the platinum resistance thermometer.

Electronics.

(a) Thermionic emission—characteristics of the diode valve. Rectification. Characteristics of the triode valve. Amplification—vacuum tube voltmeters (D.C. only). Electrometer tubes, *p*H meters. Multielectrode tubes (briefly).

(b) Photo cells (photoemissive and photovoltaic).

Chemistry.

Subjects 2.00 to 2.94.

2.11 Chemistry, General.

Inorganic Chemistry.—A review of fundamentals, the elements and their classification, preparation and reactions. Atoms, molecules, formulae, valency and variable valency. Oxides, acids, bases and salts, their classification, methods of preparations and general properties. Hydracids and oxyacids, action of acids on metals. Stability of oxides, bases, and salts. Gas laws and calculations. Oxidation and reduction.

Atomic structure, number, weight, and mass number. Isotopes. Periodic classification. Electronic theory of bonds, valency. Electrovalent, covalent, and co-ordinate bonds in simple compounds. Correlation with physical chemical evidence.

Detailed treatment of various groups in the periodic table. General review of the elements.

Physical Chemistry.—A review of the kinetic theory of gases, reference to liquids and solids, diffusion, etc. Solutions, colloidal solutions, osmotic pressure and other properties, vapour pressure.

Electrolytes and non-electrolytes. Ionic and covalent compounds. Strength of acids and bases. Electrolysis of acids, bases and salts.

Law of mass action. Equilibrium and dissociation constants. Indicators and *p*H. Hydrolysis. Buffer solutions. Le Chatelier's principle. Catalysis. Common ion effect. Solubility product. Applications.

Organic Chemistry.—Characteristics of the carbon atom and general introduction to organic chemistry, qualitative and quantitative analysis of organic compounds. Molecular and graphic formulae.

Paraffin, olefine and acetylene hydrocarbons, alcohols, ethers, aldehydes, ketones, acids, amines, esters, halogen derivatives.

Oils, fats, carbohydrates. Polymerisation. Coal tar derivatives. Aromatic hydrocarbons.

2.122 Engineering Chemistry.

For Engineering students who have completed first year chemistry.

A general description of the applications of chemistry to engineering.

Corrosion, electrochemical theory, stray current, corrosion and its prevention. Hydrogen evolution and oxygen absorption types. Heated metal surfaces and metals in neutral solutions. Differential aeration effect, pitting, pickling of steel, rust protection, paint, lacquer, corrosion resisting surfaces, etc. Corrosion resisting alloys, stainless steels, monel metal, etc.

Refractory materials, properties, acids, neutral and basic types. Insulating bricks.

Paints and varnishes, components. Paints for special purposes, acid proof, heat resisting, rubber base paints, cement and concrete paint, marine paint.

Fuels, ignition temperatures, flash point, spontaneous combustion. Calorific value and its measurement. Types, solid, liquid, gaseous. Charcoal, coal, coke, powdered coal. Petroleum, and its products. Shale oil and tar products. Alcohol. Natural gas, coal and coke oven gas, water and carburetted water gas, producer gas and blast furnace gas. Gas works and coke oven practice. Method of controlling quality.

Lubricating oils, laws of solid, fluid and boundary friction, wedge theory of oil film. Mineral, vegetable and animal oils. Semi-fluid

lubricants, greases. Solid lubricants, graphite, talc, white lead. Properties of lubricants, specific gravity, flash and fire points, viscosity. Spheres of application.

Building and insulating materials. Limes, cements, ceramics, rubber, compressed fibres, plastics, bitumen, oils for insulation.

2.131 Chemistry for Architects.

Elements, compounds and mixtures. Chemical changes and their laws. Symbols, direction of chemical change, valency, formulæ and equations. Properties of metals and non-metals.

Basic chemical compounds, acids, bases and salts. Occurrence prepartion and properties.

States of matter, solubility, solvent action. Evaporation. Crystallisation. Deliquescence and efflorescene.

Oxidation and reduction.

Hydrolysis, ionisation, electrolysis.

Properties of gases from the chemical point of view. Atomic theory.

Combustion and respiration.

General treatment of acids, bases and salts with particular reference to properties as such and as oxidising and reducing agents.

Special applications of chemistry to architecture. The properties of various metals, ferrous and non-ferrous. Alloys, brasses and bronzes, solders. Properties of oxides and salts, carbonates, sulphates and chlorides.

The chemical constitution and properties of the important building materials. Lime, hard and soft waters, cement, plasters, clays and bricks, pigments, etc.

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.

2.32 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.—Ideal 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.

The Phase Rule.—Systems of one, two, and three components.

Solutions.—Ideal solutions, liquids in liquids, solids in liquids, gases in liquids.

Surface Chemistry and Colloids.—Elementary introduction.

2.33 PHYSICAL CHEMISTRY.

Equilibria, conductance, thermodynamics (first and second laws). Electrochemistry. Kinetics.

2.34 PHYSICAL CHEMISTRY.

A more advanced treatment of selected topics.

2.41, 2.41A and 2.41B GENERAL CHEMISTRY.

The aim of this course, which presupposes no previous knowledge of the subject, is to give the student some appreciation of the chemical field as a whole before it is broken up into the usual sections. Emphasis is placed on the difference between fact and theory and on the overriding authority of the experimental facts.

General Introduction.—Mass and energy, the molecule, the atom.

Elementary Chemistry.—Physical and chemical changes, pure substances and mixtures, laws and directions of chemical change, acids, bases and salts, solutions, families of elements (periodic table), normal solutions, determination of atomic and molecular weights.

Electronic Theory of Chemistry.—Electronic atom, the ionic bond, the covalent bond, the co-ordinate bond, polarization and polarizability, van der Waals forces, the metallic bond.

Solutions, Crystallisation, etc.—Solubility, solutions, crystallisation from solutions.

Equilibria and Chemical Reactions.—Le Chatelier's principle, law of mass action, rates of chemical reactions.

Substances as Polyfunctional Reagents.—Oxidation and reduction, metals, non-metals and metalloids, acids, bases, salts.

Periodic Table.—Introductory treatment of the more important members—systematic introduction to organic chemistry, including a treatment of hydrocarbons and aliphatic helides, alcohols, carbonyl compounds, acids and amines.

2.42 INORGANIC CHEMISTRY.

Electronic Theory and Atomic Structure.—Structure of nucleus, atomic number, arrangement of electrons, quantum number. Ionic, covalent and co-ordinate bonds. Interatomic distances and spatial orientation of bonds. Shapes of molecules.

Complex Salts.—Definition of co-ordinate number. Double salts. Role of water in complex salts. Systematic survey of complex salts.

Stereochemistry and Isomerism.—Chelate and polydentate groups in complex compounds.

Periodic Table.—Systematic treatment of selected elements (continuation from 2.41).

2.44 Inorganic Chemistry.

A more advanced treatment of selected topics.

2.52 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 pH 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 Quantitative Analysis.

A more advanced treatment of selected topics.

2.62 Organic Chemistry.

Characteristics of the carbon atom and a general introduction to organic chemistry, elements in organic compounds, their detection qualitatively and methods for their quantitative estimation. Molecular and graphic formulae.

Chemistry of the chief classes of organic compounds. Saturated hydrocarbons, olefine series, acetylene series, aromatic hydrocarbons, alcohols, ether, aldehyde and ketones, acids, esters, amines and amides, halogen derivatives, oils and fats.

Optical activity and stereochemistry. Carbohydrates (introduction). Polymerisation.

2.63 and 2.63A Organic Chemistry.

A more detailed study following on 2.62. Treatment of reactions as unit processes. A survey of organic chemical types. The hydrocarbons; halogenation; nitration and nitro-compounds; sulphonation; sulphonic acids and their derivatives; phenols and alcohols; amines, diazotisation and coupling; dyestuffs, colour and dyeing; azoxy-hydroza- and nitroso-compounds; oxidation and reduction; aromatic carbonyl compounds and quinones; aromatic acids and derivatives; heterocyclic compounds (introduction); polymerisation and high polymers; survey of types of isomerism in carbon compounds, structural and stereoisomerism; the carbohydrates; fats and oils.

2.64 Organic Chemistry.

A more advanced treatment of selected topics.

2.72 Applied Mathematics for Chemists.

These courses are intended to follow the normal mathematics course given to students in first year and set out 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 the gas laws, chemical equilibria and kinetics, etc.

Dimensional Analysis.—Change ratios, checking of equations, and derivation of dimensional relationships.

Solution of Equations.—Typical transcendental and higher degree algebraic equations encountered in problems in Applied Chemistry.

Graphical Representation of Experimental Data.—Particular reference is made to the use of determinants, and to the quantitative interpretation of phase diagrams.

2.73 Applied Mathematics for Chemists.

Partial Differential Quantities.—Typical partial differential functions encountered in 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. Design of experiments.

2.84 Advanced Organic Analysis.

The lectures given in this subject will provide the necessary theoretical background.

The practical work will include illustrations of instrumental analysis (refractometry, colorimetry, spectrophotometry) and micro-analytical procedures.

2.914 General Biology.

An introduction to basic biological principles. Introductors 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.

2.92 Biochemistry.

An introduction to the following topics:—

The chemistry of carbohydrates, lipides, amino acids and proteins.

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, lipides and proteins.

2.94 Biochemistry-Microbiology.

(a) *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.

(b) *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.

Chemical Engineering.

Subjects 3.00 to 3.95.

3.14 and 3.14A Industrial Chemistry.

This course aims at giving the student in Applied Chemistry and in Chemical Engineering a broad introduction to the chemical industry.

The course will deal with the following subjects:—

The raw materials, processes, and products of the chemical industry. The relation between various types of manufactures and processes. The location of chemical industries.

A discussion of specific industries, or groups of related industries, dealing with the chemical processes involved, mass balances, overall and sectional efficiencies, energy balances and requirements, choice of equipment and materials of construction, service requirements and flow sheets. packing and distribution of products, effluents and special maintenance problems.

Examples of the industries which may be selected are—

(*a*) Sulphuric acid;
(*b*) Fertilisers—potash and phosphates;
(*c*) The nitrogen industry;
(*d*) The coal carbonisation industry with related by-products;
(*e*) The alkali and alkali-chlorine industries;
(*f*) The dyestuff industry;
(*g*) The explosives industry;
(*h*) The plastics and paint industries;
(*i*) The heavy organic chemical industries, including chemicals from petroleum;
(*j*) The cellulose industry, including paper and rayon;
(*k*) Synthetic fibres;
(*l*) Electro-chemical and electro-thermal industries, such as calcium carbide, aluminium; magnesium.

Some time will be devoted to new developments in the chemical industry, to processes which are being operated on a pilot, or small industrial scale, but which appear to be important new developments

The structure of the chemical industry. An analysis will be made of the component parts of a typical industrial concern. Management, research, engineering, production, sales and service, labour and personnel, development, and finance will be considered. The place of the chemist or chemical engineer in this industry, and his relation to other personnel will be described.

Safety in the chemical industry. Some time will be devoted to the general problem of industrial safety, and specifically to safety in the chemical industry and to methods of ensuring it.

3.24 Chemical Engineering I.

Three one-hour lectures per week and one three-hour laboratory per week for entire year.

The first two terms are devoted to a study of solid handling, fluid flow and heat transfer. The last term includes introductory lectures on distillation, gas absorption, psychrometry, drying, evaporation and extraction as well as other important topics to be studied during the following year.

3.25 Chemical Engineering II.

Two one-hour lectures per week and one three-hour lecture for entire year.

This course covers the diffusional Chemical Engineering Unit Operations covering in detail solid and liquid extraction, distillation, absorption and adsorption.

3.25A Chemical Engineering III.

Two one-hour lectures per week.

This course covers miscellaneous Unit Operations such as evaporation, psychrometry, drying, crystallization, fluidization, mixing, sedimentation, flotation, filtration, flow through porous media.

3.34 Chemical Engineering Design I.

This course consists of two hours lectures and three hours laboratory per week for one year.

It 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.

The course consists of two hours lectures and three hours laboratory per week for one year.

Advanced lectures will be given on the topics covered in Chemical Engineering Design I 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 two hours 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 Work including the possible use of diagrams made from such data.

3.54. Chemical Engineering Materials I.

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 of production and heat-treatment effects will be outlined briefly.

Protective coatings, powder metallurgy and an introduction to corrosion are included.

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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, coatings.

Concrete: Mixes, handling and placing, acid-proof, chemical-tank construction.

3.55 Chemical Engineering Materials II.

This course consists of one hour lecture per week and extends the topics of Chemical Engineering Materials I in a more detailed fashion. In addition, lectures are given on corrosion testing.

3.64 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.

Homogenous reactions. Reactions in solution. Stirred reactors.

Heterogeneous reactions. Fixed bed catalytic reactors. Mass and heat transfer in catalyst beds. Fluidised bed reactors.

3.75. Chemical Engineering Project.

Seven hours per week are devoted to this course for one year.

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.

Metallurgy.

Subjects 4.00 to 4.94.

4.122 Engineering Metallurgy.

For engineering students who do not expect to practice Metallurgy as a profession. Comparison of atomic structures, ionic, covalent and metal structures. General structural properties of metals, grain size and control. Plastic deformation, slip planes, coldwork and work hardening, hot work, internal stresses and their removal. Physical metallurgy, types of equilibrium diagrams for the main types of binary alloys. Non-ferrous metals, copper and its alloys. Tin, lead, antimony and white metals; zinc, nickel, chromium, manganese, tungsten, cobalt, vanadium, molybdenum. The manufacture of ferrous metals, iron ores, products of the steel and iron industry. The blast furnace, pig iron, foundry cupolas. Steel by open hearth, Bessemer and electric furnace methods. Wrought iron and tool steel.

The physical metallurgy of iron and steel. The iron-carbon equilibrium diagram. Structure and physical properties of carbon steel. Heat treatment of iron and steel, quenching, tempering, annealing, normalising, case hardening and other methods of hardening. Cast iron.

Alloy steels, chief alloying elements, manganese steels, chromium, nickel and chrome, vanadium or chrome molybdenum types. High speed tool steels, silicon steels, stainless steels.

Metallographic preparation of specimens, etching reagents, use of microscope.

4.14 General Metallurgy.

The subject will be treated under three headings, section (ii) receiving most attention.

(i) Extractive (primary) and general metallurgy.

(ii) General physical (secondary) metallurgy.

(iii) Physics of metals.

Laboratory work will, as far as possible, keep in step and link up with the lectures, although most time will be spent on practical aspects of section (ii). The treatment will necessarily be brief but all available opportunities will be taken to link up with previous chemical subjects.

(i) *Extractive and General Metallurgy.*

Types of ore and their relationship to extraction processes.

Classification of extraction processes—pyrometallurgical, electrometallurgical, etc.

Chemical and physical principles of these processes.

Principles of refining processes.

Refractories and slags.

(ii) *General Physical Metallurgy.*

Structure of metals and its relation to their properties.

Casting and working principles; processing defects and their control or elimination.

Classification of alloys and their representation by equilibrium diagrams.

Corrosion and protection of metals.

Principles of non-ferrous physical metallurgy; copper alloys, light alloys, white metals.

Principles of ferrous physical metallurgy; carbon steels, heat treatment, alloy and special steels, cast irons.

Metallurgy of metal joining processes.

(iii) *Physics of Metals.*

Properties of metals as derived from the periodic classification.

The zone and band theories of solids.

Theory of alloys derived from the above considerations.

Brief survey of the applications of physical theory to the electrical and plastic properties of metals.

Mechanical Engineering.

Subjects 5.00 to 5.94.

5.101 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.

5.11 Engineering Drawing and Materials.

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 dimensional 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 Mechanial Engineering Design I.

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 clutch, springs and screws (for power applications).

Design work associated with the above will be carried out in the drawing office.

5.13 Mechanical Engineering Design II.

Design of gears (spur, worm), friction brakes (band, shoe), and load lifting appliances.

Design in the drawing office of a complete crane trolley. Students will work in groups of two or three.

5.14 Mechanical Engineering Design III.

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 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 Engineering Processes.

Further instruction *re* basic features associated with common products and processes as follows:—

Mechanical aids in Foundry—conditioners and moulding machines.

Fabrication by welding, fabrication as substitute for casting and forging.

Pressed, extruded and rolled materials.

Plastic processes—moulding and machining.

Special tools and machines—automatics, multi-spindle, multi-tool gear generators, form cutting, etc.

Metrology—measurement, standards, gauges, tolerances, inspection dimensioning of drawings for production.

Practical—Demonstrations in shops of University and visits to industrial works.

5.32 Mechanical Engineering.

A. *Kinematics of Machines and Elementary Fluid Mechanics.*

Quadric cycle chain and inversions.

Translational and Rotational Motion.

Work, Power and Energy.

Precession.

Instantaneous Motion of a Body.

Determination of Velocities of Points on Mechanisms by means of instantaneous centres.

Vector velocity diagrams for mechanisms.

Determination of accelerations of points on mechanisms—Vector acceleration diagrams.

Determination of Piston Velocity and Acceleration—Graphical and Analytical methods.

Cams and cam followers for various types of motion.

Construction of cam profiles.

An introductory survey of fluid mechanics. Historical development, present-day scope. Brief review of systems of physical units. Properties of fluids.

Fluid statics, Pressure—Specific weight—height relationship. Application of hydro-static equation to manometry, pressure of inclined and curved surfaces, centre of pressure.

Kinematics of fluid flow. Streamlines and path lines. Steady, unsteady, uniform, non-uniform flow. Equation of continuity (unidimensional case of steady flow only).

Total energy equation for steady flow of an ideal fluid. Bernoulli's equation. Application of Bernoulli's equation to a real fluid. Bernoulli's equation in terms of pressure.

Viscosity—dynamic and kinematic. Motion of viscous fluids—streamline and turbulent motion.

Application of Bernoulli's equation to orifices and notches and to the measurement of discharge in closed conduits by means of rate of flow meters.

B. *Thermodynamics and Heat Engines.*

An elementary course in the study of heat engines based mainly on descriptive matter with an initiation into the mathematical treatment. Units and definitions. The working fluid and its properties. Steam boilers. Furnaces, fans, and grates. The reciprocating steam engine. Indicators and brakes. Valves, valve motions and gears. The steam cycle in the reciprocating engine. Actual and ideal cycles. The condensing plant.

Elementary thermodynamics of gases. Combustion of fuels. Ideal cycles and ideal efficiencies for internal combustion engines. Actual cycles and actual thermal efficiencies of internal combustion engines. Charging and exhausting the cylinder. Ignition of the charge. Cooling systems and starting.

Performance characteristics and testing of heat engine plant covering both steam and internal combustion engines.

