The New South Wales UNIVERSITY of TECHNOLOGY

CALENDAR, 1951

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CALENDAR

OF THE

NEW SOUTH WALES UNIVERSITY OF TECHNOLOGY

1951

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NEW SOUTH WALES UNIVERSITY OF TECHNOLOGY.

ALMANAC FOR 1951.

Date.	Two Term Day Course.	Three Term Day Course and Three Term Part-time Course.	Technical College Classes.
1951.			
Feb. 19 ...	Enrolments begin for all courses.		
Feb. 26 ...	First term begins.	First term begins.	First term begins.
Mar. 23–26	Easter Public Holidays—Good Friday and Easter Monday.		
Apr. 25 ...	Anzac Day—Public Holiday.		
May 9 ...	Public Holiday.		
May 19 ...	First term ends.	First term ends.	First term ends.
May 28 ...	....	....	Second term begins.
June 4 ...	Second term begins.	Second term begins.	....
June 11 ...	King's Birthday—Public Holiday.		
Aug. 6 ...	Bank Holiday.		
Aug. 25 ...	Second term ends.	Second term ends.	Second term ends.
Sept. 3 ...	....	....	Third term begins.
Sept. 10 ...	Examinations begin.	Third term begins.	....
Sept. 22 ...	Examinations end.	....	....
Sept. 24 ...	Industrial training begins.	....	....
Oct. 1 ...	Labour Day—Public Holiday.		
Nov. 17 ...	....	Third term ends.	....
Nov. 24 ...	....	....	Third term ends.
Nov. 26 ...	....	Examinations begin.	Examinations begin.
Dec. 7 ...	....	Examinations end.	....
Dec. 15 ...	....	....	Examinations end.
1952.			
Feb. 18 ...	Enrolments begin for all courses.		
Feb. 25 ...	First term begins.	First term begins.	First term begins.

	Two Term Day Course.	Three Term Day Course and Three Term Part-time Course.	Technical College Classes.
First Term ...	12 weeks.	12 weeks.	12 weeks.
Vacation	2 week.	2 week.	1 week.
Second Term ...	12 weeks.	12 weeks.	13 weeks.
Vacation	2 weeks.	2 weeks.	1 week.
Examinations ...	2 weeks.	....	....
Third Term ...	(Industrial) (Training)	10 weeks.	12 weeks.
Vacation		1 week.	....
Examinations ...		2 weeks.	3 weeks.
Vacation		11 weeks.	10 weeks.

Note.—Day courses are conducted between 9 a.m. and 5 p.m., Mondays to Fridays.

In 1951, the two-term day course applies to the first, second and third years of Engineering courses V, VI, VII and VIII, and first year of course XI (Architecture), but in the latter course attendance is required part-time in the third term.

The three-term day course applies to the first year of courses I (Applied Physics), II (Applied Chemistry), III (Chemical Engineering) and IX (Wool Technology); the second year of course XI (Architecture) and to the fourth year of courses V, VI, VII and VIII (Engineering).

The three-term part-time course applies to the second and third years of courses II (Applied Chemistry) and III (Chemical Engineering).

LOCATION OF STAFF.

At the present time members of the University staff are located at the Sydney Technical College, Broadway.

Director—A. Denning	Room 101, First Floor, Main Administrative Building.
Registrar—G. L. Macauley	Room 104, First Floor, Main Administrative Building.
Professor Brown	First Floor, Electrical Engineering Building.
Professor Astbury	First Floor, Main Administrative Building.
Professors Baxter and Alexander	Chemistry Building.
Professor Phillips	Principal's Building.
Professor Towndrow	Architecture Building.
Professor Hartwell	Principal's Building.
Secretary to Council and Asst. Registrar—J. S. Fraser	Room 103, First Floor, Main Administrative Building.

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 meet 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.

Under the same Act, a Governing Council of the New South Wales University of Technology has been formed, ultimately to consist of thirty members. The Council is 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 Governing 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, and the first post-graduate course—Electronic Engineering—began in March, 1949. A degree course in Architecture was introduced in 1950, and degree courses in Applied Physics and Wool Technology are planned to commence 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 chief 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.

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. Plant and machinery have been ordered for the equipment of the University's first research centre. The necessary building, with a floor space of 21,000 square feet, has been secured and is being re-built to serve the requirements of this centre.

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.

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 numerioal 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.

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.

PRESIDENT.

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; Chairman of Education Committee, The Institute of Management; Senior Executive Officer, 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), Professor of Chemical Engineering, N.S.W. University of Technology.

HAROLD JAMES BROWN, B.Sc., M.E. (Syd.), M.I.E. Aust., Professor of Electrical 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 General Manager, 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., Immediate Past Chairman, Sydney Division, The Institution of Engineers, Aust.

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, President, Technical Teachers' Association and Acting Superintendent of Trades Instruction, 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, Labour 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., 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, Labour Council of New South Wales.

Francis Mackenzie Mathews, B.E., A.M.I.E. Aust., Chairman, Wollongong Technical Education Advisory Council and Assistant 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., Principal, Sydney Technical College.

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., 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., President, The Institute of Management; Chairman of Directors and Managing Director, Burlington Mills (Aust.) Limited; Managing Director, Bradford Cotton Mills Limited; President, Chamber of Manufactures of N.S.W.

Fred Wilson, F.I.O.B., President, Building Industry Congress of N.S.W.; President, Federal Council, Building Industry Congress; and Director, Howie Moffatt and Co. Pty. Ltd.

John Fell Dalrymple Wood, B.Sc., B.E. (Syd.), A.M.I.E. Aust., Acting Lecturer-in-Charge, Mechanical Engineering Department, Sydney Technical College.

No graduate representative yet elected.

STANDING COMMITTEES OF COUNCIL.

Executive Committee.

Wallace Charles Wurth, C.M.G., LL.B.
Roy William Harman, M.Sc. (N.Z.), D.Sc. (Lond.), F.A.C.I.
Arthur Denning, B.Sc., Dip.Ed., A.S.T.C.
Stephen Henry Roberts, M.A., D.Sc., Litt.D.
James Kenneth MacDougall, M.I.E.E. (Lond.), A.M.I.E. Aust.
William George Kett, F.S.M.C., F.I.O. (Lond.).

Buildings and Equipment Committee.

Roy William Harman, M.Sc. (N.Z.), D.Sc. (Lond.), F.A.C.I.
Arthur Denning, B.Sc., Dip.Ed., A.S.T.C.
William Edward Clegg, A.M.I.E. Aust., F.I.C.A.
William Rae Laurie, B.Arch., F.R.I.B.A., F.R.A.I.A.
Fred Wilson, F.I.O.B.
The Hon. Robert Arthur King, M.L.C.

Public Relations Committee.

Robert Joseph Webster, A.A.A.
James Norman Kirby.
The Hon. James Joseph Maloney, M.L.C.
Francis MacKenzie Mathews, B.E., A.M.I.E. Aust.
Harold Graydon Conde, M.I.E. Aust.
Arthur Denning, B.Sc., Dip.Ed., A.S.T.C.

Library Committee.

William George Kett, F.S.M.C., F.I.O. (Lond.).
The Hon. James Joseph Maloney, M.L.C.
Gregory Bede Thomas, LL.B., B.Sc., B.E.

NEW SOUTH WALES UNIVERSITY OF TECHNOLOGY.

STAFF.

DIRECTOR.

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

APPLIED SCIENCE.

PROFESSOR OF APPLIED CHEMISTRY—A. E. Alexander, M.A., B.Sc. (Reading), Ph.D. (Cantab.), F.Chem.Soc.

PROFESSOR OF APPLIED PHYSICS—N. F. Astbury, M.A. (Cantab.), F.Inst.P., M.I.E.E., F.R.S.A.

PROFESSOR OF CHEMICAL ENGINEERING—J. P. Baxter, O.B.E., B.Sc. (B'ham), Ph.D. (B'ham), M.I.Chem.E., Dean of the Faculty.

ARCHITECTURE.

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

ENGINEERING.

PROFESSOR OF ELECTRICAL ENGINEERING—H. J. Brown, B.Sc., M.E. (Syd.), M.I.E. Aust., Dean of the Faculty.