5.33 Mechanical Engineering.

A. *Theory of Machines.*

More advanced work on velocity and acceleration diagrams following on 5.32. Applications to various mechanisms. Coriolis component. Determination of piston velocity and acceleration in steam and internal combustion engines. Determination of crank effort and turning moment from indicator diagrams. Design of flywheel.

Toothed gearing, profiles of teeth, velocity ratio.

Gear wheel trains, simple, compound, and epicyclic—solution of problems.

Balancing of engines, rotating and reciprocating masses, multi-cylinder engines. Governors, stability, controlling force.

Vibrations of systems, free and forced motion, with damping, nature of damping and internal friction. Vibration isolation, torsional vibration, vibration dampers.

B. *Thermodynamics and Heat Engines.*

More detailed mathematical treatment of the design consideration associated with 5.32. Changes of heat and work in various types of expansion and compression. Application to the various theoretical cycles for steam and internal combustion engines. Reversible operations and cycles, regenerative cycles.

Heat transfer by conduction, convection, and radiation, practical considerations.

Steam engines, Rankine cycle, temperature-entropy diagrams, Mollier diagrams, indicator diagrams and actual behaviour of steam in cylinder.

Air compressors, Internal combustion engines, actual cycles, relative methods of injection, standard cycles, air standard efficiency, effect of compression ratio.

Nozzles, injectors, steam and gas turbines. Performance of steam turbines.

Refrigerators, various working substances, performance.

5.34 Automatic Control Engineering.

Definitions and terminology. Characteristics of proportional, integral and derivative control and of combinations of these. Controller equations. Discontinuous systems. Time lags in control and arising from process capacity. Measuring lags caused by changes in controlled condition. Response lags caused by inertia and viscosity. Response of simple systems to step and to sinusoidal changes. Distance-Velocity lag. Self-regulation. Mathematical treatment of simple systems. Disturbance feed-back.

Short course on instrumentation for temperature, pressure and fluid-flow controlled systems. Regulator elements.

Descriptive treatment of electrical and pneumatic control systems.

5.41 Descriptive Geometry.

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. Especial emphasis on ability to visualise problems and processes involved in their solution.

5.53 Fluid Mechanics.

The syllabus of the Fluid Mechanics section of 5.32 Mechanical Engineering together with—

Statics of compressible fluids. Standard atmosphere. Stream function. Sources and sinks. Source in uniform stream. Pressure distribution around a moving cylinder. General case of equation of continuity, energy and momentum balance. Dimensional analysis. Flow of incompressible fluids in pipes. Dynamical similarity. Resistance of immersed and floating bodies. Unsteady flow of liquids in closed conduits. Impact of jets on stationary and moving vanes. Elementary theory of centrifugal pumps and fans.

5.54 Fluid Mechanics.

Section A—Rotodynamic Machinery.

Similarity Relations. Specific Speed and its relation to design of rotodynamic runners. Scale effect and model laws. Cavitation. One-dimensional theory of rotodynamic machines. Design procedure for a radial flow pump according to the one-dimensional theory. Thermodynamics of the flow of gases and their application to rotodynamic machines. Design procedure for an axial flow impeller. General principles and characteristics of hydrodynamic transmissions. Propeller in the open stream—(a) airplane, (b) marine. Theory of hydraulic design of inward radial flow, axial flow and mixed flow turbines. Some particular problems of installation and operation of rotodynamic machines.

Section B—Gas Dynamics.

The general energy equation of a compressible fluid. The sound velocity. The Mach number. Non-frictional flow of a compressible fluid inside ducts and pipes. The Fanno and Raleigh equations. The convergent-divergent nozzle. The effect of the variation of the outlet pressure on the flow conditions. Normal shockwaves. Pressure, density and static temperature changes across shockwaves. Energy efficiency of a shockwave. Oblique shockwaves. Frictional flow in a constant area duct with or without heat transfer. The principles of jet propulsion; rockets, turbojets, ramjets.

5.64 Production Engineering Design.

Interchangeability requirements. Use of standards. Hole basis or shaft basis. Limits and fits. Unilateral and bilateral tolerances. Functioning, manufacturing, and inspection data. Effect of gauge tolerances and gauge wear. Magnitude of tolerances. Tolerancing of cylinders, gaps and widths, lengths, angles and tapers, squares, hexagons and roundness etc., profiles, radii and screw threads. General

analysis of designs for production. Advantages and disadvantages of pursuing interchangeable principle. Designing for interchangeability or unit assembly. Design, dimensioning and tolerancing of particular types of work, and associated jigs, fixtures, tools and guages. Economics of tooling-up. Development and use of standards in design of work, jigs, tools etc.

5.94 Mechanical Engineering.

This course consists of two hours' lecture and one hour laboratory for one year.

It covers the fundamental mechanical engineering principles of heat engines and simple theory of machines. The following topics are covered:—

1. Boiler plant—steam engines—indicator diagrams—thermal efficiency of various steam cycles—flow of steam through nozzles—steam turbines—steam reticulation.
2. Internal combustion engines, gas, petrol and Diesel engines —indicator diagrams—thermal efficiency—engine cycles—power and efficiency.
3. Gas compressors—volumetric efficiency—multi stage hydrogen pumps, inter and after coolers.
4. Refrigeration—general theory—compression and absorption machines—choice of refrigerant.
5. Theory of machines—in particular plane kinematics of mechanisms—cams, levers, gear trains.

Electrical Engineering.

Subjects 6.00 to 6.94.

6.12 Electric Circuit Theory.

Introduction: Circuit and field problems, basic circuit parameters, units, electric conduction. Ohm's law, resistance, effect of temperature, non-linear resistances.

Electromotive Force: Sources of e.m.f. Generation of alternating and direct voltages.

D.C. Networks: Series and parallel resistances. Delta-star conversions, node and mesh equations, circuit theorems.

Magnetic Circuits: Analogy between magnetic and electric circuits. Computations, magnetic force, magnetic hysteresis, permanent magnets.

Circuit Parameters in Circuits: Inductance, mutual inductance, capacitance and resistance in d.c. and a.c. circuits. Transient and steady state solutions.

A.C. Concepts: Sine wave theory, vector representation, complex algebra.

R.L.C. Circuits in the Steady State: Circuit theorems, resonance, coupled circuits, air core transformers, equivalent circuits.

Harmonics: Production of harmonics. Solution of circuits for non-sinusoidal voltages and currents.

6.13 Electric Circuit Theory.

Harmonics and harmonic analysis.

Polyphase circuits, balanced and unbalanced, symmetrical component treatment.

Passive networks, network analysis, two and four terminal networks, electric wave filters.

Networks with active elements, analysis of circuits with vacuum tubes.

Transients in electric circuits and networks, Laplace transformer treatment.

Non-electric and mixed networks, electromechanically coupled systems.

Feedback in amplifiers, automatic control and servomechanisms.

Quasi-Stationary field problems, potential problems, field plotting relaxation methods, computation of circuit parameters, skin effect proximity effects, heat dissipation.

Materials used in Electrical Engineering, conductors, semiconductors, dielectrics and insulating materials.

Non-linear circuit elements, vacuum tubes, rectifiers, thermistors.

Electric transmission lines treated from both the power and the communication aspect. Overhead and underground lines. Reflection, loading, artificial lines, concentric lines, transients.

Maxwell's equations, propagation of waves along transmission lines, wave guides and in vacuo.

Magnetic circuits and forces between currents and magnetic fields.

6.214 Electric Power Engineering "A".

Principles of e.m.f. generation. Armature windings for direct and alternating current machines. Leakage reactance, armature reaction, rotating fields.

Synchronous generator; operation on load; synchronous reactance; estimation of regulation; parallel operation on large and small systems; transient conditions; automatic voltage regulators.

Synchronous motors; circle diagrams; vee curves; synchronous condensers.

Induction motors; operating characteristics; speed control by pole changing, cascading and control of secondary e.m.f. Induction generator. Synchronous induction motor.

Commutator motors. Phase advancers. A.C. and D.C. control systems for starting, speed control, braking, and load balancing. Electric and regenerative braking; plugging.

Metadynes, Selsyns.

6.224 Electric Power Engineering "B".

Transformers. Leakage reactance. Current surges. Phase conversion. Special types. Harmonics in single and 3-phase Transformer. Design. 3-winding transformers. Thermal rating. Instrument Transformers.

Power Transmission by underground cables and overhead lines. Line constants. Rigorous solution for steady state conditions. Reactive power. Power circle diagrams. Voltage surges. Terminal effects.

Symmetrical components. Application to unbalanced faults.

Protection. Operation of basic devices and application to equipment and system protection.

System voltage regulation. Power Limits and Stability.

Traction. Speed time curves.

Illumination. Requirements and design.

6.23 Electric Power Engineering.

Magnetization of iron, magnetic circuits in transformers and machines. Transformers, construction, operation, theory, design, polyphase, instrument transformers. D.C. and A.C. machine construction. Machine windings. Generated e.m.f., rotating m.m.fs. in polyphase machines. Synchronous generators and motors. Induction motors, single phase motors. D.C. generators and motors, operation, applications, starting and control. Rotary converters. Transmission, overhead and underground, voltage regulation, power limits, stability, protection. Distribution, wiring rules, power factor correction. Circuit breaking devices, arc extinction. Basic devices and relay applications in protection. Meters, indicating, recording and integrating. Illumination, light sources, visibility, requirements for effective illumination.

6.303 Electronics and High Frequency.

(*a*) Electron ballistics: charged particles and their motion in electrostatic and magnetic fields.

Electron emission from metals: thermionic emission, photoelectric emission, secondary emission.

Electrical conduction through vacuum, gases and vapours: space charge limitations, occurrence of gas in electronic devices, gaseous discharge, Townsend discharge, breakdown, glow discharge, arc discharge.

High vacuum electron tubes: characteristics, rating and control in high vacuum diodes and triodes, tetrodes, pentodes, beam power tubes and other multi-electrode tubes.

Gas tubes: effect of gas in thermionic diodes, mercury arc rectifiers, ignitrons; effect of gas in thermionic triodes, thyratrons.

(*b*) Single phase rectifier circuits: rectifier theory, smoothing and filter circuits.

Vacuum tubes as Class A amplifiers: considerations of voltage gain, input admittance, waveform distortion, power output and efficiency; coupled amplifiers with various types of coupling.

Amplifiers of the Class AB, Class B and Class C type: design and operation.

Vacuum tube oscillators: types of oscillators and conditions for oscillation.

Modulation and detection: the modulation process and types of modulation, radio communication.

6.304 Industrial Electronics and Control.

A course designed to link electronic and electric power 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.

Polyphase rectifiers.

Basic circuits and devices, grid control circuits for gas tubes, amplifiers for industrial electronics.

Regulators and Servomechanisms, dynamics of closed systems, industrial control problems.

Electronic control of motors and generators.

Basic timing circuits.

Ignitrons and thyratrons as line switches.

Resistance-welder controls.

Induction heating, dielectric heating.

Electronic measurements.

Industrial X-rays.

Photoelectric devices, electronic lamps.

Electrostatic precipitation.

Power line carrier.

6.314 High Frequency Engineering "A".

Propagation of Radio Waves: A general treatment of propagation by means of ground, sky and space waves. Reflection and refraction in conducting media.

Properties of the ionosphere. Practical problems of propagation at different frequencies.

Radiation: Fundamental considerations deriving from Maxwell's Laws. Use of Poynting's vector. Calculation of field pattern from linear antenna in free space. Effect of ground reflections, and properties of spaced antennas. Pattern and gain obtainable from directional arrays. Wave guides, aperture radiators and reflectors. Receiving aerials.

Vacuum Tube Circuits: Behaviour of basic oscillator and amplifier circuits at low and high frequencies. Inverse and positive feedback. Conditions for oscillatory or non-oscillatory response. Sinusoidal and relaxation oscillations. Trigger circuits. Input admittance, output impedance, gain and phase shift of untuned amplifiers. Tuned amplifiers, response and operation, class A and class C. Harmonic generators, linear amplifiers and special amplifiers.

Modulation and modulators—amplitude, frequency and phase. Response of circuits to modulated waves. Frequency multiplication of modulated waves. Demodulation and demodulators. Frequency conversion and mixers.

Elements of radio communication and navigation systems. Elements of television systems. Brief treatment of electro-acoustic transducers, elements of acoustics.

6.324 High Frequency Engineering "B".

Principles and methods of design procedure are exemplified in the design of equipment of the following types:—

Low frequency and high frequency measuring and testing devices, audia frequency systems, special-purpose amplifiers, cathode-ray oscillographs, communication transmitters and receivers.

6.334 Line Communications.

More advanced work on circuit theory following 6.13, specially applied to line communication work. Telegraph systems, manual operation, machine operation, elements of equipment and characteristics.

Carrier telegraphy, line and equipment operation. Picture transmission. Long lines and cables.

Telephone systems, general principles and electrical design of common components, circuit design, switching systems and exchanges, carrier systems. Distortion, interference, cross talk, power line interference, protection, amplifiers and repeaters.

6.83 Electrical Engineering.

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 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 I.

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 II.

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. It is envisaged that 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 and Geology.

Subjects 7.00 to 7.94.

7.21 Mining Processes and Practice.

This course is an introductory series of lectures in Mining dealing with the following:—

History of the mining industry, development of methods of working, ventilation of mines, mine lighting, transport and mining machinery, mine organisation and mine management, health and safety in mines, mine gases and explosions.

7.32 Mining.

(Mine Atmospheres. Dust Control. Mining Hygiene. 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.

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.

7.33 Mining.

(Deep Boring and Shaft Sinking. Explosives and Blasting. Mine Ventilation.)

Deep Boring and Shaft Sinking.

Percussive rotary; non-coring, coring; equipment, accessories; lining and surveying of boreholes.

Shaft sinking. Preliminary considerations; selection of site; determination of number and size of shafts; ordinary methods of sinking and lining shafts; appliances and accessories required.

Ventilation and lighting of shafts; dealing with water from shafts.

Shaft sinking in difficult conditions; special methods of sinking; enlarging, repairing and deepening shafts. Large diameter boreholes.

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 shotfiring; multiple shotfiring. Exploders. Arrangements of shotholes in coal and stone. Substitutes for explosives. Tunnelling; shot hole drilling practice and methods of blasting.

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; evase 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.

Laboratory.

Fan testing. Ventilation plans. Dust measurement. Mine air analysis. Gas detectors.

7.34 MINING.

(Winding, transport and drainage; power supply and transmission; mine organisation and management).

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. Balanced winding. Skip winding. Signalling systems. Ropes.

Transport.

Rails; tracks; skips. Manual haulage. Horse haulage. Rope haulage. Locomotive haulage. Safety devices; signalling systems; haulage calculations.

Drainage.

Adit levels. Siphons. Ram pumps. Piston pumps. Multi-throw pumps. Differential pumps. Duplex pumps. Centrifugal and multi-stage centrifugal pumps. Mono pumps. Megator pumps. Sumps and standages. Drainage of flooded workings.

Power Supply and Transmission.

Comparisons of forms of power

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.

Electricity—Outline of Colliery Electrical Organisation and Equipment.

Surface Installation at Mines.

Distribution of power; sub-stations; 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—connections 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.

Mine Organisation and Management.

Surface organisation and equipment and colliery costs. General surface arrangements; location of plant; workshops and surface buildings. Colliery organisation and management; control of labour; duties and functions of officials; reports; returns and notices; labour and output; materials and stores; systems of payment. Time keeping; measurement of work; analysis of costs; estimates; overheads.

Company organisation and company law; economics of New South Wales coalfields. Trades unions and associations.

7.43 Metalliferous Mining.

(Working of unstratified deposits.)

Definition of mining terms. Types of mineral deposits. Prospecting.

Surface mining methods. (*a*) Alluvial mining; panning; long tom sluicing; hydraulicing; dredging; draft mining. (*b*) Quarrying; layouts; glory-holing; methods of loading and transporting products.

Underground mining methods. Factors influencing selection of methods. (*a*) Open stope supported naturally. Open stoping; sub-level stoping; shrinkage stoping. (*b*) Open stope supported artificially. Horizontal cut and fill; inclined cut and fill; stulled and square set stoping. (*c*) Caved stopes. Block caving; sub-level caving; top slicing.

*7.44 Metalliferous Mining.

Rock drills; drill steel and steel sharpening; drill bits; churn, calyx and diamond drilling.

Blasting in stopes; long hole blasting.

Transfer of broken ore from stopes to chutes and cars.

Mine fires; fire fighting; fire protection in stopes and shafts and electrical installations.

*Optional for students in the Mining Engineering Course who wish to specialise in Metalliferous Mining.

Sampling.

Underground sampling. Procedure. Stope and development sampling; reduction of samples; computations for tonnage and assay values; books and assay plans.

Borehole sampling. Procedure; spacing of boreholes; computation for tonnage; average value.

Alluvial sampling. Borehole samples; power and hand drill drive; pipe panning; computation of bore value; computation for yardage and value.

Pit sampling. Dump sampling—reliability.

Mining Law and Valuation.

New South Wales Mining Act.

Ore reserves—proved, probable and prospective; mineral beneficiation and marketing of ores.

Mineral properties. Taxation; life; annual value; present value. Mine Accounts. Labour-day, contract and bonus work.

Organisation of mine management; mine reports.

Mine stores and storekeeping.

Laboratory.

Principally spent on additional work on—

(*a*) Metalliferous mine ventilation plans.

(*b*) Preparation of minerals and fire assaying.

(*c*) Laboratory work and tests for preparation of theses.

7.54 Coal Mining.*

(Methods of working coal. Subsidence and strata control. Spontaneous combustion, fires and inundations. Explosions, rescue and recovery work).

Methods of Working Coal:

Opencut 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

*Optional for students in the Mining Engineering Course who wish to specialise in Coal Mining.

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.

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 Combustion, 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 heatings.

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 of coal dust and methane. Rescue apparatus.

7.64 Preparation of Minerals.

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; leaching.

Storage: conveyors, weighing; sampling; feeding; thickening, filtering; pumping; tailings disposal; centrifuges; dust collection.

Flowsheets: mill design; pilot plants.

7.83 Geology.

Scope of the science of Geology, the various sub-divisions of the science, the geological periods; cosmology and structure of the earth's crust, agents of denudation, weathering, river action, glaciology, wind action, the sea and its action, lakes, underground water; diastrophism, vulcanism, earthquakes, primary and secondary geological structures; principles of physiography; igneous, sedimentary and metamorphic rocks. Introductory study of important ore-forming minerals; economic deposits of non-metallic materials such as clay, gypsum, ochre, limestone, shale, etc.

Inter-relation of Geology and Soil Mechanics—types of unconsolidated materials and their behaviour under stress. Geological aspects of foundation sites—ground conditions, groundwater considerations, preliminary and exploratory geological work, influence of geological features on foundation design.

Building stones—general considerations, selection of suitable material by field and laboratory investigations, deleterious minerals, causes and prevention of decay; geological aspects of quarrying. Petrological examination of common building stones used in Australia.

Field Work: Three geological excursions will be held on Saturdays during the year, including one visit to a monumental works.

7.92 Geology.

(*a*) *Physical Geology.*—Scope of the science of Geology, cosmology and structure of the earth's crust, agents of denudation, weathering, river action, glaciology, wind action, the sea and its action, lakes, vulcanism and earthquakes, primary and secondary geological structures; underground water; principles of physiography; brief treatment of igneous, sedimentary and metamorphic rocks.

Historical geology.

(*b*) *Elementary Palaeontology and Introduction to Historical Geology.*—Outline of the scope and application of historical geology; principles of stratigraphy; elementary palaeontology, use and value of fossils; examination of fossils found in rocks of economic importance in New South Wales.

Field Work.—A minimum of six days to be spent in the field.

7.92A Geology.

Scope of the science of Geology; cosmology and structure of the earth's crust, agents of denudation, weathering, river action, glaciology, wind action, the sea and its action, lakes; underground water; diastrophism, vulcanism and earthquakes, primary and secondary geological structures; principles of physiography; detailed study of the principal igneous, sedimentary and metamorphic rocks, magma differentiation; coal and petroleum.

Laboratory.—Examination and identification of common minerals and rocks in the hand specimen; interpretation and preparation of geological maps and sections.

Field Work.—Six excursions will be held on Saturdays during the year.

7.93 Geology.

(*a*) *Petrology, Crystallography and Mineralogy.*—Physical, chemical and optical properties of the chief rock forming mineral groups; elementary crystallography; detailed study of the origin and nature of igneous, sedimentary and metamorphic rock types.

(*b*) *Australian Geology.*—Stratigraphical, orogenic, tectonic, physiographical and economic considerations (emphasis to be placed on New South Wales geology).

(*c*) *Geology of Coal and Petroleum.*—Coalfields and coal resources of Australia.

(*d*) *Principles of Ore Deposition.*—Introduction; formation of minerals, importance of underground waters, openings in rocks, metasomatism, texture of ore deposits, form and structure of mineral deposits; syngenetic and epigenetic deposits; structural control of ore deposition, ore shoots; classification of mineral deposits; alteration of ore deposits near the surface; examples of important metalliferous deposits in various countries of the world.

Laboratory.—Examination of hand specimens of rocks; elementary crystallography; microscopic examination of the principal igneous, sedimentary and metamorphic rocks; megascopic study of important ore minerals; interpretation and preparation of geological maps and sections.

Field Work.—A minimum of six days to be spent in the field.

7.94 GEOLOGY.

Geology of non-metallic substances, including structural and building materials, refractories, abrasives, ceramic materials, etc.; groundwater supplies.

Photogeology and its applications; methods of geological and geophysical exploration; geology of foundation sites, cuttings and embankments.

NOTE.—It will be desirable for those Mining Engineering students wishing to specialise in coal mining to receive more detailed instruction in the geology of coal, and those wishing to specialise in metalliferous mining, to deal with minerals and ore deposits in more detail. The following alternative courses are arranged with this end in view.

Geology of Coal.—General considerations; details of occurrence, megascopic and microscopic features, chemical and physical properties, classification, origin and review of Australian occurrences; occurrences in other countries of the world.

Metalliferous Geology.—Magmas and mineral deposits; types of ore deposits, including detrital, syngenetic mineral deposits of sedimentary origin, deposits formed by sublimation and evaporation, epithermal, mesothermal, hypothermal and pyrometasomatic deposits, pegmatitic and magmatic deposits; oxidation of metallic ores; metallogenetic epochs; minable ore limits, ore reserves, sample assay analyses; detailed study of main Australian ore occurrences.

Laboratory.—Examination of industrial materials such as refractories, abrasives, road metals, etc.; determination of ores by blowpipe tests; mineragraphy; megascopic and microscopic examination of coal, advanced mapping and its application to economic problems; photo geology.

Field Work.—A minimum of six days will be spent in the field during the year. Students will be instructed in the methods of geological and geophysical surveying.

7.94A GEOLOGY AND MINERALOGY.

General Introduction to the Science of Geology.

Physical Geology—a broad study of the origin, constitution and structure of the earth, and the agents tending to modify its surface.

Introduction to Historical Geology.

Physical, Chemical and Optical Mineralogy—a study of the physical, chemical and optical properties of the more important rock-forming minerals; important ore minerals; crystallography; X-ray analysis of crystal structure.

Economic Geology—geology of coal and petroleum; principles of ore deposition—types of ore deposits and their origin; Australian ore occurrences.

Civil Engineering.

Subjects 8.00 to 8.94.

8.11 MECHANICS AND GRAPHICS.

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 STRENGTH OF MATERIALS.

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.

Properties of materials. Tension, compression, impact hardness and fatigue testing. Factors of safety and working stresses.

8.113 STRUCTURES (THEORY AND DESIGN).

(*a*) Influence for simple beams and trusses. Impact maximum moments and shears. Continuous beams. Three-moment theorem and applications. Torsion in rolled sections with application to runway girders. Deflection of trusses by graphical and analytical methods. Stresses in redundant frames. Strain energy methods. Castigliano's theorems.

(*b*) Design of steel structures—columns with bracket loads plate web girders, mill building, steel frame buildings.

(*c*) Reinforced concrete, elastic theory, design of beams with single and double reinforcement T beams.

(*d*) Drawing office work associated with (*b*) and (*c*).

8.114 Structures (Theory and Design).

(*a*) Tension coefficients. Space frames. Relaxation methods and analysis of indeterminate structures. Elementary treatment of arches. Experimental methods of stress analysis.

(*b*) Design of retaining walls, weirs, small dams, timber design, strength, joints, beams and joists, columns and struts. Reinforced concrete columns. Plastic theories. Prestressed concrete.

(*c*) Associated drawing office work.

8.122 Structural Drawing and Design.

Application of work in Strength of Materials (8.112) to the design of simple structures. Design of simple built-up beam or beam system. Design of roof truss, determination of loading, member forces, etc. Design of riveted and welded joints. Theory and design of columns.

8.123 Structures (Theory and Design).

(*a*) Influence lines for simple beams and trusses. Impact maximum moments and shears. Continuous beams. Three-moment theorem and applications. Torsion in rolled sections with application to runway girders.

(*b*) Design of steel structures—columns with bracket loads, plate web girders, mill buildings, steel frame buildings.

(*c*) Associated drawing office work.

8.124 Structures.

Revision of fundamental theory, including proofs where these were previously omitted. Bending of beams. Relationship between load intensity, S.F. and B.M. Distribution of bending stresses and shear stresses with proof of formulae. Curves of maximum B.M.

Slope and deflection of beams. Application to fixed-ended beams. Moment-area methods. Myosotis method. Continuous beams. Theorem of three-moments.

Unsymmetrical bending.—Bending in a plane inclined to the principal axes of the cross-section. Angles used as beams. Conditions of freedom from twist.

Complex stress.—Principal stresses. Mohr's stress circle.

Theory of Columns.—Columns with lateral loads in addition to direct thrust.

Strain Energy.—Due to axial force, bending moment, etc. Trussed beams.

Framed Structures.—Analysis of frames with one redundant member. Deflection of trusses. Design of riveted and welded joints; tension joints, beam to column connections, etc. Features and the design of plate girders.

Drawing Office Work.—Design of plate girder. Design of column with lateral loading. Design of timber trestle subjected to wind load.

8.125 Structural Design.

Statically indeterminate structures. Analysis by strain energy methods.

Analysis of rigid frames by moment distribution. Further reinforced concrete design—simple beams, double-reinforced beams; T-beams. Continuous slabs. Pigeaud's method. Axially loaded columns and columns with bending and compression. Circular columns. Column footings.

Design of retaining walls.

Drawing Office Work.—Design of a simple reinforced concrete building frame.

Design of a continuous floor slab with beam system.

Design of cantilever R.C. retaining wall.

Those students who have pursued the study of structural design up to this stage, will be encouraged to carry this study further by taking part of the Civil Engineering degree course.

It is the intention that, apart from the lectures in the engineering course, they should provide full calculations and structural details on one or two of the design projects that they are taking as a part of their Architectural course; this work is marked separately from their work on architectural design and construction: alternatively, in addition to the lectures they may provide a thesis on some matter of structural design in steel or reinforced concrete, or building research.

8.132 Materials and Structures.

This course consists of two hours' lecture and one hour laboratory for two terms. The early sections of the course will be treated on a fundamental basis but in the more advanced work the student will be acquainted with methods of solving various problems without being given the fundamental derivations.

The course covers the following topics:—

Behaviour of material subjected to tension compression, bending and impact and high temperature and low temperature stresses.

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 hollow shafts, combined torsion and bending—power transmission (multiplane graphical solution).

Stresses and deflections of close coiled springs.

Simple strut theory.

8.23 Materials of Construction.

Concrete—(a) physical and chemical properties, (b) testing and selection of basic constituents, (c) design and proportioning of mixes, (d) admixtures, placing, curing and testing, (e) methods of mixing, transporting, placing, (f) formwork, (g) plant.

Timber—(a) types and sources of structural timbers, (b) identification and constitution, (c) defects, tests and selection of timber, (d) preservation.

Steel—(a) basic manufacturing processes, (b) general types used in civil engineering, (c) defects, testing, selection, procession, (d transportation, erection.

Stone and ceramics.—Application of masonry to engineering structures, stone types, preparation and defects, selection.

Pipes—(a) various types, (b) use in civil engineering, (c) defects, tests and selection, (d) methods of transportation, laying.

Chains and ropes: types, sizes and uses—Tests, selection.

Elements of soil stabilization technique.

8.33 Engineering Computations.

Practical introduction to numerical, graphical and mechanical calculation and analysis as required in the engineering or applied mathematical sciences. Numerical solution of equations, including differential equations, graphical methods; nomography and the construction of graphical charts; curve fitting to empirical data, approximate methods of integration differentiation and interpolation; use and principles of construction of instruments employed in calculation; electro-mechanical analogues, relaxation methods and many kindred topics.

8.42 Land Surveying.

The principles of the theodolite and dumpy-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 Surveying.

Chaining errors and corrections. Construction, adjustments and use of theodolite and level. Minor instruments, sextant, compass, abney level. Levelling, traversing, contouring, control and detail surveys. Booking, reducing and plotting adjustment of traverses. Estimation of errors. Least squares. Correstions due to maladjustment of theodolite. Barometric surveys. Tacheometry. Plane tabling on a large scale. Areas and volumes. Curves. Setting out works. Land titles and statutory obligations. (Survey Camp.)

8.44 Surveying.

Instruments—modern developments. Precise measurement of angles, distances and levels. Further work on tacheometry and plane table surveys. Surveys for roads and railways, water supply. Underground, hydrographic, and aerial surveying. Computations for coordinates, triangulation, traverses, curves, subdivisions. More precise working following on 8.43 Surveying.

Elementary field astronomy—including definitions of terms used, time, use of Nautical almanac, ex-meridian observation for azimuth—convergence of meridians. Elements of geodesy, errors and adjustments, base lines, triangulation, precise levelling. Description of map projections.

Mine surveying, shaft plumbing, correlation of surface and underground surveys. Surveying and prospecting. (One week to be spent in Survey Camp.)

8.53 Fluid Mechanics.

Properties of fluids. Fluid statics. Ideal fluid flow. Orifices and weirs. Viscous fluid flow. Laminar and turbulent flow. Surface and form resistance. Dimensional analysis. Scale models. Pipes and pipe systems. Uniform flow in open channels. Hydraulic machines.

8.63 Civil Engineering.

(*a*) *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.

(*b*) *Geological Considerations.*

About twelve lectures on the following topics:—

Geological exploratory work, geological aspects of quarrying and tunnelling, geology of dam and reservoir sites, river engineering, soil erosion, underground and artesian water, geological aspects of foundation engineering, geology and petrology of road aggregates, clays, cements, etc.

Laboratory.—About twelve demonstrations on micropetrology and advanced mapping.

Field Work.—One three-day excursion during the first term vacation, and one Saturday excursion during term.

(*c*) *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.

(*a*) *Roads.*

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.

(*b*) *Railways.*

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.

(*c*) *Harbours and Rivers.*

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.

(*d*) *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.

(*e*) *Hydro-electric Engineering.*

Associated works and equipment. Preliminary surveys and investigation. Economic factors. Water available, drought characteristics, storage regulation. Emergency precautions, maintenance.

(*f*) *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.

(*g*) *Contracts, Quantities, Specifications and Estimates.*

Elements of contract law, principles to be observed in drawing up specifications, including practical assignments. Elements of quantity surveying applied to civil engineering works, practical assignments in taking out quantities and preparing estimates.

(*h*) *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.

8.73 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.

8.84 City Planning.

Principles of regional and city planning—Inter-relationship of various civil engineering and planning problems—Evolution of the modern city and relationships of architecture and engineering to problems of city development and civic design. Street systems—Transportation—public buildings and utilities—parks and playgrounds—housing—zoning—methods of financing city improvements.

PROFESSIONAL ELECTIVES.

Civil Engineering Design.

(*a*) *Theory and Design of Structures.*

Study of design aspects of civil engineering by further work on relaxation theories and the mathematical theory of elasticity together with topics such as arches, columns and pre-stressed concrete.

and/or

(*b*) *Soil Mechanics.*

Advanced studies of either theoretical or practical nature in various selected phases of soil engineering, such as stability of slopes and

retaining wall; earth and masonry dams, with reference to stability, seepage, and piping effects; bearing capacity and settlement of foundations, piles and pile groups; frost action; and special types of foundations.

and/or

(*c*) *Hydrology and Hydraulics.*

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. Hydraulic structures such as spillway gates, outlet works and diversion works.

and/or

(*d*) *Mathematics.*

Students whose interests are along the lines of advanced mathematics may study application of such work to specialised engineering problems.

and/or

(*e*) *Modern Foreign Language.*

Students with a leaning towards modern foreign languages may elect to master such language and review recent engineering literature of the country concerned.

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 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.

and/or

(*b*) *Geology.*

Further study of Australian Geology and its relation to construction tasks. Structural geology and interpretation of further work in Petrology and study of the application of such topics to Civil

Engineering. Geological mapping—photographic geology, introductory treatment of geophysics—study of typical geological investigations for dam sites, etc.—preparation of geological reports. Field work in geological surveying and the mapping of a small area.

and/or

(*c*) *Management.*

Purposes of management—leadership—personnel control—applications to construction—management in practice. Financial aspects—sales engineering.

and/or

(*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.

and/or

(*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 associate work such as refuse disposal, industrial hygiene, etc.

SURVEYS AND INVESTIGATIONS.

(*a*) *Astronomy and Geodesy.*

Fundamentals of geodesy and astronomy and a study of the application of these sciences to national projects.

and/or

(*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.

and/or

(*d*) *Hydrology and Hydraulics.*

See Section (*c*) of Civil Engineering Design Option.

and/or

(*e*) *Geology.*

See Section (*b*) of Civil Engineering Construction Option.

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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. Digestion 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, ensilage. 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 of the course.

9.114 Farm Livestock.

A study of the breeding, feeding, management and most common sources of loss in livestock other than sheep, of importance to the pastoral industry of Australia.

9.12 Sheep Husbandry I.

Sheep breeds—descriptions, uses and economic relationships. Sheep judging. Elementary anatomy and physiology. Principal sources of loss and their control. Wool sheds, dips and yards. Principles of animal production—Reproduction and fertility, growth and development, milk secretion, elementary nutrition and breeding.

Sheep Management—Principal sheep areas in the Commonwealth, development of the sheep and wool industry and its place in the economic life of Australia. Stratification of the industry. Calendar of operations on a sheep property. Cross breeding. Fat lamb production. Stud breeding—record keeping. Factors affecting sheep and wool production. Pasture improvement. Fodder conservation. Supplementary feeding and drought feeding. Elementary marketing.

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. 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 Sheep Husbandry II.

(*a*) *Physiology II.*—A special course of lectures dealing with the physiology of digestion, circulation, renal secretion, the nervous system, endocrine glands and the reproduction of domesticated animals.

(*b*) *Sheep Health.*—Sheep 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, mycotic dermatitis, 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, photosensitisation, pregnancy toxaemia and hypo-calcaemia, swelled head, subterranean clover disease, tetanus malignantoedema, toxaemic jaundice, urinary calculi. Veterinary first-aid. Common drugs.

9.134 Accountancy.

Definitions. Principal documents. Theory of double-entry bookkeeping. Classes of accounts. The books of account. Entering and posting. Trial balance. Distinction between capital and revenue. Classes of errors. Bank reconciliation statements. Columnar or tabular recording. Sectional and self-balancing ledgers—control accounts. Petty cash. Bills of exchange and promissory notes. Ascertainment of the cost of goods sold and rate of stock turnover. Trading and profit and loss accounts. Balance day adjustments. Balance-sheet. Grouping of balance-sheet items. Classes of assets and liabilities.

9.144 Commercial Law.

Law of contract. Sale of goods. Principal and agent. Bailments. Common carriers. Bill of Sale. Pawn. Hire purchase agreements. Lien. Mortgages. Guarantees. Ships and shipping and sea carriage of goods. Commercial terms.

9.154 Fibre Science II.

Study of the origin, identification and use of synthetic fibres used on wool processing machinery.

9.22 Agronomy I.

Environmental factors affecting agricultural development and utilisation of land.

Climate.—Rainfall. Temperature. Light. Homoclimes. Classification of climate. Application of climatological data to land utilisation studies.

Soil.—Soil formation and soil types. Work of the soil surveyor.

Topography.—Effect on climate, soil, erosion rate and utilisation of machinery.

Vegetable Cover.—Clearing and developmental costs.

Proximity to Markets.—Transport costs and perishable products.

Modification of Environment.—Irrigation and drainage. Electricity supply. Scientific discoveries and developments.

Soil Erosion.—Effect of land utilisation. Prevention and control.

9.24 Pastoral Agronomy.

Major agro-climatological regions in New South Wales. Rotation of crops. Relation to livestock production. Detailed treatment of crop plants used in connection with the pastoral industry. Pasture plants. Principles of agrostology. Pasture establishment and management. Fodder conservation.

9.32 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 Foreign Exchange.