PROFESSOR OF MINING ENGINEERING—D. W. Phillips, B.Sc. (Wales), Ph.D. (Cantab.), Dip.Met.Min., F.G.S., M.I.Min.E.

SENIOR LECTURER IN CIVIL ENGINEERING—G. R. McKay, B.Eng., Ph.D. (Liverpool), A.M.I.C.E.

SENIOR LECTURER IN MECHANICAL ENGINEERING—A. H. Willis, B.Sc. (Eng.), Ph.D. (London), Wh.Sc., A.M.I.Mech.E.

HUMANITIES.

PROFESSOR OF ECONOMIC HISTORY—R. M. Hartwell, M.A., Dip. Ed. (Syd.).

(Action is proceeding for the appointment of professors to the following chairs: Mechanical Engineering, Nuffield Research Chair of Mechanical Engineering, Civil Engineering, Mathematics and Metallurgy.)

REGISTRAR.

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

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

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

SYDNEY TECHNICAL COLLEGE.

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

PRINCIPAL.

R. K. Murphy, Chem.E. (Columbia), Dr. Ing. (Darmstadt), M.I.Chem.E., A.S.T.C., F.A.C.I.

Heads of Departments Conducting Courses.

MECHANICAL ENGINEERING—J. F. D. Wood, B.Sc., B.E., A.M.I.E. Aust.

ELECTRICAL ENGINEERING—A. S. Plowman, A.S.T.C., A.M.I.E.E., M.I.E. Aust., A.Am.I.E.E.

CIVIL ENGINEERING—C. H. Munro, B.E., A.M.I.E. Aust., M.R.San.I.

CHEMISTRY AND CHEMICAL ENGINEERING—V. S. Rawson, B.Sc., A.S.T.C., Dip.Agric., F.R.I.C., F.A.C.I.

PHYSICS—G. H. Godfrey, M.A., B.Sc., F.Inst.P.

MATHEMATICS—G. Bosson, M.Sc.

WOOL TECHNOLOGY—P. R. McMahon, M.Agri.Sc. (N.Z.), Ph.D. (Leeds), A.R.I.C., A.N.Z.I.C.

HUMANITIES—L. M. Haynes, B.A.

(Other lecturing staff associated with these officers is listed in the Handbook of the Department of Technical Education.)

GENERAL INFORMATION.

Location.

The temporary accommodation for the New South Wales University of Technology is in the buildings of the Department of Technical Education, Broadway, Sydney.

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, Engineering, and Architecture.

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

Some special, short, intensive post-graduate courses will be provided which will not lead to higher degrees.

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 students 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 £27. For any year of Courses II, III and XI in which full-time daily attendance is required, the fee will be £27. For any year of Courses II, III and XI in which part-time attendance is required, the fee is £18.

Where part of any course is taken by alternative part-day, part-evening courses at the Sydney Technical College, the fees charged will be those fixed by the Department of Technical Education.

Students accepted for enrolment in courses leading to a Master's Degree shall pay a registration fee of £2 2s. 0d. Internal students shall pay a yearly fee of £27. External students shall pay a yearly fee of £10. All students shall pay a degree fee of £15 when submitting their thesis for examination. No refund shall be made to students who discontinue their studies or who fail to qualify for a degree.

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

Practical Training.

Every student must complete satisfactorily the course of approved practical 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 practical training during their course. Such employment and training must be of a standard approved by the University.

Undergraduate Courses of Study.

The following 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 lecture 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.)

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 in the Department of Technical Education, followed by the fourth year of the degree course at the University of Technology.

Associates in Electrical Engineering—Two years part-time work in prescribed subjects in the Department of Technical Education, 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 in the Department of Technical Education, 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*—One academic year's attendance at the University of Technology covering prescribed work.

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.

No degrees will be conferred on students completing a conversion course until the first group of undergraduates passing through the normal undergraduate courses reach graduation; that is, not before 1952 for Mechanical, Civil, Electrical and Mining Engineering, and not before 1953 for Applied Chemistry and Chemical Engineering.

CONDITIONS FOR THE AWARD OF MASTER'S DEGREE.

Candidates for a Master's Degree shall have obtained a Bachelor's Degree with Honours in the New South Wales University of Technology or other approved University in an appropriate department. An applicant who holds a Bachelor's Degree without Honours may be admitted as a candidate for a Master's Degree if the Professorial Board is satisfied that he has attained a standard not lower than second class honours by additional work and study since graduating. The Board may require such applicants to sit for examinations or carry out prescribed work as determined in each case to ensure that the appropriate standard has been reached.

The Professorial Board may accept as candidate for a Master's Degree a Diplomate of the New South Wales Department of Technical Education (or holders of an equivalent qualification awarded by some other approved institution) of at least five years standing, whose academic or professional progress in his field of undergraduate study subsequent to graduation has been of such a nature as would merit special consideration by the Professorial Board. Such acceptance may be conditional upon the performance of additional study as prescribed by the Professorial Board.

Candidates accepted by the Professorial Board may, subsequent to registration, study for the Master's Degree in either of two ways—

(*a*) By pursuing a course of work in the laboratories of the University of Technology for a minimum of two years.

(*b*) By pursuing a course of work externally to the University for a minimum of three years.

In either case the work must be approved by and carried out under the supervision of a Professor nominated by the Professorial Board.

(*a*) The work prescribed shall consist of experimental and observational work required for the compilation of a thesis on a specific research project.

(*b*) The Professorial Board may, at their discretion, require candidates to satisfy the examiners in a written or oral examination.

Save as may be otherwise directed by the Professorial Board in special cases, each candidate shall submit his thesis for examination and complete all other requirements before 30th November of the year prior to that in which he wishes to be awarded the degree.

There shall be two examiners for the thesis, one of whom must be an external examiner.

Candidates who have fulfilled the conditions prescribed and reached a satisfactory standard may be recommended by the supervising Professor to the Professorial Board for admission to a Master's Degree in the appropriate subject. The degree awarded may be:

Applied Chemistry and Chemical Engineering—The degree to be awarded in these courses shall be the Master of Science (M.Sc.) degree.

Mining, Mechanical, Civil and Electrical Engineering—The degree to be awarded in these courses shall be Master of Engineering (M.E.) degree.

Architecture—The degree to be awarded in this course shall be Master of Architecture (M.Arch.) degree.

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:—

While living at home—

1st year	£156 per annum.
2nd year	£182 per annum.
3rd year	£208 per annum.
4th year	£234 per annum.

While living away from home—

1st year	£208 per annum.
2nd year	£234 per annum.
3rd year	£260 per annum.
4th year	£286 per annum.

Payment is made in equal fortnightly instalments. In addition, an allowance of £35 per annum is provided for fees and books, and students' membership fees for University associations and societies are paid.

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 £130 per annum for a student living with his parents, and £169 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 £300 per annum. The adjusted family income is the taxable 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 £300 the amount of living allowance payable abates at the rate of £3 for every £10 by which the adjusted family income exceeds £300.

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

New South Wales Public Service Board Scholarships.

From 1951 the Public Service Board will 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.

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.

John Heine Memorial Scholarship.

The Metal Trades Employers' Association offers a scholarship at the New South Wales University of Technology on behalf of the John Heine Memorial Foundation.

This scholarship will have a total value of £250. It will be tenable for two years, thus enabling recipients to undertake the last two years and proceed to the Bachelor's Degree in a selected course in the Faculty of Engineering; or, alternatively, to undertake the last three years and proceed to the Bachelor's Degree in a selected and approved course in the Faculty of Applied Science.

The total endowment of £250 is to be allotted as under:—

In the Faculty of Engineering—

1st year of tenure (3rd year of course)	£100
2nd year of tenure (4th year of course)	£150
Total (2 years)	£250

Or

In the Faculty of Applied Science—

1st year of tenure (2nd year of course)	£50
2nd year of tenure (3rd year of course)	£50
3rd year of tenure (4th year of course)	£150
Total (3 years)	**£250**

Broadcasting, Radio, Electrical Industries Fellowship Club (B.R.E.I.F.), 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 four 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.

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.—Mechanics, 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 may not be taken with Modern History*, and, further, Ancient History is accepted only in cases where the pass was obtained at an examination held in 1945 or 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 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, 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.