Financial institutions (money, banking systems, trading banks). Domestic monetary theory and policy—value of money, factors affecting value of money, effects of changes, inflation and deflation, monetary policy and the national income. Exchange rate theory and

policy—exchange rates and methods of quotation, spot and forward rates, gold standard. Exchange control—international currency and reconstruction, International Monetary Fund and exchange adjustments.

9.42 General Textiles I (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 II (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 identifications. Scaffolding threads and their applications. The appreciation of good design in textiles. New development in textile manufacture. Textile literature and research association, 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 I.

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 II.

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 III (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.

9.63 Statistics.

Philosophy of the statistical approach. Study of variation—distributions, averages and means of dispersion, reliability of estimate, probability and fiducial limits. Analysis of variance and covariance, components analysis, tests of significance. Goodness of fit, chi square tests. General sampling problem and design and analysis of general sampling investigations. Relationship between variables. Regression analysis with one or more independent variables. Control of variation—experimental designs, control charts. Handling of data which do not follow a standard pattern—transformations, non-orthogonal analyses.

9.74 Fibre Science I.

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 10.94.

10.11 and 10.11a 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.

10.11B 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), and Course III (Chemical Engineering).

10.12 Mathematics.

A fuller treatment of Mathematics 10.10 with special reference to functions of more than one variable. Multiple integrals.

The Laplace transform and its use in solving linear differential equations. Solution of differential equations in series. Introduction to partial differential equations.

Revision of work on complex numbers covered in 10.10 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. Green's and Stokes' theorems.

Introduction to Fourier series and harmonic analysis.

The general principles of dynamics and their applications.

10.13 Mathematics.

Statistical methods and industrial experimentation. Special functions and theory of complex variable. Metric algebra.

The syllabus consists of a selection of topics from Mathematics 10.12 with special reference to the needs of Chemical Engineers.

10.22 Mathematics II.

Applied. Hydrostatics. Statics: Reduction of a system of plane forces. Bending moment. Stresses in frames. Virtual work.

Pure. Conic sections (if not done in first year). Calculus: Plane curves—catenary, cycloid, epicycloid, cardioid radius of curvature, length of arc, intrinsic equations. Integration—change of variable multiple integrals.

10.33 Mathematics for Electrical Engineers.

A course of advanced mathematics specially chosen for students in Electrical Engineering Courses. Complex variable theory and contour integration. Differential equations of special types met with in electrical engineering, Bessel and similar functions. Advanced vector analysis, electromagnetic theory, solution of Maxwell's equations with boundary conditions.

Operational methods of circuit analysis.

10.43 MATHEMATHICS FOR CIVIL ENGINEERS.

A course of advanced mathematics specially chosen for students in Civil Engineering Courses. Spherical trigonometry. Fourier analysis and solution of selected differential equations in series of Fourier type. Elementary statistical analysis.

10.51 MATHEMATICS FOR ARCHITECTS.

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.

Architecture.

Subjects 11.00 to 11.96.

11.11 DESCRIPTIVE GEOMETRY.

This subject is an introduction to architectural drawing and drafting technique. A good grounding in this work is essential in later years. The student is taught the correct choice of drawing office materials, use of instruments, the elements of good lettering, geometric drawing, perspective, shadow projection and sheet composition.

There are about thirty-four lecture-demonstrations, followed by drawing. Each student is required to complete thirty-four sheets of drawings dealing with the following: drawing materials and drawing instruments; 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; simple working drawings.

11.21 FREEHAND DRAWING AND PRESENTATION I.

Introduction by means of studio and out-door drawing to architectural presentation and as an aid to design process. Practical survey—by way of simple tasks—of drawing materials, media and elementary techniques. Study of the sources and effects of light, with particular regard to their influence on form definition in delineation. Freehand lettering and the progressive study of simple

geometrical, irregular planar and complex casts. Independent work in sketchbook form, with appropriate instructions and a limited number of stated assignments, designed to develop powers of observation and memory and to provide scope for practical expression of initiative and imagination.

11.22 Freehand Drawing and Presentation II.

Continuation of Part I at a higher level with emphasis on out-door work: instruction in free out-door sketching and sketch notation in conjunction with study in various media of more complex range of natural and artificial forms. Elementary measuring and plotting in association with sketching of simple buildings. Practical analysis of techniques of more advanced character. Importance of good composition stressed in all work. Private sketchbooks as a medium for independent experiment and practice as for Part I. Students' sketch-books will be marked separately and those failing to reach a reasonable standard will continue sketch-book work in Third Year.

11.31–11.32 Architectural Studies and Design.

A course in general design, taken over Years One and Two, 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. Participation in forum activity is encouraged in the way of prepared talks, debates and group discussions.

11.31 Architectural Studies and Design I.

Introduction. Design conception, description of specialised fields of design activity.

Visual Fundamentals. Accuracy of perception; improvement of observation.

Elements of Design. Basic elements in line, shape, form, textures and colour; tone relations with exercises in water colour and body colour; colour mixing, brightness, contrast, monotone and monochrome.

Visual Representation. Means of representation; expressive draughtsmanship; techniques; media of presentation; ornamental and pictorial art; natural abstract and non-objective form.

11.32 Architectural Studies and Design II.

Design Fundamentals. Advanced analysis; theories of colour mixing; historical survey of colour; the Ostwald and Munsell systems; studio work in colour combinations.

Textures. Classification of materials; consideration of finishes and effects; studio exercises in the composing of samples of materials.

Composition. Elaboration of the principles of design in structural relationship to function; the use of the model; studio exercises in non-objective expression; abstract composition in the "collage".

11.41–11.44 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 four 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 constructions: 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. Later Roman works and 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 mediaeval 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.

The Architecture of the Renaissance in Europe. Introduction.

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.

11.44 History of Architecture IV.

History of Architecture in the 19th and 20th Centuries. The Industrial Revolution and the Romantic Movement. The Age of Revivals; Archaeology and Mediaevalism; the Eclectics. The emergence of the Engineer and the growth of specialisation; Art Nouveau and the Deutsche 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.

11.51 Building Science I.

Porosity, absorption and permeability of materials and the relationship of these properties to methods of formation, density, capillary attraction, weathering, heat and sound insulation, condensation and strength.

Analysis of the constituents of rainwater and their effect on the weathering of building materials.

A study of the manufacture of bricks and the decay of brickwork due to the action of water.

Types of stone and their formation, their properties and reaction to frost and florescence.

Chemical and physical analysis of the constitutents of concrete and the necessary qualities required. Advantages of grading of aggregate. Water content and bulking of sand. Florescence and moisture movement. Methods of waterproofing.

Chemical and physical analysis of softwoods and the relationship between structure and strength. Moisture content and movement and its relationship to atmospheric humidity. Casehardening theory. Decay, fungi and insect attack.

Chemical and physical analysis of commercial metals, their properties and uses.

11.52 Building Science II.

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.

As in 1951 University Calendar.

11.71A Building Construction Theory I.

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.

11.71B Building Construction Drawing I.

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. Later on a number of information sheets are drawn up by the students. These contain most of the notes and sketches given in the previous lectures and are kept in the student's notebooks to form a handy reference file.

During third term the students have an Integration problem which correlates elementary design theories* with constructional detailing in the form of working drawings of a simple building.

*See 11.31.

11.72A Building Construction Theory II.

The course is comprised of 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 concret,e 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.

11.72B Building Construction Drawing II.

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 steel 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 steel frame buildings, design and detailing of structural elements in steel (riveted and welded work) and reinforced concrete following the lectures in the Theory of Structures subject 11.103.

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, tradesmen and labourers.

(*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.

As in 1951 University Calendar.

11.83 Theory of Architecture B.

Factors influencing Architectural Design: people, climate, topography, materials, economics, social systems, etc.; influence of weather and "the element": sun light, air, wind, rain, etc.; orientation; elements of contemporary architecture; floors, walls, roofs, windows, etc.; expression of function; materials and construction; "style"; character or 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; good manners in architecture, influence of adjacent buildings, elementary notes on urban architecture; scale and other principles of design in simple contemporary work; detailing; the surroundings of buildings; contemporary philosophies.

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.

An increasing proportion of the work as the course proceeds is done under the "group" system.

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.

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.

11.101 and 11.103 Theory of Structures.

The whole range of this subject has been divided into five sections. The first three sections (subjects 11.101, 11.102 and 11.103) are compulsory and taken by all students, whereas the last two sections (subjects 8.124 and 8.125) are 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 three 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 advanced sections 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.

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 (rivetted 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 Constructional 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 (rivetted 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 wtih 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.

11.114 Architectural Research (alternative to 8.124—Structures).

In this subject the student is required to undertake research work on early Australian architecture, and on some subject of his own choosing.

The historical research takes place during the first term, and 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 their terms each student is required to deliver a brief paper upon some aspect of architecture or the allied arts, the selection of matter being left to the student, subject to approval by the lecturer.

11.115 PLANNING RESEARCH (alternative to 8.125—Structures).

The student is encouraged to pursue 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 will 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; types of specifications and their uses; specifications in parts; setting out front page of a specification; specifications with trades in schedule form; specification for two or more similar buildings, treatment of trades for alterations and additions and use of addendum.

Theory of specification writing; expression in writing; methods of typing dimensions, cross referencing; door schedules and numbering rooms in large buildings; trades covered by regulations, points to observe in visiting site and existing buildings; explanation of differences between a government specification and that of private architect; explanation of P.C. items, provisional and contingency sums and provisional quantities.

Reading and explanation of a standard specification and its uses; practical sketching from specifications and resume of first two terms.

11.144 Building Research Review.

As in 1951 University Calendar.

11.154 Interior Furnishing and Decoration.

As in 1951 University Calendar.

11.164 Acoustics and Sound Insulation.

As in 1951 University Calendar.

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, 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.

As in 1951 University Calendar.

11.204 Building Services and Equipment B.

As in 1951 University Calendar.

11.215 Estimating.

Preamble. 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 to:—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.

Humanities and Social Sciences.

G1 Philosophy—Scientific Method.

G2 Philosophy—Social Sciences.

G10 English.

G20 History.

Electives.

Major.		*Minor.*	
G3	Philosophy.	G4	Philosophy.
G11	English.	G12	English.
G21	History.	G22	History.
G30	Politics.	G31	Politics.
G40	Psychology.	G41	Psychology.
G50	Economics.	G51	Economics.

G1. Scientific Method.

The aim of this introductory course is to provide students with some grounding in the elementary logical and methodological material which is necessary for an understanding of scientific method. The course is thus aimed to acquaint the student with the universal nature of scientific method and to distinguish it from laboratory technique.

The course will incude: An account of the historical development of method, in order to bring out some of the general issues involved; an examination of problems such as induction and deduction, observation, hypotheses, the nature of experiment, and experimental methods. There will also be some consideration of elementary logic.

G2. An Introduction to the Social Sciences.

This course is designed to do two things:

(i) to acquaint the student with the nature and scope of the various social sciences; and

(ii) to examine some of the basic logical issues that have characterized the history and development of the various fields of social enquiry.

These two aims will be dealt with concurrently, the former being achieved in illustrating the latter.

The development of the contemporary social sciences from the historical background of evolutionary theory, utilitarianism and 19th century individualism has meant that a number of special problems of method, content and aim, have recurred in all fields of social science. An appreciation of these issues is necessary to understand and critically evaluate current trends, especially in connection with "applied science," social engineering values, practicalism, action research, and the various attempts to synthesize social sciences.

G10. Language and Literature.

(*a*) The language will treat History, Usage and Prose-criticism.

(*b*) The literature will involve a study of Personality as treated in various modern prose works.

G20. History.

The aim of this course is to introduce the student to some of the main trends of modern history, with special reference to Western Europe since 1750. There will be four main topics: the industrial revolution; the growth of democratic thought; the expansion of Europe; the modern state. The student will be expected to know in greater detail the history of one country, say Great Britain. The course will show the impact of industrialism and democratic thought on the nation state, and describe the emergence, in an age of conflict, of new experiments in government. It will also show the impact of Europe on the rest of the world.

G3. Philosophy.

This is a course designed to examine, in some detail, a number of the important problems of modern philosophy with special emphasis on those bearing directly on controversy in social fields.

As this course involves a more systematic examination of philosophical issues than other courses in the series, part of it will be devoted to an examination of some preliminary logical material.

G4. Philosophy.

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.

G11. English.

The course will be of two parts: a study of the development of English drama, with special attention to Shakespeare's tragedies, and works by selected major dramatists; and a study of some 19th and 20th century novelists.

G12. English.

The course will make a brief study of Semantics and Satire.

G21. History.

This course will consist of two strands, which will vary from year to year:

(*a*) some aspect of Australian history, and

(*b*) a topic in European history.

For 1952 the courses will be as follows:

(*a*) Australian political and economic development, 1820-1914—32 lectures;

(*b*) Renaissance in Europe—40 lectures.

Text books are not needed for these courses, which will be mainly reading courses.

G22. History.

After a brief review of American history in colonial and early independence times, this course will examine the causes and effects of the Civil War. Then the development of the United States will be examined up to the conclusion of World War II. In particular, attention will be paid to the economic and political problems involved in the United States' advance to world leadership of the democratic nations.

G30. Politics.

Parliamentary Government. An examination of the theoretical basis and practical working of parliament in Britain and Australia, and some comparisons with the American system.

The course will include comparisons of unitary and federal systems of government, the nature of an institution, the working of the cabinet, electoral systems, and the importance of political parties in the modern state.

The main aim will be to find out just how parliamentary government works, and what functions it is reasonable to expect it to perform. Some attention will be paid to the degree of democracy existing in Australia and Britain to-day, as compared with earlier periods and with other countries.

G31. Politics.

Theory of Marxism. The course will survey and analyse the Marxist materialist interpretation of history, the class struggle, and the theory of the State. The approach will be critical and an assessment made of the tenability of the theory in the light of world developments in the 20th century.

G40. Psychology.

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. An attempt will also be made to suggest how psychology might be integrated with ethnology, and social interaction generally, as well as the social determinants of personality which will be emphasised.

G41. Psychology.

Heredity and some social issues. This topic is offered as a means to 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 his major fields of study as intending technologists.

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.

G50. Economics.

A general introduction to the study of economic theory. The nature and scope of economics. Production, market economy. Value and distribution: supply and demand, marginal utility, history of theories of value, marginal productivity, wages, profit, rent, interest. Competition and monopoly. Trade unions. Index numbers. National income. Money, credit and banking. Employment and the trade cycle. International trade: balance of payments, comparative costs, free trade versus protection.

G51. Economics.

Current Economic Issues. The course will deal in terms of elementary economic analysis, with two types of issue:—(*a*) Some of the issues graduates would be likely to encounter as employees of industry, and (*b*) current issues of national economic policy. The first type involves such problems as industrial organisation and policies, monopoly, efficiency, trade unionism. The second, inflation, dollar problem, exchange rates, tariffs, employment.

G60. Painting, Sculpture, Allied Arts.

A series of lectures on painting, sculpture, metal work, stained glass, carving, etc., given by specialists.

TEXT BOOKS.

The following text books are prescribed for 1952.

	Subject.	Text Book.
	PHYSICS—1.00 to 1.94.	
1.11 1.11A	Physics	Lemon and Ference—*Analytical Experimental Physics.*
	Physics	Poynting and Thomson—*University Text Book of Physics—Properties of Matter, Vol.* 1.
1.12	Physics	Starling and Woodall—*Physics.* Dushman—*Fundamentals of Atomic Physics.* *OR* *Tolansky—Atomic Physics.* *OR* Crowther—*Ions, Electrons and Ionizing Radiations,* (8th Edition).
1.41	Physics	Lemon and Ference—*Analytical Experimental Physics.*
1.42	Physics	Starling and Woodall—*Physics.*
	APPLIED CHEMISTRY—2.00 to 2.94.	
2.111	Chemistry	Latimer and Hildebrand—*Reference Book of Inorganic Chemistry* (Rev. Ed. 1940). Bound with— Hildebrand—*Principles of Chemistry* (5th Edition, 1947). Sydney Technical College—First Year Practical Chemistry Notes—Union Store.
2.111	Chemistry	Read—*Textbook of Organic Chemistry* (3rd Edition). *OR* English and Cassidy—*Principles of Organic Chemistry.*
2.122	Engineering Chemistry.	Gyngell—*Applied Chemistry for Engineers* (2nd Edition, 1951). Leighou (for reference)—*Chemistry of Engineering Material* (4th Edition, 1942). Carman—*Chemical Constitution and Properties of Engineering Materials.*
4.122	Engineering Metallurgy.	Rollason—*Metallurgy for Engineers* (2nd Edition, 1949). Sydney Technical College—Notes for C. 4a-4b, *Technology for Engineers.* Carman (for reference)—*Chemical Constitution and Properties of Engineering Materials.*
2.32 2.33	Physical Chemistry	Findlay—*Practical Physical Chemistry* (7th Ed., 1941). *OR* Palmer, W. G.—*Experimental Physical Chemistry.* Glasstone—*Elements of Physical Chemistry*—1st choice. *OR* Glasstone—*Textbook of Physical Chemistry* (2nd Edition, 1948—(2nd choice). Daniels—*Outlines of Physical Chemistry,* 1948. For further reading— Eastman and Rollefson—*Physical Chemistry.*

Subject.		Text Book.

APPLIED CHEMISTRY—2.00 to 2.94 (*continued*).

2.41 2.41A 2.41B	Chemistry	Latimer and Hildebrand—*Reference Book of Inorganic Chemistry* (Rev. Ed., 1940). Bound with— Hildebrand—*Principles of Chemistry* (5th Edition, 1947). English and Cassidy—*Principles of Organic Chemistry*. *OR* Read—*Textbook of Organic Chemistry* (3rd Edition). Sydney Technical College—First Year Practical Chemistry Notes—Union Store. 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*.
2.52 2.53	Quantitative Analysis.	Vogel—*A Textbook of Quantitative Inorganic Analysis*. *OR* Kolthoff and Sandell—*A Textbook of Quantitative Inorganic Analysis* (2nd Edition, 1943).
2.62 2.63 2.63A	Organic Chemistry	Fieser and Fieser—*Organic Chemistry* (2nd Edition, 1950). *OR* Karrer—*Organic Chemistry* (4th Edition, 1950).
2.72	Applied Mathematics for Chemists.	Porter—*The Method of Dimensions* (3rd Edition, 1946).
2.73	Applied Mathematics for Chemists.	Chambers—*Statistical Calculations for Beginners*. Brownlee—*Industrial Experimentation*—(H.M. Stationery Office), (4th Edition, 1949).

CHEMICAL ENGINEERING—3.00 to 3.75.