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* Both Modern History and Ancient History may be taken as qualifying subjects at the examinations held at the end of 1951 and subsequent years.

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, 1951.

(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 "provisional 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. Owing to the recent revisions of the Applied Chemistry and Chemical Engineering degree courses the precise programmes of study have not been laid down, but details will be available from the Registrar during 1951.

ENGINEERING COURSES.

Students who are in diploma courses conducted by the Department of Technical Education, 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, Mechanical Engineering and Materials Laboratory I, Workshop Processes and Practice I, course in Language and Literature and Scientific Method.

Students of the Department of Technical Education who have been granted exemptions from the first year of the University degree courses may be permitted to undertake additional special part-time study in the Department of Technical Education (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 Structure 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)	2¼
Mechanical Engineering IIIE and F, Tutorial (3rd Term)	1¼
*G1, G2, G10, G11, G20, Humanities	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)	2¼
Mechanical Engineering IIIE and F Tutorial (3rd Term)	1¼
Electrical Engineering II	2½
*G1, G2, G10, G11, G20, Humanities	2½
	12 (2 terms.) 10½ (1 term.)

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* These subjects are not normal diploma subjects, but are provided specially for students seeking admission with advanced standing to the University of Technology.

(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
*G1, G2, G10, G11, G20, Humanities	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
*G1, G2, G10, G77, G20, Humanities	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)	2¼
Mechanical Engineering IIIE and F Tutorial (3rd Term)	1¼
*G1, G2, G10, G11, G20, Humanities	2½
	9½ (2 terms.)
	8 (1 term.)

APPLIED CHEMISTRY AND CHEMICAL ENGINEERING COURSES.

ALTERNATIVE PART-DAY-PART-EVENING STUDY.

Students who satisfactorily completed the special year 1A (courses II and III) in 1950 will be eligible to proceed to the second year of course II or III on completion of the following course of study, namely year 1B, which will be offered in 1951 only. Subsequently, students desiring admission to the second year of these degree courses and who do not follow the normal full day first year course may qualify as outlined on page 56.

Year 1B—*Courses II and III* (1951).

	Hours per week.		
	Term 1 lec. lab.	Term 2 lec. lab.	Term 3 lec. lab.
Chemistry	1 — 0	1 — 3	1 — 3
Physics	2 — 3	2 — 0	2 — 0
Mathematics	2 — 1	2 — 1	2 — 1
Drawing and Materials	1 — 0	1 — 0	1 — 3
Workshop Practice	0 — 0	0 — 3	0 — 0
Chemical Techniques	0 — 3	0 — 0	0 — 0
Humanities	1 — 0	1 — 0	1 — 0
	7 — 7	7 — 7	7 — 7

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* Ibid.

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.

This arrangement will not operate until 1952 when the first students will have reached the final year. Programmes of study for the two part-time years will be published in the 1952 Calendar. Students desiring advance information may obtain it from the Registrar during the third term of 1951.

Students enrolling in 1951 and subsequently and who desire to take the final year over two years of part-time study will be required to satisfy the conditions outlined in p. 56.

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.

SYLLABUSES FOR UNDERGRADUATE COURSES.

In 1951, all four years of the Engineering Courses V, VI, VII and VIII will be available.

The first, second and third years of Courses II and III in Applied Chemistry and Chemical Engineering and the first and second years of course XI in Architecture will also be available in 1951.

The first year of Course I, Applied Physics, and Course IX, Wool Technology, will be available in 1951 if sufficient applications for enrolment are received.

The first year syllabuses for Engineering Courses V, VI, VII and VIII are identical, as also is the syllabus 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 department in which the instruction is given, each department utilizing a distinguishing Roman numeral as set out below. A course is a programme of study made up of subjects selected from several departments, 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 department 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.

DEPARTMENT.	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—34 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—34 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—34 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 March 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 practical experience.

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

Fourth Year—34 weeks from March to November (excluding examinations and vacations) full time day attendance at the University of Technology.

Faculty of Architecture.

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—34 weeks from late February to November full time study at the University.

Third and Fourth Years—37 weeks from late February to December part time study at the University while the student is engaged in suitable professional employment in architecture.

Fifth Year—34 weeks from late February to November full time study at the University.

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 the application of statistical methods of industrial experimentation.

First Year.

(34 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. drwg. and Materials ..	1 — 0	1 — 0	1 — 3
	Humanities	3 — 0	3 — 0	2 — 0
		17—11	17—10	14—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
	Humanities	1 — 0	1 — 0
		13—11	12—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
	Humanities	1 — 0	1 — 0
		13—11	12—14

FOURTH YEAR.

(34 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
	Humanities	3—0	3—0	2—0
		12/15—9+	12/15—9+	11/12—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 Applied Chemistry course has recently been revised but the modifications do not affect the length of the course. The revised course will operate in first, second and third years in 1951.

The Chemical Engineering course has been revised 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 will be replaced by the revised syllabus stage by stage commencing in 1951.

COURSE II—APPLIED CHEMISTRY.

FIRST YEAR.

(34 weeks' day course.)

		Term 1 Th. Pr.	Term 2 Th. Pr.	Term 3 Th. Pr.
2.41	General Chemistry	3 — 3	3 — 9	3 — 6
1.11	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
	Humanities	3 — 0	3 — 0	2 — 0
		14—14	14—14	11—14

* Tutorials, etc.

SECOND YEAR.

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

2.32	Physical Chemistry	1 — 0	1 — 0	1 — 3
2.42	Inorganic Chemistry ..	1 — 3	1 — 0	1 — 0
2.52	Quantitative Analysis ..	1 — 3	1 — 3	1 — 3
2.62	Organic Chemistry	1 — 0	1 — 3	1 — 0
2.72	Applied Maths. for Chemists	1 — 0	1 — 0	1 — 0
1.92	Physics	1 — 0	1 — 2	2 — 1*
	Humanities	1 — 0	1 — 0	0 — 0
		7 — 6	7 — 8	7 — 7

* Tutorials.

THIRD YEAR.

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

2.33	Physical Chemistry	1 — 2	1 — 3	1 — 3
2.53	Quantitative Analysis ..	1 — 3	1 — 3	1 — 2
2.63	Organic Chemistry	1 — 3	1 — 2	1 — 3
2.73	Applied Maths. for Chemists	1 — 0	1 — 0	1 — 0
3.14A*	Industrial Chemistry ..	2 — 0	2 — 0	2 — 0
	Humanities	1 — 0	1 — 0	0 — 0
		7 — 8	7 — 8	6 — 8

* Taken in third year of course II.

FOURTH YEAR.

(34 weeks' day course.)

		Term 1		Term 2		Term 3	
		Th.	Pr.	Th.	Pr.	Th.	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
	Humanities	3	0	3	0	2	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	9	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:

		Hours per week.
10.12	Mathematics* (or Diploma Mathematics II) 2.73 Applied Mathematics for Chemists (or Applied Chemical Mathematics III)	2
1.11	Physics (or Diploma Physics II)	3
	Humanities	3
		8

Plus advanced laboratory work on a specified project and the presentation of a thesis, together with any special subjects prescribed in each case.

The student is required to attend full time for one 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.

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* As described in 1950 Calendar.

COURSE III—CHEMICAL ENGINEERING.

FIRST YEAR.

(34 weeks' day course.)

		Hours per week. Term 1 lec. lab.	 Term 2 lec. lab.	 Term 3 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
	Humanities	3 — 0	3 — 0	2 — 0
		14—14	14—14	11—14

SECOND YEAR.

(34 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 — 0	1 — 3
2.42	Inorganic Chemistry	1 — 0	1 — 0	1 — 3
2.62	Organic Chemistry	1 — 3	1 — 0	1 — 0
1.92A	Physics	3 — 3	3 — 3	0 — 0
10.22	Mathematics II	2 — 0	2 — 0	2 — 0
8.132	Materials and Structures	0 — 0	2 — 1	2 — 1
	Humanities	1 — 0	1 — 0	0 — 0
		9 — 6	11— 4	7 — 7

THIRD YEAR.