3.14	Industrial Chemistry	Riegel—*Industrial Chemistry* (5th Edition, 1949). Shreve—*Chemical Process Industries*. Groggins—*Unit Processes in Organic Synthesis* (3rd Edition, 1947).
3.24	Chemical Engineering I	McAdams—*Heat Transmission* (2nd Edition, 1942). **Reference.** Brown, G. G. (editor)—*Unit Operations*. Badger and McCabe—*Elements of Chemical Engineering* (2nd Edition, 1936). Riegel—*Chemical Machinery*. Kern—*Process Heat Transfer*. Perry—*Chemical Engineers' Handbook* (3rd Edition 1950). Rouse, H.—*Fluid Mechanics*. Lyon, R. M.—*Liquid Metal Handbook*.

SUBJECT.	TEXT BOOK.
CHEMICAL ENGINEERING—3.00 to 3.75 (*continued*).	
3.34 Chemical Engineering Design.	*Mechanical World Pocket Book.* *OR* Low, D.A.—*Pocket Book for Mechanical Engineers*, 1948. Faires—*Design of Machine Elements* (Rev. Ed., 1941). *OR* Maleev—*Machine Design* (2nd Edition, 1946). *OR* Black, P. H.—*Machine Design.* Marks—*Handbook for Mechanical Engineers* (5th Edition, 1950). Inst. of Engineers (Aust.)—*Australian Standard Engineering Drawing Practice* (1946). Hesse and Rushton—*Process Equipment Design.* Stoever—*Applied Heat Transmission.* *OR* McAdams—*Heat Transmission* (2nd Edition, 1942). Eckman—*Industrial Process Control.* *S.A.A. Boiler Code* (C.B. 1—1949). *S.A.A. Code for Corrosion Resistant Steel Boilers* (C.B. 10—1942). *S.A.A. Welding Codes* (*C.A.*8—1939). *S.A.A. Code for Structural Steel in Buildings* (*C.A.*1—1939). *S.A.A. Aust. Standard Rules for Certification in Boiler Welding, Pt.* 1 : *Arc Welding Operators* (*C.B.*14—*Pt.* 1—1947). B.S. 1500 Fusion Welded Pressure Vessels. **Reference.** *ASME Boiler Construction Code, Section VIII*; *Unfired Pressure Vessels Code* (1950 Edition). Perry—*Chem. Engineering Handbook* (3rd Edition, 1950). Amer. Soc. for Metals—*Metals Handbook* (1948). Lloyd's Rules for Welded Pressure Vessels. Nelson, W. L.—*Petroleum Refinery Engineering* (3rd Edition, 1949). Robinson, C. S. and Gilliland—*Elements of Fractional Distillation* (3rd Edition, 1939).
3.44 Chemical Engineering Calculations.	Sherwood and Reed—*Applied Mathematics in Chemical Engineering.* Hougen and Watson—*Chemical Process Principles* (Vol. 1). **Reference.** Davis, D. S.—*Empirical Equations and Nomography.* Chambers—*Statistical Calculations.* Brownlee—*Industrial Experimentation* (4th Ed., 1949). Hitchcock and Robinson—*Differential Equations* (2nd Edition, 1936).

Subject.		Text Book.
CHEMICAL ENGINEERING—3.00 to 3.75 (*continued*).		
3.44	Chemical Engineering Calculations—*contd.*	Lipka—*Graphical and Mechanical Computation.* Lewis and Radasch—*Industrial Stoichiometry.* Haslam and Russel—*Fuels and Their Combustion.* Davies, O. L.—*Statistical Methods in Research and* Production. Worthing and Geffner—*Treatment of Experimental Data.* I. S. and E. S. Sokolnikoff—*Higher Mathematics for Engineers and Physicists* (2nd Edition, 1941).
3.64	Chemical Engineering, Thermodynamics and Kinetics.	Smith, J. M.—*Introduction to Chemical Engineering Thermodynamics.* Hougen and Watson—*Chemical Process Principles* (Vols. II and III). **Reference.** Dodge—*Chemical Engineering Thermodynamics.* Guggenheim—*Thermodynamics.* Hinshelwood—*Kinetics of Chemical Change.*
MECHANICAL ENGINEERING—5.00 to 5.94.		
5.101	Drawing & Materials	Institution of Engineers, Australia—*Australian Standard Engineering Drawing Practice* (*CZ*1—1946). Sydney Technical College—Notes for Mechanical Engineering I.
5.11	Engineering Drawing and Materials.	Institution of Engineers, Australia—*Australian Standard Engineering Drawing Practice* (*CZ*1—1946). Sydney Technical College—Lecture Notes for Mechanical Engineering I.
5.12	Mechanical Drawing and Design.	Black, Paul H.—*Machine Design.* *OR* Faires—*Design of Machine Elements* (2nd Edition, 1941).
5.13	Engineering Design ...	Black, Paul H.—*Machine Design.* *OR* Faires—*Design of Machine Elements* (2nd Edition, 1941). *B.S.S. Spur Gears.* *B.S.S. Worm Gears.* *S.A.A. Crane and Hoist Code* (*C.B.* 2). *N.S.W. Scaffolding and Lifts Act.*
5.32A	Theory of Machines ...	Bevan, Thomas—*Theory of Machines* (2nd Edition, 1943). Sydney Technical College—Lecture Notes for Mechanical Engineering IIIA.

SUBJECT.	TEXT BOOK.

MECHANICAL ENGINEERING—5.00 to 5.94 *(continued)*

5.32B	Thermodynamics and Heat Engines.	Moorfield and Winstanley—*Heat Engines* (3rd Edition, 1947). **Reference.** Sydney Technical College—Lecture Notes for Mechanical Engineering II and Mechanical Engineering IIIB, term 3.
5.33A	Theory of Machines ...	Bevan, Thomas—*Theory of Machines* (2nd Edition, 1943. Sydney Technical College—Lecture Notes for Mechanical Engineering IIIA. Don Hartog—*Mechanical Vibrations* (3rd Edition, 1947).
5.33B	Thermodynamics and Heat Engines.	Wrangham—*The Theory and Practice of Heat Engines* (2nd Edition, 1948). Inchley—*Theory of Heat Engines* (6th Edition, 1944). Lewitt—*Thermodynamics Applied to Heat Engines* (3rd Edition, 1943). Walshaw—*Applied Thermodynamics.* **Reference.** Fraas—*Combustion Engines.* Macintyre, H. J. and Hutchinson—*Refrigeration Engineering* (2nd Edition, 1950). Pye—*Internal Combustion Engines* (Vol. 1, 2nd Edition, 1937; Vol. 2, 1934). Young, S. J. and Pryor—*Testing of Internal Combustion Engines.*
5.41	Descriptive Geometry	Abbot, W.—*Practical Geometry and Engineering Graphics* (5th Edition, 1951).
5.53	Fluid Mechanics ...	Hunsaker and Rightmire—*Engineering Applications of Fluid Mechanics.* *OR* Rouse, Hunter—*Elementary Mechanics of Fluids.* **Reference.**
5.54	Fluid Mechanics and Hydraulic Machines.	Wislicenus—*Fluid Mechanics of Turbo-Machines* Stephanoff—*Centrifugal and Axial-flow Pumps.* Vincent, E. T.—*Theory of Gas Turbines and Jet Engines.*
5.34	Mechanical Engineering Practice.	Eckman—*Principles of Industrial Process Control.* Rhodes—*Industrial Instruments for Measurement and Control.* **Reference.** Eckman—*Industrial Instrumentation.* Smith, E. S.—*Automatic Control Engineering.*

Subject.		Text Book.
ELECTRICAL ENGINEERING—6.00 to 6.94.		
6.12	Electric Circuit Theory	Kerchner and Corcoran—*Alternating Current Circuits* (3rd Edition, 1951). Hessler and Carey—*Fundamentals of Electrical Engineering.* **Reference.** Frazier—*Elementary Electric Circuit Theory.*
6.13	Electric Circuit Theory	Kimbark, Edward W.—*Electrical Transmission of Power and Signals*, 1949. Kerchner and Corcoran—*Alternating Current Circuits* (3rd Edition, 1951).
6.214	Electric Power Engineering	Starr, A. T.—*Generation, Transmission and Utilization of Electric Power* (2nd Edition, 1942.)
6.224	Electric Power Utilization.	Say, M. G.—*Performance and Design of A.C. Machinery* (2nd Edition, 1948). **Reference.** Mass. Inst. of Tech.—Staff of Dept. of Electrical Engineering—*Magnetic Circuits and Transformers.* Westinghouse Electric Mfg. Co.—*Electrical Transmission and Distribution Reference Book* (3rd Edition, 1944).
6.23	Electric Power Engineering.	Cook, A. L. and Carr—*Elements of Electrical Engineering* (5th Edition, 1947).
6.303	Electronics	Mass. Inst. of Tech.—Staff of Dept. of Electrical Engineering—*Applied Electronics.*
6.304	Industrial Electronics	Cage, J. M.—*Theory and Applications of Industrial Electronics*, 1951. **Reference.** Westinghouse Electric Mfg. Co.—*Industrial Electronics Reference Book*, 1948.
6.314	High Frequency Engineering.	Arquimban, L. B.—*Vacuum Tube Circuits*, 1943.
6.324	High Frequency Design.	Terman, F. E.—*Radio Engineer's Handbook*, 1943. American Radio Relay League—*The Radio Amateur's Handbook* (latest Edition). Radio Corp. of America—*Tube Handbook* (latest Edition).
6.83	Electrical Engineering	Cook, A. L. and Carr—*Elements of Electrical* Engineering (5th Edition, 1947).
MINING ENGINEERING AND GEOLOGY—7.00 to 7.94.		
7.32	Mining	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.* **Reference.** Beringer—*Underground Practice in Mining* (3rd Edition, 1947).

	Subject.	Text Book.
	MINING ENGINEERING AND GEOLOGY—7.00 to 7.94 (*continued*).	
7.32	Mining—*continued* ...	Peele—*Mining Engineer's Handbook* (2 Vols., 3rd Edition, 1941). Young, G. J.—*Elements of Mining* (4th Edition, 1946). Forster Brown—*Shaft Sinking.* Uren—*Petroleum Production Engineering.*
7.33	Mining	Penman and Penman—*Principles and Practice of Mine Ventilation.*
		Reference.
		Same as for 7.32—Mining.
7.34	Mining	Statham—*Winning and Working.* Wheeler, H. R.—*Manual of Modern Underground Haulage Methods.* Broughton—*Electric Winders* (2nd Edition, 1948).
		Reference.
		Peele—*Haulage Winding.* Beringer—*Underground Practice in Mining* (3rd Edition, 1947). Peele—*Mining Engineer's Handbook* (2 Vols., 3rd Edition, 1941). Young, G. J.—*Elements of Mining* (4th Edition, 1946).
7.43	Metalliferous Mining...	Beringer—*Underground Practice in Mining* (3rd Edition, 1947).
7.44	Metalliferous Mining...	Beringer—*Underground Practice in Mining* (3rd Edition, 1947). Truscott—*Mine Economics* (2nd Edition, 1946).
		Reference.
		Peele—*Mining Engineer's Handbook* (2 Vols., 3rd Edition, 1941).
7.54	Coal Mining	Given—*Mechanical Loading of Coal Underground.* Whitaker and Willet—*Colliery Explosions and Recovery Work.* Penman and Penman—*Principles and Practice of Mine Ventilation.* Waltham—*Mine Rescue and First Aid.*
		Reference.
		Same as for 7.32—Mining.
7.64	Preparation of Minerals. ...	Truscott—*Textbook of Ore Dressing.* *OR* Gardin—*Principles of Mineral Dressing.*
7.92	Geology	Emmons, Thiel, Stauffer and Allison—*Geology—Principles and Processes* (3rd Edition, 1949). *OR* Longwell, Knopf and Flint—*Physical Geology* (3rd Edition).
		Reference.
		Cotton, C. A.—*Geomorphology* (5th Edition, 1949). Hills, E. S.—*Outlines of Structural Geology* (2nd Edition, 1944).

	SUBJECT.	TEXT BOOK.
	MINING ENGINEERING AND GEOLOGY—7.00 to 7.94 (*continued*).	
7.92	Geology—*continued* ...	Geikie—*Structural and Field Geology* (5th Edition, 1940). Shimer—*Introduction to the Study of Fossils* (2nd Edition, 1949). Woods, H.—*Palaeontology Invertebrate* (6th Ed.).
7.92A	Geology	Emmons, Thiel, Stauffer and Allison—*Geology—Principles and Processes* (3rd Edition, 1949). *OR* Longwell, Knopf and Flint—*Physical Geology* (3rd Edition). **Reference.** Cotton, C. A.—*Geomorphology* (5th Edition, 1949). Geikie—*Structural and Field Geology* (5th Edition, 1940). Hills, E. S.—*Outlines of Structural Geology* (2nd Edition, 1944). Ries and Watson—*Engineering Geology* (5th Edition, 1948).
7·92B	Geology	**Reference.** Longwell, Knopf and Flint—*Physical Geology* (3rd Edition, 1948). Leggett—*Geology and Engineering.*
7.93	Geology	Rutley—*Elements of Mineralogy* (24th Edition, 1948). Smith, H. G.—*Minerals and the Microscope* (4th Edition, 1940). **Reference.** 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). Reports of Scientific Societies and Geological Surveys.
7.94	Geology	**Reference.** Forrester, J. D.—*Principles of Field and Mining Geology.* 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). Bateman, A. M.—*Economic Mineral Deposits* (2nd Edition, 1950). Leggett—*Geology and Engineering.* Heiland—*Geophysical Exploration.*

SUBJECT.		TEXT BOOK.
CIVIL ENGINEERING—8.00 to 8.94.		
8.11	Mechanics and Graphics.	No text book.
8.112	Strength of Materials	**Reference.** Don Hartog—*Strength of Materials.* Salmon, E. H.—*Materials and Structures,* (Vol. I), *Electricity and Strength of Materials.* Timoshenko and MacCullough—*Elements of Strength of Materials* (3rd Edition, 1949).
8.122	Structural Drawing and Design.	*S.A.A. Code CA*1.—*Code for Structural Steel in Building.* *S.A.A. Code CA*8.—*Welding Code.* **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.*
8.113	Structures	*S.A.A. Codes—CA*1, *CA*2, *CA*8. **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,* (Vol. II, *Theory and Design of Structures.* Sutherland, H. and Reese—*Introduction to Reinforced Concrete Design* (2nd Edition, 1943).
8.123	Structures	Same as for 8.113—Structures.
8.114	Structures	Same as for 8.113—Structures. Magnel, G.—*Prestressed Concrete.*
8.23	Materials of Construction.	**Reference.** Bauer—*Plain Concrete* (3rd Edition, 1949). U.S. Bureau of Reclamation—*Concrete Manual.* Bateman, J. H.—*Materials of Construction.*
8.33	Engineering Computations.	**Reference.** 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).
8.53	Fluid Mechanics ...	**Reference.** Rouse—*Elementary Mechanics of Fluids.* Vennard—*Elementary Fluid Mechanics* (2nd Edition, 1947). Dodge and Thompson—*Fluid Mechanics.*

Subject.		Text Book
CIVIL ENGINEERING—8.00 to 8.94 (*continued*).		
8.53	Fluid Mechanic —*contd.*	Hunsaker and Rightmire—*Engineering Applications of Fluid Mechanics.*
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.*
8.64	Civil Engineering ...	Rouse (Ed.)—*Engineering Hydraulics.* Rouse—*Fluid Mechanics for Hydraulic Engineers.* Barrows—*Water Power Engineering.* Creager, Justin and Hinds—*Engineering for Dams.* Steel—*Water Supply and Sewerage.* Phelps—*Public Health Engineering.* Webb—*Railroad Construction.* Du Platt, Taylor—*Docks, Wharves and Piers.* Etcheverry—*Irrigation Practice and Engineering.*
8.73	Soil Mechanics ...	Terzaghi and Peck—*Soil Mechanics in Engineering Practice.* Taylor, D. W.—*Fundamentals of Soil Mechanics.* Tachebokirioff, G. P. (McGraw)—*Soil Mechanics, Foundations and Earth Structures.* **Reference.** T. William Lambe—*Soil Testing for Engineers.* Terzaghi—*Theoretical Soil Mechanics.* A.S.T.M., 1950—*Soil Testing Procedures.*
8.92	Properties of Materials	Davis, H. E., Troxell and Wiskocil—*Testing and Inspection of Engineering Materials.* **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.
MATHEMATICS—10.00 to 10.94.		
10.11 10.11A	Mathematics ...	Middlemiss—*Differential and Integral Calculus* (2nd Edition, 1946). Middlemiss—*Analytic Geometry.* **Reference.** Courant—*Differential and Integral Calculus* (2 Vols., (Vol. 1, 2nd Edition). Siddons and Hughes—*Trigonometry* (Parts 2, 3 and 4).
10·12	Mathematics	Carslaw and Jaeger—*Operational Methods in Applied Mathematics* (2nd Edition, 1947). Rutherford—*Vector Methods* (6th Edition, 1949). **Reference.** Middlemiss—*Analytic Geometry.* Sokolnikoff, I. S. and E. S.—*Higher Mathematics for Engineers and Physicists* (2nd Edition 1941).

SUBJECT.		TEXT BOOK.
MATHEMATICS—10.00 to 10.94 (*continued*).		
10.33	Mathematics	Carslaw and Jaeger—*Operational Methods in Applied Mathematics* (2nd Edition, 1947). Jeans—*Mathematical Theory of Electricity and Magnetism.* **Reference.** Stratton—*Electromagnetic Theory.*
10.43	Mathematics	Owing to possible modification in the syllabus of 10.43, no text book title can be given at this stage.
ARCHITECTURE—11.00 to 11.95.		
11.41 11.42 11.43	History of Architecture.	Fletcher, Sir Banister (Batsford)—*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* (2 Vols.). Blomfield—*Short History of Renaissance Architecture in England.*
11.51	Introduction to Architectural and 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.*
11.52	Building Science ...	Same as for 11.51—Introduction to Architectural and Building Science.
11.71 A & B 11.72 A & B	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.* **Reference.** McKay, W. B.—*Building Construction* (Vols. 1, 2 and 3). Mackey, G. F.—*Gregory's Modern Building Practice in Australia.* Sharp, W.—*Australian Methods of Building Cosntruction.* Fitzmaurice, R.—*Principles of Modern Building* (Vol. I).