(34 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 — 3	1 — 2
2.63A	Organic Chemistry	1 — 3	1 — 2	1 — 3
10.23	Mathematics III	3 — 0	3 — 0	3 — 0
	Humanities N	1 — 0	1 — 0	———
		7 — 8	7 — 8	6 — 8

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* Taken in third year of Course III.

FOURTH YEAR.

(34 weeks' day course.)

		Hours per week. Term 1 lec. lab.	Term 2 lec. lab.	Term 3 lec. lab.
3.14†	Industrial Chemistry	2 — 2	2 — 2	2 — 2
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
3.64	Chemical Engineering Thermodynamics & Kinetics	3 — 0	3 — 0	3 — 0
5.94	Mechanical Engineering ..	2 — 1	2 — 1	2 — 1
6.94	Electrical Engineering I ..	1 — 2	1 — 2	1 — 2
		17—11	17—11	17—11

†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
	Humanities	3 — 0	3 — 0	2 — 0
		12—16	12—16	11—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:

		Hours per week.
1.42	Physics (or Diploma Physics II)	3
	Humanities	3
		6

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.)

First Term.

		Hours per week.	
		Lect.	Lab.
1.41	Physics	3	3
2.111	Chemistry	3	3
5.41	Descriptive Geometry	2	3
5.11	Engineering Drawing and Materials	1½	3
10.11	Mathematics	6	0
G1	Scientific Method	1	0
G10	Language and Literature	1	0
		17½	12

Second Term

		Hours per week.	
		Lect.	Lab.
1.41	Physics	3	3
2.111	Chemistry	3	0
*5.41	Descriptive Geometry	2	3
*8.11	Mechanics and Graphics		
5.11	Engineering Drawing and Materials	1½	3
5.21	Workshop Processes and Practice	0	2½
10.11	Mathematics	6	0
G1	Scientific Method	1	0
G10	Language and Literature	1	0
		17½	11½

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

SECOND YEAR.

(24 weeks—day course.)

		Houre per week.	
		Lect.	Lab.
1.42	Physics	2	2½
2.122	Engineering Chemistry	1½	2
4.122	Engineering Metallurgy		
5.12	Mechanical Drawing and Design	1	2
5.32	Mechanical Engineering	2	3
5.22	Engineering Processes	1	0
*8.112	Strength of Materials	1½	2½
8.122	Structural Drawing and Design	1	2
10.12	Mathematics	5	0
G11	Language and Literature	2	0
G2	History of Science and Technology		
G20	Human Relations		
		17	14

*Laboratory work in 8.112 will occupy only 18 periods of two and a half hours each. The remaining six periods will be used for works visits in connection with 5.91.

THIRD YEAR.

(24 weeks—day course.)

First Term.

		Hours per week.	
		Lect.	Lab.
5.13	Engineering Design	1	3
8.33	Engineering Computations	0	1½
5.53	Hydraulics	1	2
6.83	Electrical Engineering	2	3
8.123	Structures	1½	2
8.33	Engineering Computations	0	1½
G3	Contemporary Civilisation	1	0
G12	Language and Literature	1	0
G21	Human Relations	1	0
		12½	15½

Second Term.

		Hours per week.	
		Lect.	Lab.
5.13	Engineering Design	1½	4
5.33	Mechanical Engineering	4	4
5.53	Hydraulics	1	2
6.83	Electrical Engineering	2	3
8.123	Structures	0	2
8.33	Engineering Computations	0	1½
G3	Contemporary Civilisation	1	0
G12	Language and Literature	1	0
G21	Human Relations	1	0
		11½	16½

FOURTH YEAR.

(34 weeks—day course.)

First Term.

		Lect.	Lab.
5.14	Engineering Design	1½	3
5.54	Hydraulics	1½	3
5.64	Production Engineering Design	1½	3
6.84	Electrical Engineering	1½	2½
*8.43	Surveying	2	2
	Seminars	2	
	One Professional Elective Subject	3	
G4	Contemporary Civilisation	1	0
G13	Language and Literature	1	0
G22	Human Relations	1	0
		29½	

* Taken in fourth year of course V.

Second Term.