Subject.		Text Book.
ARCHITECTURE—11.00 to 10.95 (*continued.*)		
11.82 11.83	Theory of Architecture.	Robertson, Howard—*Principles of Architectural Composition.*
11.101	Structures I	**Reference.** Reynolds and Kent—*Introduction to Structural Mechanics.*
11.102	Structures II	**Reference.** Reynolds and Kent—*Introduction to Structural Mechanics.*
11.103	Structures III ...	**Reference.** 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.*
HUMANITIES AND SOCIAL SCIENCES—G1 to G99.		
G1	Philosophy—Scientific Method.	Latta and MacBeath—*Elements of Logic.* **Reference.** J. S. Mill—*A System of Logic.*
G2	Philosophy—An Introduction to the Social Sciences.	No one text book covers the material in the course. A special reading list will be supplied.
G3	Philosophy	A special reading list will be provided.
G4	Philosophy	A special reading list will be provided.
G10	English	Potter—*Our Language* (Penguin). Wells, H. G.—*The History of Mr. Polly.* Steinbeck, J.—*Of Mice and Men.* Wilder, T.—*The Bridge of San Luis Rey.* Balchin, N.—*Mine Own Executioner.* Shaw, G. B.—*Pygmalion.* Galsworthy, J.—*Strife.* Strachey, L.—*Eminent Victorians.* Bennett, A.—*The Old Wives' Tale.* Shakespeare—*Tragedies.*
G11	English	One work to be selected from each of the following :—

Marlowe, C.	The Brontes.
Johnson, S.	Eliot, G.
Congreve, W.	Hardy, T.
Sheridan, R. B.	Conrad, J.
Synge, J. M.	Wells, H. G.
O'Neill, E.	Greene, G.
Shaw, G. B.	Huxley, A.
Austen, J.	Cary, J.
Dickens, C.	Orwell, G.
Thackeray, W. M.	

G12	English	Swift, J.—*Gulliver's Travels.* Orwell, G.—*Animal Farm.* Wells, H. G.—*Tono-Bungay.* Huxley, A.—*Brave New World.* Lewis, S.—*Babbitt.* Waugh, E.—*Decline and Fall.* Peacock, T. L.—*Nightmare Abbey.* Voltaire—*Candide.*

	Subject.		Text Book.
	HUMANITIES AND SOCIAL SCIENCES—G1 to G99 (*continued*).		
G20	History	... ...	Fisher, H. A. L.—*A History of Europe.* Thomson, D.—*England in the Nineteenth Century* (Penguin). **Reference.** Grant, A. J. and Temperley—*Europe in the Nineteenth and Twentieth Centuries.* Becker, C.—*Modern History.* Schapiro, J. S.—*Modern and Contemporary European Civilization.*
G21	History	... ...	Text books are not needed for this course, which will be mainly reading courses.
G22	History	... ...	Nicholas, H. B.—*American Union* (Penguin).
G30	Politics	... ...	W. Ivor Jennings—*The British Constitution.* Crisp, L. F.—*The Parliamentary Government of the Commonwealth of Australia.* **Preliminary Reading.** Warren Denning—*Inside Parliament.* Sawer, G.—*Australian Government Today* (booklet). Cair—*The Responsible Citizen.* **Reference.** W. Ivor Jennings—*Cabinet Government.* W. Ivor Jennings—*Parliament.* Laski, H. J.—*Parliamentary Government in England.*
G31	Politics	... ...	R. N. Carew Hunt—*The Theory and Practice of Communism.* **Reference.** Marx and Engels—*The Communist Manifesto.* Marx—*Preface to Capital, a Critique of Political Economy.* Marx and Engels—*Selected Works.* Sidney Hook—*Towards the Understanding of Karl Marx.*
G40	Psychology	... ...	Klineberg, O.—*Social Psychology.* **Reference.**
G41	Psychology	... ...	Scheinfeld, A.—*You and Heredity.* Blackburn, J.—*The Framework of Human Behaviour.* Anastasi, A. and Foley—*Differential Psychology.* Klineberg, O.—*Social Psychology.*
G50	Economics	... ...	Samuelson, P. A. *Economics, An Introductory Analysis* (2nd Edition, 1951).
G51	Economics	... ...	A reading list will be supplied.
	WOOL TECHNOLOGY—9.00 to 9.94.		
9.12	Sheep Husbandry I	...	Belschner—*Sheep Management and Diseases.* Pearse, E.—*Sheep, Farm and Station Management* (6th Edition). British Ministry of Agriculture Bulletin—*Rations for Livestock* (11th Edition, 1948).
9.63	Statistics	... ...	Snedecor—*Statistical Method* (4th Edition, 1946).

Subject.		Text Book.

WOOL TECHNOLOGY—9.00 to 9.94 (*continued*).

9.104	Nutrition	Halnan and Garner—*The Science and Practice of Feeding Farm Animals* (3rd Edition, 1946).
9.114	Farm Livestock ...	McMeekan, C. P.—*Principles of Animal Production,* Nichols—*Livestock Improvement* (2nd Edition 1946). Phillips, R. W., F.A.O.—*Breeding Animals Suited to Unfavourable Environments.*
9·12	Sheep Husbandry I ...	**Reference.** Fraser, A.—*Sheep Husbandry.* Hammond, J.—*Growth and Development of Mutton Qualities.* Lydeker—*The Sheep and Its Cousins.* Coffey—*Productive Sheep Husbandry* (3rd Edition).
9.94	Genetics	Lush, J. L.—*Animal Breeding Plans* (3rd Edition. 1945). Hagedoorn A.—*Animal Breeding* (4th Editions 1950). Kelly—*Animal Breeding.*
9.104	Nutrition	Morrison, F. B.—*Feeds and Feeding.*
9.114	Farm Livestock ...	Sisson—*Anatomy of Domestic Animals* (3rd Edition).

Note.—Text books for subjects not listed will be recommended by the lecturers in those subjects.

REPORT

OF THE

COUNCIL OF THE NEW SOUTH WALES UNIVERSITY OF TECHNOLOGY

FOR THE YEAR ENDED 30th JUNE, 1951.

1. INTRODUCTION.

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, 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, 1951.

2. ENROLMENTS.

The number of students admitted to the University in 1951, with a view to proceeding to a first degree in one or other of the several faculties, was 125. In addition, 15 students were engaged on work leading to the degree of Master.

The following are the 1951 enrolments in each year of each undergraduate course.

UNDERGRADUATE COURSES.

Course.	1st Year.	2nd Year.	3rd Year.	4th Year.	Conversion.	Total.
Applied Chemistry	12	8	3	...	12	35
Applied Physics	3	...	...	...	...	3
Architecture	9	6	...	...	...	15
Chemical Engineering ...	8	9	9	...	8	34
Civil Engineering	42	23	16	9	3	93
Electrical Engineering ...	29	25	9	9	7	79
Mechanical Engineering ...	27	13	5	11	10	66
Mining Engineering... ...	9	12	6	6	1	34
Wool Technology	6	...	...	...	...	6
	145*	96	48	35	41	365

* First enrolment 125 plus 20 re-enrolments.

ANALYSIS OF STUDENT ENROLMENTS BY FORMS OF ASSISTANCE.

Course.	No. of Students assisted by—										
	Industry.	Governmental or Semi-Governmental Departments.	Joint Coal Board.	Combined Colliery Proprietors' Association.	C.R.T.S.	State Bursaries	State Exhibitions.	Commonwealth Scholarships.	Conversion Courses.	Private Students	Total.
Applied Chemistry ...	3	1	...	...	...	...	...	4	12	15	35
Applied Physics ...	...	...	...	...	...	...	1	...	...	2	3
Architecture	...	1	...	...	...	...	...	2	...	12	15
Chemical Engineering ...	6 (includes 2 conversion students).	...	...	...	...	...	2 (includes 2 C'wealth Scholarships).	5 (plus 2 included elsewhere).	6 (plus 2 sponsored by industry).	15	34
Civil Engineering ...	3	34 (includes 3 Exhibitions, 2 C'wealth Scholarships, 1 State Bursary).	...	...	5	(1 included elsewhere).	(3 included elsewhere).	9 (plus 2 included elsewhere).	3	39	93
Electrical Engineering...	6 (includes 1 C'wealth Scholarship).	24 (includes 8 C'wealth Scholarships).	...	...	2	...	...	14 (plus 9 included elsewhere).	7	26	79
Mechanical Engineering	7	10	...	...	6	...	3	2	10	28	66
Mining Engineering ...	...	...	23 (includes 1 C.R.T.S. student).	6 (includes 1 C.R.T.S. student).	(2 included elsewhere).	...	...	...	1	4	34
Wool Technology ...	...	3	...	...	...	...	...	...	...	3	6
	25 (includes 2 Conversion students, 1 C'wealth Scholarship).	73 (includes 3 Exhibitions, 10 C'wealth Scholarships, 1 State Bursary).	23 (includes 1 C.R.T.S. student).	6 (includes 1 C.R.T.S. student).	13 (plus 2 included elsewhere).	... (1 included elsewhere)	6 (including 2 C'wealth Scholarships plus 3 included elsewhere).	36 (plus 13 included elsewhere).	39 (plus 2 included elsewhere).	144	365

4. THE COUNCIL.

The Council held five ordinary meetings and one special meeting during the year. The attendance of various members was as follows:—

President of the University.

WALLACE CHARLES WURTH, Esq., C.M.G., LL.B. (Syd.), Chairman of the New South Wales Public Service Board—six meetings. (Re-elected 14th May for the ensuing two years.)

Vice-President.

ROY WILLIAM HARMAN, M.Sc. (N.Z.), D.Sc. (Lond.), F.A.C.I., Past General President, Australian Chemical Institute and President, Sydney Division of the Australian Institute of Management; General Manager, Colonial Sugar Refining Co. Ltd.; Director, Courtaulds (Aust.) Ltd.—three meetings. (Re-elected 14th May for the ensuing two years.)

Director.

ARTHUR DENNING, B.Sc. (Syd.), Dip.Ed., A.S.T.C., Director, Department of Technical Education—six meetings.

Members.

JOHN PHILIP BAXTER, O.B.E., B.Sc., Ph.D. (B'ham.), M.I.Chem.E., Professor of Chemical Engineering, The New South Wales University of Technology—five meetings. (Re-elected by Faculty of Applied Science on 16th May, 1951, for the ensuing two years.)

HAROLD JAMES BROWN, B.Sc., M.E. (Syd.), M.I.E. Aust., Professor of Electrical Engineering, The New South Wales University of Technology—six meetings. (Re-elected by Faculty of Engineering on 16th May, 1951, for the ensuing two years.)

THE HON. JOHN SYDNEY JAMES CLANCY, LL.B. (Syd.), Justice of the Supreme Court and Chairman, Crown Employees' Appeal Board—five meetings.

WILLIAM EDWARD CLEGG, A.M.I.E. Aust., F.I.C.A., Chairman, Newcastle Technical Education District Council and General Manager, Commonwealth Steel Co. Ltd.; Senior Vice-President, Metal Trades Employers' Association of New South Wales—six meetings.

HAROLD GRAYDON CONDE, M.I.E. Aust., Manager, Electric Light and Power Supply Corp. Ltd.; Electricity Commisisoner for New South Wales—two meetings.

GERALD KING CRANNY, Undergraduate, The New South Wales University of Technology—five meetings. (Re-elected by the undergraduate body in May, 1951, for the ensuing two years.)

THE HON. FRANCIS JOSEPH FINNAN, M.L.A., Minister for Labour and Industry and Social Welfare—two meetings. (Re-elected by the Legislative Assembly on 24th October, 1950.)

JOHN PATRICK GLASHEEN, Dip.Ed. (Syd.), A.C.I.S., Member, New South Wales Public Service Board—six meetings.

ROBERT CARR HARRISON, Assistant Director, Department of Technical Education—six meetings.

WILLIAM GEORGE KETT, F.S.M.C., F.I.O. (Lond.), Member, Board of Optometrical Registration, and Director, Mark Foys Ltd.—five meetings.

THE HON. ROBERT ARTHUR KING, M.L.C., Secretary, Labor Council of New South Wales—three meetings.

JAMES NORMAN KIRBY, Managing Director, James N. Kirby Pty. Ltd.; Technical Director, Nuffield (Aust.) Pty. Ltd., and International Products Ltd.—three meetings.

WILLIAM RAE LAURIE, B.Arch. (Syd.), F.R.I.B.A., F.R.A.I.A., Past President, Royal Australian Institute of Architects—three meetings.

JAMES KENNETH MACDOUGALL, M.I.E.E. (Lond.), A.M.I.E. Aust., Manager, Rylands Bros. Ltd., Newcastle—three meetings.

THE HON. JAMES JOSEPH MALONEY, M.L.C., Research Officer, Labor Council of New South Wales—two meetings.

FRANCIS MACKENZIE MATHEWS, B.E. (Syd.), A.M.I.E. Aust., Chairman, Wollongong Technical Education District Council, and Chief Engineer, Australian Iron and Steel Ltd.—five meetings.

JOHN GORDON MCKENZIE, B.A., B.Sc. (Syd.), Director-General of Education in New South Wales—six meetings.

ROBERT KENNETH MURPHY, Chem.E. (Columbia), Dr. Ing. (Darmstadt), M.I.Chem.E., A.S.T.C., F.A.C.I., Principal, Sydney Technical College—five meetings. (Appointed to fill vacancy caused by resignation of Mr. P. D. Riddell on 8th May, 1950.)

RICHARD GODFREY CHRISTIAN PARRY-OKEDEN, Managing Director, Lysaghts Works Pty. Ltd., Vice-President, Chamber of Manufactures of New South Wales—three meetings.

STEPHEN HENRY ROBERTS, M.A. (Melb.), D.Sc. (Bristol), Litt.D., (Melb.), D.Sc. (Econ.) Lond., Vice-Chancellor, The University of Sydney—two meetings.

GREGORY BEDE THOMAS, LL.B., B.Sc., B.E. (Syd.), Barrister—three meetings.

FREDERICK EDWARD TOWNDROW, F.R.I.B.A., F.R.A.I.A., M.T.C.P.I. (Aust.), Professor of Architecture, The New South Wales University of Technology—six meetings. (Re-elected by Faculty of Architecture on 16th May, 1951, for the ensuing two years.)

ROBERT JOSEPH WEBSTER, A.A.A., Past President, The Australian Institute of Management; Chairman of Directors and Managing Director, Burlington Mills (Aust.) Ltd., and Managing Director, Bradford Cotton Mills Ltd.; President, Chamber of Manufactures of N.S.W.—three meetings.

FRED WILSON, F.I.O.B., President, Building Industry Congress of N.S.W.; President, Federal Council, Building Industry Congress; and Director, Howie Moffat and Co. Pty. Ltd.—four meetings.

JOHN FELL DALRYMPLE WOOD, B.Sc., B.E. (Syd.), A.M.I.E. Aust., Associate Professor of Mechanical Engineering, The New South Wales University of Technology—six meetings. (Re-elected by teaching staff on 17th May, 1951, for the ensuing two years.)

(During the year, leave of absence from Council meetings for varying periods was granted to Dr. Harman, Professor Roberts and Messrs. Kirby and Webster.)

5. COMMITTEES OF COUNCIL.

At the July meeting, Council re-appointed for a further period of twelve months the existing committees of Council as set out hereunder and in May, 1951, elected Mr. W. E. Clegg, Chairman of the Buildings and Equipment Committee, *vice* Dr. R. W. Harman, who withdrew from this position because of pressure of other activities.

Buildings and Equipment Committee.

Chairman: Mr. W. E. Clegg.

The Vice-President.

The Director.

The Hon. R. A. King.

Mr. W. R. Laurie.

Mr. F. Wilson.

Executive Committee.

Chairman: The President.

The Vice-President.

The Director.

Professor S. H. Roberts.

Mr. W. G. Kett.

Mr. J. K. MacDougall.

Public Relations Committee.

Chairman: Mr. R. J. Webster.

The Director.

Mr. H. G. Conde.

Mr. J. N. Kirby.

The Hon. J. J. Maloney.

Mr. F. M. Mathews.

Library Committee.

In November, 1950, Council established a Library Committee consisting of the following members:—

Chairman: Mr. W. G. Kett.

The Hon. J. J. Maloney.

Mr. G. B. Thomas.

Professor D. W. Phillips (Chairman of Library Committee of the Professorial Board) co-opted member.

6. ADVISORY PANELS.

The membership of the following Advisory Panels constituted to furnish advice on undergraduate courses of the University was approved by Council at meetings on the dates shown.

Applied Chemistry and Chemical Engineering Advisory Panel—10th July, 1950.

Applied Physics Advisory Panel—11th September, 1950.

Mechanical Engineering Advisory Panel—12th March, 1951.

Architecture Advisory Panel (re-appointed)—12th March, 1951.

Civil Engineering Advisory Panel (re-appointed)—12th March, 1951.

Electrical Engineering Advisory Panel (re-appointed)—12th March, 1951.

Management Advisory Panel (re-appointed)—12th March, 1951.

Metallurgy Advisory Panel (re-appointed)—12th March, 1951.

Mining Engineering Advisory Panel (re-appointed)—12th March, 1951.

Wool Technology Advisory Panel (re-appointed)—12th March, 1951.

7. PROFESSORIAL BOARD.

Election of Chairman.

In accordance with the provision of By-law 2 of Chapter III of the By-laws the election of the Chairman of the Professorial Board took place at the meeting of the Board held on 15th May, 1951. The Director, Mr. Denning, was elected as Chairman.

Appointment of Additional Member.

Council appointed Mr. J. Tainsh, Senior Assistant Director of Technical Education, *ex officio* a member of the Professorial Board as from 12th March, 1951.

8. INTEGRATION OF DEGREE AND DIPLOMA COURSES.

On behalf of the Department of Technical Education certain diploma courses are now administered by the University of Technology, with effect from 19th February, 1951. The courses concerned are in those fields in which the University is conducting degree courses. The transfer of administration was made after a decision of the University Council, with which the Minister for Education and the Technical Education Advisory Council concurred. In accordance with this decision the University administers the following diploma courses:—

Faculty of Architecture.—Architecture, Building, Quantity Surveying.

Faculty of Engineering.—Aeronautical Engineering, Civil Engineering, Electrical Engineering, Mechanical Engineering, Mining Engineering, Naval Architecture, Production Engineering, Radio Engineering.

Faculty of Science.—Chemical Engineering, Chemistry, Food Technology, Leather Chemistry, Metallurgy, Optometry, Physics, Science, Secondary Metallurgy.

This mutual agreement between the University Council and the Technical Education Advisory Council ensures the joint and economic use of a considerable quantity of laboratory equipment and material for degree and diploma studies.

Diploma students have over a long period been desirous of securing statutory recognition for their studies and examinations, and of enjoying the opportunity to study for a degree. That opportunity is now directly available to them, through the medium of conversion courses. By means of these conversion courses a diploma student secures full recognition of the work he has completed for his diploma and so may proceed to a degree in the minimum of time.

In approving of the transfer of the diploma courses to the University, Council expressed itself in agreement with the principle of progression to a degree by way of a diploma course followed by a part-time conversion course and instructed the University's officers to investigate methods of introducing part-time conversion courses as soon as possible.

Diploma Students Enrolled at the University.

The following are the total enrolments of diploma students at Sydney and other centres in courses administered by the University:—

Sydney	2,748
Newcastle	534
Wollongong	171
Broken Hill	74
Lithgow	17
	3.544

Staff.

Action is being taken for the transfer of staff members of the Department of Technical Education, previously employed in connection with diploma instruction, to the staff of the University of Technology.

Joint Committee.

Arrangements for the integration of degree and diploma courses included the establishment of a Joint Committee to advise on the standards of diploma courses. The personnel and functions of the Joint Committee were approved by the University Council, the State Technical Education Advisory Council and the Department of Technical Education. The Committee consists of the Director of the University and the Department of Technical Education (Chairman), two representatives of the Professorial Board, two representatives of the Department of Technical Education, and the Registrar of the University.

9. NEW UNDERGRADUATE COURSES.

Applied Physics Degree Course.

The Council at its November meeting approved the syllabus for a four-year degree course in Applied Physics, and authorised the commencement of the course as from the first term in the 1951 academic year.

The undergraduate course in Applied Physics is designed to equip students for research in industry and in the field of applied science generally. The course will provide a thorough training in the fundamentals of physical science and in mathematics, and particular

emphasis will be 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 research ability. The extramural training includes six months in industry in each of the second and third years. On the mathematical side, particular attention is given to the formal training required by the physicist, and special courses are given in the application of statistical methods to industrial experimentation.

Wool Technology Degree Course.

The Council also at its November meeting approved the syllabus for a four-year degree course in Wool Technology, and authorised the commencement of the course as from the first term in the 1951 academic year.

The first year of the course consists of a basic training in fundamental and biological science. Vocational subjects essential to all branches of the wool industry are given in the second and third years, together with approximately six months' approved work in the wool industry in both of these years. In the final year provision is made for students who wish to specialise in either wool production or wool commerce.

Thus the course brings the student in contact with developments in a wide variety of fields related to wool production, wool commerce and wool utilization. It will supply graduates qualified not only in these fields but also who are versed in the scientific principles operating in each part of the wool industry; in so doing it will fill a long standing need.

10. REVISION OF APPLIED CHEMISTRY AND CHEMICAL ENGINEERING DEGREE COURSES.

At its November meeting the Council approved revised syllabuses for the courses in Applied Chemistry and Chemical Engineering. Authority was given by Council for the amended syllabuses to operate from the first term of the 1951 academic year, subject to students already enrolled in the Chemical Engineering degree course being permitted to complete the course of four years previously in existence, if they so desired. Although some additional work in fundamental subjects is now required, the revision of the Applied Chemistry degree course provided desirable relief to students in the time required for formal study. To permit more adequate treatment of the work to be covered in the Chemical Engineering degree course, the length of the course was increased from four to five years, and the course

compares favourably with the best established courses in Chemical Engineering in the United States, Great Britain and on the Continent. It is one of the most comprehensive courses of its kind in this subject in Australia and should provide graduates of a type not previously available to Australian industry.

11. STAFF.

Resignation of Registrar—John C. Webb.

The University experienced a serious loss in the resignation of John C. Webb on 3rd November, 1950. Mr. Webb had filled the position of Registrar from the incorporation of the University and resigned to return to Wales.

Appointments.

The following appointments have been made during the year under review:—

Chair of Economic History in the Faculty of Humanities—Professor R. M. Hartwell, M.A., Dip.Ed.

Associate Professor of Wool Technology—P. R. McMahon, M.Agr.Sc. (N.Z.), Ph.D. (Leeds), A.R.I.C., A.N.Z.I.C.

Associate Professor of Civil Engineering—C. H. Munro, B.E., A.M.I.E. (Aust.).

Associate Professor of Mechanical Engineering—J. F. D. Wood, B.Sc., B.E. (Syd.), A.M.I.E. (Aust.).

Associate Professor (Research) of Mechanical Engineering—A. H. Willis, B.Sc. (Eng.), Ph.D. (Lond.), A.M.I.M.E., Wh.Sc.

Associate Professor of Mathematics—G. Bosson, M.Sc. (Lond.).

Registrar—G. L. Macauley, B.Ec. (Syd.).

12. AUSTRALIAN NATIONAL UNIVERSITY CONVOCATION.

Following an invitation extended by the Australian National University, the President and the Director were appointed members of Convocation of the Australian National University early in 1951. Other members nominated by the Council of the N.S.W. University of Technology and subsequently appointed to the Australian National University convocation are:—

Dr. R. W. Harman, the Vice-President.

Mr. W. E. Clegg.

Mr. W. G. Kett.

Mr. J. K. MacDougall.

Mr. R. J. Webster.

13. 100th ANNIVERSARY OF UNIVERSITY OF SYDNEY.

On 4th December, 1950, the President, Vice-President and Director waited on the Senate and Chancellor of the University of Sydney and presented an address under the Seal of the University of Technology, congratulating the University of Sydney upon attaining the 100th anniversary of its Act of Incorporation.

14. BUILDINGS.

Further progress has been made in the construction of the first University building on the Kensington site. On 14th February, 1951, the contract was signed by James Wallace and Co. Pty. Ltd. for the completion of the building at a contract price of £689,274. This follows the preparatory work on the building completed by the Department of Public Works. The contracting firm has carried out preliminary work in various sections of the building to bring the walls up to ground floor level. Floors at this level have been poured and the erection of further brickwork is now proceeding.

In March, 1951, the University Council approved the erection on the Broadway area of light-framed buildings to meet urgent accommodation requirements and also gave authority for the University to co-operate with the Department of Technical Education in the provision of improved entrance and administrative facilities at Broadway. The major building to be erected is a three storied steel and concrete framed building sheeted with aluminium and will provide staff and student accommodation, cafeterias, lecture rooms and laboratories. The estimated cost of the building is £243,000.

The University will share the facilities of a new library building at present in course of erection on the Thomas-street frontage.

15. BENEFACTIONS.

Benefactions received during the year were:—

(i) *Grant of* £10,000 *by J. I. Carroll and Electricity Meter and Allied Industries Ltd.*

In June, 1951, a grant of £10,000 was made to the University by J. I. Carroll and Electricity Meter and Allied Industries Ltd. for the purpose of equipping a research laboratory for investigations into the properties of materials used in the electrical engineering industry. A special section of the Applied Physics Department is being adapted at present for this laboratory and will be known as the "J. I. Carroll Research Laboratory".

(ii) *ICIANZ Research Fellowship.*

Imperial Chemical Industries of Australia and New Zealand Limited have granted a sum of £600 annually to the University to provide a fellowship to be known as the ICIANZ Research Fellowship. A condition for the award of the Fellowship is that the fellow shall engage in research at the University in a field allied to the scientific interests of ICIANZ.

(iii) *BREIF Scholarships.*

In February, 1951, the Broadcasting, Radio, Electrical Industries Fellowship (BREIF) Club, Sydney, granted two scholarships to be awarded annually and tenable in the second, third or fourth years of the Electrical Engineering degree course. The scholarships will exempt from payment of fees.

(iv) Academic Robes.

Early in the year consideration was given to the University acquiring academic robes for members of Council. Following reference to the Public Relations Committee of Council, a sum of £1,100 was subscribed by the following industrial establishments in Sydney for the purchase of the necessary robes which are now on order.

Nuffield (Australia) Pty. Ltd.

Australian Consolidated Industries Ltd.

Bradford Cotton Mills Ltd.

R. J. Webster, Esq.

Burlington Mills (Aust.) Ltd.

Colonial Sugar Refining Co. Ltd.

James N. Kirby Pty. Ltd.

York Motors Pty. Ltd.

16. SPECIAL ACTIVITIES OF THE TEACHING SCHOOLS.

The volume of research work being undertaken is increasing rapidly. In addition to those who are proceeding to higher degrees there is increasing recognition by industry of the advantages of releasing technical graduates to attend the University for research on special technological problems of interest to the firms concerned.

The following is an outline of the special achievements and research activities of the various Schools and will be supplemented by the Research Report of the University to be published separately.

Applied Chemistry.

The research activities of the staff have been facilitated by more adequate technical assistance and new apparatus becoming available. New research projects initiated during the year were as follows:—

Control of Cattle Tick by D.D.T.

Synthesis of New Weedicides.

Supercontraction of Wool.

Several research workers from the Commonwealth Scientific and Industrial Research Organisation and from industry worked in the School for short periods during the year.

Assistance has been given to industry in a number of ways, particularly by advice on specific problems and the loan or use of special apparatus.

The following technical articles have been published:—

"A Method of Integrating the Gibbs Adsorption Isotherm". A. E. Alexander and A. M. Posner: "Nature", Vol. 166, Sept., 1950, Page 432.

"The Dependence on State of the Apparent Dipole Moments of Ethylamine, Diethylamine and Triethylamine". G. A. Barclay, R. J. W. Le Fevre and B. M. Smythe: Transactions of the Faraday Society, Vol. 46, Oct., 1950, Page 812.

Palladium Complexes. "Part 1. The Reaction of Potassium Chloropalladate II with o-Methyl-mercaptobenzoic Acid". S. E. Livingstone, R. A. Plowman and J. Sorenson, 1950, Journal and Proceedings, Royal Society of N.S.W., Vol. 84, Page 28.

Palladium Complexes. "Part II. Bridged Compounds of Palladium with o-Methyl-mercaptobenzoic Acid". S. E. Livingstone and R. A. Plowman, 1950. Journal and Proceedings, Royal Society of N.S.W., Vol. 84, Page 188.

Studies in the Chemistry of Platinum Complexes. "Part IV. Oxidation of Ions of the Tetrammine Platinum II Type with Hydrogen Peroxide". S. E. Livingstone and R. A. Plowman, 1950, Journal and Proceedings, Royal Society of N.S.W., Vol. 84, Page 107.

"Halogenostannates (IV) of Some Complex Cations". J. R. Anderson, S. E. Livingstone and R. A. Plowman, 1950, Journal and Proceedings, Royal Society of N.S.W., Vol. 84, Page 184.

Coordination Compounds of Copper. "Part II. Compounds Derived from Copper (I) Iodide". C. M. Harris, 1950, Journal and Proceedings, Royal Society of N.S.W., Vol. 84, Page 111.

"The Dipole Moments of Ethylene Oxide and Carbonyl Chloride in Benzene Solution, and a Note on a Useful Modification of Barclay and Le Fevre's Equation". C. L. Angyal, G. A. Barclay and R. J. W. Le Fevre, Journal of Chemical Society, Dec., 1950, Vol. 657, Page 3370.

"Indium Alkylxanthates, Indium Trithiocarbonate and Some Indium Reactions". G. J. Sutton, Australian Chemical Institute Journal and Proceedings, June, 1950, Page 249.

"The Quantitative Estimation of I-Methyl-5-Amino-Acridine". J. R. A. Anderson and M. Lederer. The Analyst, June, 1950, Vol. 75, Pages 318.891.

The Constituents of the Wood of Castanospormum Australe. "Part I. Isolation of a new sapogenin castanogenin". J. J. H. Simes, Journal of Chemical Society, 1950, Page 2868.

"Occurrence of Saponins in Spear-lilies". W. J. Dunstan and J. J. H. Simes, Australian Journal of Science, Vol. 13, Page 50 (1950).

The Chemistry of the "Insoluble Red" Woods. "Part IV. Some Mixed Benzoins". G. G. Badcock, G. W. K. Cavill, A. Robertson and W. B. Whalley. Journal of Chemical Society (1950), Page 2961.

Iso Oxazolones. "Part II. iso Oxazolidonos". G. Shaw. Journal of Chemical Society (1951), Page 1017.

The Effects of Substituents in the Naphthalene Ring. "Part II. The measurement of the second dissociation constants of the aminoaphthalene monosulphonic acids", Alexander Bryson.

"Part III. An Interpretation of the Effects of the SO_3– and NO_2 groups on the basic strengths of the substituted naphthylamines", Alexander Bryson, Transactions of the Faraday Society, 1951, Vol. 47, Pages 522-533.

Quantitative Paper Chromatography. "Part I. Separation and Gravimetric Determination of Thallium". J. R. A. Anderson and M. Lederer, Analytica Chimica Acta, Vol. 4 (1950), Pages 513-516.

"Part II. The Separation and Gravimetric estimation of gold". J. R. A. Anderson and M. Lederer, Analytica Chemica Acta, 1951, Vol. 5, Pages 321-324.

"Variation of Dipole Moment and State of n-Propyl-and n-Butylamines, with notes on the apparent moments in solutions of certain other amines". G. Barclay, R. J. W. Le Fevre and B. M. Smythe, Transactions of the Faraday Society, 1951, Vol. 47, Page 357.

Architecture.

The School arranged during the year a series of 18 lectures for senior and post-graduate students. These were on the latest developments in Building Research and were given by experts from various Research Stations throughout the Commonwealth.

Late in 1950 arrangements were made for the School of Architecture to undertake a project in Town Planning and Civic Design jointly with the Newcastle Technical College and the Northumberland Shire Planning Authority. The subject was the re-planning of the eastern end of the city of Newcastle. Plans and excellent models were made.

During August, 1950, the Heads of Architecture Schools of the Universities and Technical Colleges of Australia and New Zealand held a conference in Sydney. They discussed detailed structure of Architectural courses. They visited the School and inspected the work of the students and generally congratulated the School on its high standards. They were interested particularly in our method where academic studies and practical employment are so organised as to be complementary to each other.

Also in August a conference of the Joint Federal Board of Architectural Education was held in Sydney. This was attended by representatives of all states of the Commonwealth, Professor Towndrow representing New South Wales. The Federal Board re-endorsed its approval of the Diploma Course as exempting from the Final Examinations of the Royal Australian Institute of Architects and the Royal Institute of British Architects.

In October the Annual Inspection was made by the New South Wales Board of Architectural Education. They have now reported and highly commended the Diploma course in Architecture and re-endorsed their approval. In regard to the degree course in Architecture, they have approved the course so far as it had run, i.e., up to the end of the first year. The Board will consider, with the view to approval, each year of the course as it is completed.

Chemical Engineering.

The Chemical Engineering Department has made steady progress with regard to both its teaching and research functions. The syllabus for the University degree course in Chemical Engineering has been completely revised as reported elsewhere.

A number of diploma students have taken advantage of the facilities provided for conversion from the diploma to the University degree and three students completed such conversion courses during the year. Prior to the year in question, very little research work had been done in the field of chemical engineering. By the end of the year eleven post-graduate or post-diploma research projects were in operation covering a range of problems of interest both industrially and academically. The titles of the current research projects are:—

(i) Study of oxidation of iron pyrites and other sulphide ores in a fluidised reactor.

(ii) Study of the reaction between carbon rutile and chlorine in a fluidised reactor.

(iii) An examination of the kinetics of the decomposition of titanium tetra iodide and the application of this knowledge to processes for the production of titanium metal.

(iv) A study of the distribution of uranium nitrate between water and a range of organic solvents, and the extension of this work to other metallic compounds.

(v) An investigation of the effect of supersonic vibrations on matter transfer in liquid extraction processes.

(vi) An investigation of the depolymerisation of polytetrafluoroethyne by the agency of elementary fluorine.

(vii) Investigations into the use of plastic materials for the construction of chemical plant.

(viii) Study of the production of crudes of nitrogen during the operation of a make-and-blow gas generator.

(ix) Investigation into the microscopic method of determining particle size of dusts.

(x) The effect of sonic vibrations in coagulating air-borne smokes and dusts.

(xi) Studies of methods for the aseptic canning of food.

A great deal of progress has been made in the design, manufacture and purchase of the permanent equipment which the School will require. It is expected that when these plans mature, the University will have one of the best equipped Chemical Engineering Schools in the Southern Hemisphere. Members of the staff have maintained close liaison with industry, with the Commonwealth Scientific and Industrial Research Organisation and with other Universities. A number of public lectures have been given and many visits by staff and students to industrial establishments have been arranged.

A paper by Mr. R. H. Buchanan, "Methods of Analysing Combined and Free Carbonyls in the Presence of One Another" was published in the Australian Journal of Applied Science (Vol. 2, No. 2, June, 1951).

Civil Engineering.

The new Civil Engineering laboratories are nearing completion. Ten separate sections are provided for, comprising Materials, Photoelasticity, Dynamic Analysis, Soil Mechanics, Cement, Concrete, Photographic and Photogrammetric laboratories. Research has been initiated into problems in Fluid Mechanics, Experimental Stress Analysis, Properties of Materials, Concrete Technology and Hydrology.

An interesting feature of the work carried out by the School of Civil Engineering has been the liaison between the School and the Snowy Mountains Hydro-electric Authority, who have requested that investigations of material for dam foundations be carried out on behalf of that Authority.

The School has also received a request from the State Director of Secondary Industries and Building Materials for an investigation into the transportation of cement slurry over long distances by pipeline, and the School is co-operating with two major cement companies in this problem. These investigations are designed to increase the output of cement by providing economical methods for transporting of raw materials.

Specific titles of current research are as follows:—

(i) Flow resistance of Australian commercial pipes.

(ii) Transportation of suspended materials by fluids.

(iii) Internal stress distribution of structural concrete members.

(iv) Photoelastic investigations of—

(*a*) Vierendeel truss.

(*b*) Various structural sections.

(*c*) Soil stresses near culverts.

(v) Investigation of bond stress in concrete.

(vi) Shear capacity of concrete building blocks.

(vii) Creep phenomena in high tensile steel.

(viii) Strain gauge analysis and the development of strain gauge techniques.

(ix) Rainfall-run-off relations for heavy storms.

(x) Behaviour of eccentrically loaded columns.

(xi) The efficiency of nailed joints in timber.

(xii) Experimental analysis of flat plates.

(xiii) Properties of timbers.

(xiv) Analysis of space frames with curved members by relaxation methods.

Electrical Engineering.

Research work has been proceeding over the past year on the following topics:—

(i) Properties of dielectric and insulating materials.

(ii) The development of special self-heating valves with electron bombarded cathodes.

(iii) The development and applications of magnetic amplifiers and other electronic industrial control equipment.

The following technical articles have been published:—

"Processes in Dielectrics Containing Free Charges—The Entropy of Electrostatic Systems." Dr. F. Gutmann with Dr. B. Breyer of the University of Sydney. Journal and Proceedings, Royal Society of N.S.W., Vol. 83, Page 66. (1950).

"Polarography with Alternating Currents. I. Outline of Theory, Apparatus, and Technique." Dr. F. Gutmann with Dr. Breyer and Mr. S. Hacobian of the University of Sydney. Australian Journal of Scientific Research, Vol. A-3, Page 558. (1950).

"Polarography with Alternating Currents. II. A-C Polarography of Cd, Zn, Pb, Tl, In, Bi, Sb." as in (2). Australian Journal of Scientific Research, A-3, 567. (1950).

"A Relationship between Resistance and Temperature of Thermistors." Dr. F. Gutmann with Professor G. Bosson and Dr. L. M. Simmons. Journal of Applied Physics, Vol. 21, Page 1267. (1950).

"Ultrasonically Assisted Tanning." Dr. F. Gutmann with Dr. R. L. Ernst of the Research Laboratory of the Crown Chemical Company, Alexandria, N.S.W., Journal of Society of Leather Trades Chemists, Vol. 34, Page 454. (1950).

"A Quantized Form of the Boltzmann-Maxwell Distribution Law." Dr. F. Gutmann with Dr. L. M. Simmons, Australian Journal of Science, Vol. 13, Page 109. (February, 1951).

"Studies on the Determination of Dead or Diseased Tissues (Using Electrical Bridge Methods)." C. G. Greenham of The Division of Plant Industry, C.S.I.R.O., and D. J. Cole, Lecturer, School of Electrical Engineering, Australian Journal of Agricultural Research, Vol. 1, No. 2, Pages 103-117. (1950).

Design work is proceeding on a modern high voltage laboratory which it is proposed to build. During the year the electronic, circuit theory and machine laboratories have been completely rebuilt and much new equipment installed. This has provided more flexibility in the use of the laboratories, more effective protection for personnel, and a greater range of experiments for laboratory classes. Equipment recently received for research purposes includes a 300,000 volt industrial X-ray plant, a high frequency heating unit and a large range of measuring bridges, signal generators and other instruments.

Humanities.

Professor R. M. Hartwell, Professor of Economic History, took up duties on 15th December, 1950. Before returning to Australia he visited technical institutes in America and on the Continent. Professor Hartwell prepared a report on his visits to overseas Universities

and submitted a plan for the future development of general studies in the University. As a result, the courses in the non-technological subjects will be revised as from 1952.

The following work, researches, and investigations have been carried out during the period January to June, 1951:—

An Investigation of Special Committees in the House of Commons, 1826-31.

English Monetary Theory, 1800-1850: work in progress.

Committees of the House of Commons, 1800-1850.

Some Problems of Australian Arbitration: work in progress.

The Development of the Australian Labour Party in the Twentieth Century: work in progress.

A study of George Orwell: work in progress.

Officialese: work in progress.

Professor Hartwell has the following publications in hand:—

The Van Diemen's Land Economy, 1800-1850: book being published by Melbourne University Press.

The Yorkshire Woollen and Worsted Industry: work in progress.

An Economic History of Great Britain in the Twentieth Century: work in progress.

Mathematics.

In addition to the normal work of servicing the degree and diploma courses of other departments, various seminars on advanced topics have been organised by this department. These include:—

(i) "A Non-linear Stress-strain Theory" by Professor N. F. Astbury.

(ii) "Magneto-Hydrodynamic Waves", by Mr. C. B. Kirkpatrick.

(iii) "An Operational Calculus and its Possible Application", by Associate Professor G. Bosson.

(iv) "Some Aspects of Field Theory", by Mr. C. B. Kirkpatrick.

These seminars have proved successful in stimulating interest in various branches of applied mathematics and some interesting research projects seem likely to arise as a result.

Publications:—

(i) Bosson, Gutmann and Simmons: "A Relationship Between Resistance and Temperature of Thermistors." (Published by Journal of Applied Physics, U.S.A., Dec., 1950).

(ii) Weiler: "On the Most Economical Sample Size for Control Charts Controlling the Mean of a Population." (Accepted for publication by the Annals of Mathematical Statistics, U.S.A.).

It is encouraging to this department to note that the majority of the fourth year Civil Engineering degree students chose to take the Mathematics Option as one of their elective subjects. This course is in its first year of operation and is, to some extent, in an experimental stage. It is designed with a view to giving the students sufficient mathematics to enable them to deal with some of the more difficult aspects of the mechanics of elastic materials.

Mechanical Engineering.

The following research projects are in hand:—

(i) *An Investigation into the Engineering Applications of Rubber,* involving the behaviour of rubber at high rates of stress and the performance of special types of shock mountings. Other projects are planned with a view to developing precise design techniques for stressed rubber components. This work is under the direction of Associate Professor A. H. Willis.

Papers and Publications:—

"Stressed Rubber in Automotive Engineering".—A paper by Associate Professor A. H. Willis to the Institute of Automotive Engineering on 12th July, 1950, and published in the "Journal of the Institute of Automotive Engineering," Vol. 10, September, 1950.

"The Engineer's Approach to Rubber".—Paper by Associate Professor A. H. Willis to the Institution of the Rubber Industry on 12th April, 1951. Publication in the "Transactions of the Institution of the Rubber Industry" is due in October, 1951.

(ii) *Fluid Flow Through Narrow Slots.*—A preliminary investigation has shown that little work has been done on fluid flow through narrow slots or rectangular orifices of relatively small dimensions. Work is continuing under the supervision of Mr. R. Barden to ascertain the normal characteristic coefficients, and to see whether surface tension effects are pronounced when the slots are subjected to small fluid heads.

(iii) *Shockwave Formation in Long, Slender, Tapering Tubes.*—Shockwave phenomena have been clearly demonstrated and the position of the sonic section has been located by using

the Generalized Entropy Chart for Air. The study of the effect of incorrect back pressure pertaining to nozzle flow was also made possible during the experiments. This project is under the direction of Mr. P. Barna and Mr. R. Barden.

(iv) *Addition of Heat to a Gas Travelling at Near Sonic and Supersonic Speed.*—Research in this field has been carried out by Mr. P. Barna and a paper has been written.

(v) *Investigation into the Functioning of a Carburettor.*—The behaviour of the Zenith type carburettor was investigated by a student as a diploma thesis.

Publications:—

A paper entitled "Streamlining the Motor Car" was presented by Mr. P. Barna to the Institution of Mechanical Engineers (Automobile Division), on 22nd November, 1950.

(iv) *Kinematics of Mechanisms.*—Dr. Rosenauer is in charge of this work. He has ordered an extensive range of mechanism models from Germany and has written three papers which are under consideration by scientific bodies. Also, during the year, in collaboration with Associate Professor A. H. Willis, his book, "Kinematics and Mechanisms," originally published in Latvia, was translated.

(vii) *Machine Design.*—A paper entitled "An Analysis of the Forces and the Pressure Distribution in Shoe Brakes," has been prepared by Mr. J. Hirschhorn for publication in "Engineering."

(viii) *Work done at Newcastle Technical College.*

(*a*) Investigations into Erosion Problems at Stockton Beach.

(*b*) The Development of a Flash Steam Generator and Engine for Road Vehicles.

Mining Engineering.

The following research projects were undertaken during the year:—

(i) The composition and distribution of gases behind seals in coal mines.

(ii) Investigation of the high sulphur-content coal of the upper portion of the Greta seam.

(iii) Investigation of the Australian tin industry with a view to improved recovery of cassiterite, especially from slimes.

(iv) Field and laboratory study of an occurrence of native tin. Completed and paper to be published in Australian Journal of Science, December, 1951.

(v) A review of the Yerranderie silver-lead field.

(vi) The replacement of crinoid stems and gastiopodes by cassiterite at Vegetable Creek.

(vii) Conditions essential for economic deposits of pyrophyllite.

Physics.

Research and investigations in hand—

(i) Phenomena of magnetism:

(*a*) Effects of polarizing fields on domain orientations in anisotropic strip. Preliminary results obtained.

(*b*) Development of equipment for measurement of hysteresis and anomalous losses in very low fields.

(*c*) Preliminary investigation of thermal agitation effects in ferromagnetic domains.

(ii) Motional impedance investigations on moving-coil galvanometers.

(iii) Susceptibility measurements on naturel ore deposits. Preliminary work on Stradbroke Island sands has been completed.

(iv) (*a*) Determination of accommodation coefficient of gases to metals. Paper drafted.

(*b*) Literature survey on internal friction in glasses.

(v) Fidelity of three-colour reproduction process: application of colour photometry. Work proceeding.

(vi) Design of 15 kW electromagnet for application to nuclear induction investigations.

(vii) X-ray research.
Scanning mechanism for examination of sheet metals. Completed. Preliminary camera calibrations made.

(viii) Work for Commonwealth Scientific and Industrial Research Organisation.

(*a*) Optical properties of metallic films.

(*b*) Structure of F_1 and F_2 regions of the ionosphere.

(ix) Theoretical investigations.

(*a*) Theory of co-operative phenomena in relation to Weiss-Langevin theory of ferromagnetic materials.

(*b*) Linear non-associative algebra.

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Publications, etc.

Book:

"Industrial Magnetic Testing" (in the press). Professor Astbury.

Papers:

"Path and energy of a charged particle in a varying magnetic field". G. H. Godfrey. Physics Abstract Report No. 13, National Standards Laboratory.

"A general purpose photoelectric tricolorimeter". H. F. Pollard. Physics Abstract Report No. 10, National Standards Laboratory.

"Pressure of radiation in the boundary between moving transparent media". G. H. Godfrey. Submitted to Philosophical Magazine.

"Hyperphoria". J. Lederer. ANZAAS, May, 1951. Australian Journal of Optometry, June, 1951.

Wool Technology.

A feature of the work of this School is the extent to which it conducts investigations and research in co-operation with organisations external to the School. The undermentioned projects are being conducted in conjunction with the organisations indicated.

Commonwealth Scientific and Industrial Research Organisation.

(i) *Wool Survey*: Wool Type in Relation to Environment. This project is financed through the Commonwealth Scientific and Industrial Research Organisation by funds from the Wool Research Trust Account, and employs four officers for six months each year in the collection of data which are used to determine the most profitable type of wool for the various types of environment found in this State. To date some eighty thousand fleeces grown on sixty properties have been weighed and graded and reports have been forwarded to the owners of the sheep.

(ii) *Relation between Subjective and Objective Wool Evaluation*: The School is providing trained observers who carry out the commercial subjective appraisal of fleeces grown in strain trials which the Commonwealth Scientific and Industrial Research Organisation is running at Cunnamulla, Armidale and Deniliquin. Data have also been collected to establish the relationship between subjective judgments and objective determination of wool quality.

New South Wales Department of Agriculture.

The School is co-operating in sheep husbandry investigations being carried out at the Trangie Agricultural Experimental Station and at Wagga Agricultural College.

Department of Physics and Optometry.

Three post-graduate students of the Department of Physics and Optometry have been carrying out a special study of the visual factors involved in woolclassing, and their findings will be correlated with the final examination results of some 70 students in the Sheep and Wool classes at Sydney Technical College.

Industry.

The School has recently installed a complete small scale scouring plant for the determination of yield, and has available laboratory facilities for all types of determinations required by the wool trade and by firms engaged in the early stages of wool processing. Routine determinations have been carried out in connection with moisture estimation, clean scoured yield and a number of miscellaneous measurements, such as fibre fineness and yarn count.

Two post-graduate students from the United States are working in the School as a result of funds supplied under the Fulbright Act and arrangements have been completed under the Commonwealth Technical Co-operation Scheme for several students from Pakistan and India to join the School in the near future.

17. COAT OF ARMS.

A special committee of Council has been constituted to advise on a University Coat of Arms and Motto. This committee is continuing its investigations in conjunction with a sub-committee of the Professorial Board.

18. ADMISSION REQUIREMENTS.

(i) At its meeting on 10th July, 1950, the Council varied admission requirements by providing that a candidate may present both the subjects Ancient History and Modern History at examinations qualifying for admission to undergraduate courses.

(ii) On 14th May, 1951, Council extended until March, 1953, the provision that 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.

19. VACATION PERIODS.

On 13th November, 1950, Council provided that, commencing in the 1951 academic year, student vacations at the end of the first and second terms should be each increased from one to two weeks.

20. REGULATIONS GOVERNING AWARD OF DEGREE OF MASTER.

Revised regulations for the award of the degree of Master were adopted by Council on 14th May, 1951.

21. FEES.

(i) On 11th September, 1950, Council approved fees in accordance with the following scale for persons undertaking research at the University and who are not enrolled in University courses:

(*a*) attendance on 1 day or part thereof per week—£6 per annum;

(*b*) attendance on 2 or 3 days per week—£18 per annum;

(*c*) attendance on 4 or 5 days per week—£27 per annum;

(*d*) where the work involved requires attendance for any period of time less than one academic year provision may be made for payment of the above fees on a basis of division of the year into periods of 4, 8 and 12 months.

(ii) To assist administrative arrangements with regard to the payment of fees generally, Council approved the following procedure:

(*a*) "students to be permitted to pay their fees at the commencement of the academic year, or in two equal instalments during the year, or in equal instalments at the commencement of each term during the year;

(*b*) "applications for remission of fees to be determined generally by the Registrar in accordance with the following general rule, provided that the Registrar has satisfied himself that there are bona fide reasons for each application—where a student terminates a course of study before half a term has elapsed, one half of the term fee may be remitted, and where a student terminates a course of study after half a term has elapsed, there may be no refund of fees in respect of that term.

(*c*) "requests for remission or reduction of fees which cannot be determined by the application of this general rule to be referred by the Registrar to the Professorial Board for recommendation to the Executive Committee."

(iii) On 12th March, 1951, Council made further determinations with respect to fees as shown below:—

(*a*) "the deferred examination fee for University courses to be £2 2s., such fee to apply in respect of deferred examinations held following the 1951 final examinations.

(*b*) "full-time staff members undertaking courses leading to the award of a Master's degree to be exempt from payment of the yearly course fee, but such persons to be required to pay the registration fee of £2 2s. and the degree fee of £15."

J. P. BAXTER, Acting Director.

WALLACE C. WURTH, President.

STATEMENT OF INCOME AND EXPENDITURE FOR

EXPENDITURE.

	£ s. d.	£ s. d.
Salaries and Staff Charges	199,343 18 10	
Payroll Tax	5,001 13 9	
Employers Superannuation Contributions	7,927 17 1	
		212,273 9 8
Printing, Stationery, Postages, etc.		1,613 15 3
Telephone Advertising		1,008 15 8
Examination Expenses (Supervision)		179 12 5
Teaching Departments—General Maintenance and purchase of apparatus		17,211 17 3
Plant		1,002 16 9
Furniture		1,757 7 10
Books, Pamphlets Periodicals		1,658 2 0
Repairs, General Maintenance Buildings		1,859 13 8
Rates and Property Insurance		387 1 2
Power, Lighting and Heating		982 11 8
Bursaries		110 0 0
Contribution Vice-Chancel ors' Secretariat		100 0 0
Expenses of New Appointments		2,338 13 11
Expenses of motor vehicles		348 8 10
Miscellaneous Expenses		773 4 10
		£243,605 10 11
Buildings	23,397 19 11	
Plant	57,126 8 9	
Furniture	2,147 4 10	
		82,671 13 6
		£326,277 4 5
Salaries	6,296 15 7	
Equipment	4,375 2 9	
Maintenance Expenses	326 2 7	
		10,998 0 11
Salaries	723 2 0	
Maintenance Expenses	86 13 4	
		809 15 4
		£338,085 0 8
Balances Carried Forward—		
Commonwealth Research Grant	2,545 16 11	
Commonwealth Scientific and Industrial Research Organisation Grants	540 4 8	
Electricity Meter and Allied Industries Donation towards equipping Research Laboratory	10,000 0 0	
Joint Coal Board—Grant towards equipping Mining Department	6,000 0 0	
Donations towards purchase Academic Robes	1,100 0 0	
State Treasury—Advance under Section 40 Technical Education and N.S.W. University of Technology Act	10,000 0 0	
		30,186 1 7
		£368,271 2 8

STATEMENT OF BALANCES AND ASSETS

LIABILITIES.

	£ s. d.	£ s. d.
Accumulated Funds		166,980 1 3
Commonwealth Research Grant	2,545 16 11	
Commonwealth Scientific and Industrial Research Organisation Grant	540 4 8	
Joint Coal Board—Grant towards equipping Mining Department	6,000 0 0	
Electricity Meter and Allied Industries Donation towards equipping Research Laboratory	10,000 0 0	
Donations towards purchase Robes	1,100 0 0	
		20,186 1 7
State Treasury—Temporary Advance under section 40—Act 11 of 1949		10,000 0 0
		£197,166 2 10

STATEMENT.

THE PERIOD 1ST JULY, 1950 TO 30TH JUNE, 1951.

INCOME.

	£ s. d.	£ s. d.
Fees	23,922 4 3	
Other Income	93 18 3	
		24,016 2 6
State Grant—(Consolidated Revenue)		219,589 8 5
		£243,605 10 11
State Grant (General Loan)		82,671 13 6
		£326,277 4 5
Commonwealth Research Grant Balance B/F	3,086 17 10	
Income Received	10,457 0 0	
		13,543 17 10
Commonwealth Scientific and Industrial Research Organisation Grants		1,350 0 0
		£341,171 2 3
Electricity Meter and Allied Industries Donations towards equipping Research Laboratory		10,000 0 0
		£351,171 2 3
Joint Coal Board—Grant towards equipping Mining Department		6,000 0 0
		£357,171 2 3
Donations towards purchase Academic Robes		1,100 0 0
		£358,271 2 3
State Treasury—Advance under Section 40 Technical Education and N.S.W. University of Technology Act		10,000 0 0
		£368,271 2 3
		£368,271 2 3

E. H. DAVIS, Accountant.

AS AT 30TH JUNE, 1951.

ASSETS.

	£ s. d.	£ s. d.
Buildings (at cost)	89,559 7 1	
Plant (at cost)	72,666 6 8	
Furniture (at cost)	4,754 7 6	
		166,980 1 3
Balance—Special Deposits Account No. 1228—N.S.W. University of Technology A/c	24,186 1 7	
Balance—Special Deposits Account No. 1238—Joint Coal Board Grant towards equipping Mining Department	6,000 0 0	
		30,186 1 7
		£197,166 2 10

E. H. DAVIS, Accountant.

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Sydney: A. H. Pettifer, Government Printer—1952.

N.S.W. UNIVERSITY OF TECHNOLOGY, CALENDAR, 1952