		Lect.	Lab.
5.14	Engineering Design	0	3½
5.34	Mechanical Engineering Practice	2	3
5.54	Hydraulics	1½	3
5.64	Production Engineering Design	1½	3
8.43	Surveying	2	2
	Seminars	2	
	One Professional Elective Subject	3	
G4	Contemporary Civilisation	1	0
G13	Language and Literature	1	0
G22	Human Relations	1	0
		29½	

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

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.
Refrigeration, Air Conditioning and Ventilation.
Industrial Heating.
Hydraulic Machinery.
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 given by the Department of Technical Education in the evening as one year courses spread over three terms. The student enrols with the Department of Technical Education for these subjects.

	Hours per week.
Conversion Mathematics	3
Conversion Course in Modern Physics ..	3
Strength of Materials (Conversion)	1
Humanities (Conversion)	3
	10

2. On completion of the work prescribed under (1) above the student may seek enrolment in the New South Wales University of Technology with advanced standing (Conversion), and if accepted, will be required to complete the normal fourth year of the undergraduate course.

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, emphasising mechanics, thermodynamics, electricity and magnetism. It must be emphasised that success in this course is dependent upon scientific outlook and thought; students should endeavour to cultivate the correct approach from the outset.

There are three main branches of Electrical Engineering, viz.:—Electric Power, Line Communications, and Electronics and High Frequency. By allowing the student to choose his major elective subjects in his fourth year the curriculum is made flexible enough to meet the needs of individual students, while still ensuring that all students get a fundamental training in the elements of all three phases in their first three years.

The student who is interested mainly in electrical machinery, power generation, transmission and distribution in preparation for work with heavy apparatus manufacturers, public power utilities, and users of heavy electrical equipment would logically choose subjects 6.214, 6.224 and 6.304. For line communication work associated with telegraph and telephone public utilities, the student would normally choose 6.334 and two others from 6.214, 6.304, 6.314, 6.324. On the electronic and high frequency side associated with radio, radar valve design and manufacture, the choice would probably be 6.304, 6.32, 6.33. Other combinations of subjects can be made, however, to suit requirements and complete flexibility of choice has been the aim.

The professional elective subjects provide a wide range from which the student can choose to make a special study for reading, research and finally for the preparation of a thesis. The purpose of providing a large range of professional elective subjects, each covering a broad phase of electrical engineering, is primarily to provide the incentive to accomplishment which comes from emphasis on that portion of the electrical engineering field which arouses a student's special interest.

COURSE VI—ELECTRICAL ENGINEERING.

FIRST YEAR.

(Common for Courses V, VI, VII and VIII.)
(24 weeks—day course.)

First Term.

		Hours per week.	
		Lect.	Lab.
1.41	Physics	3	3
2.111	Chemistry	3	3
5.41	Descriptive Geometry	2	3
5.11	Engineering Drawing and Materials	1½	3
10.11	Mathematics	6	0
G1	Scientific Method	1	0
G10	Language and Literature	1	0
		17½	12

Second Term

		Lect.	Lab.
1.41	Physics	3	3
2.111	Chemistry	3	0
*5.41	Descriptive Geometry	2	3
*8.11	Mechanics and Graphics		
5.11	Engineering Drawing and Materials	1½	3
5.21	Workshop Processes and Practice	0	2½
10.11	Mathematics	6	0
G1	Scientific Method	1	0
G10	Language and Literature	1	0
		17½	11½

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

SECOND YEAR.

(24 weeks—day course.)

		Hours per week.	
		Lect.	Lab.
1.12	Physics	4	3
2.122	Engineering Chemistry	1½	2
4.122	Engineering Metallurgy		
5.32	Mechanical Engineering	2	3
6.12	Electric Circuit Theory	1½	0
†8.112	Strength of Materials	1½	2½
8.122	Structural Drawing and Design	1	2
10.12	Mathematics	5	0
G11	Language and Literature	2	0
G2	History of Science and Technology		
G20	Human Relations		
		18½	12½

†Practical work in 8.112 will occupy only 18 of the 24 weeks available.

THIRD YEAR.

(24 weeks—day course.)

First Term.

		Hours per week. Lect.	Lab.
5.33B	Heat Engines	2 —	2
5.53	Hydraulics	1 —	2
6.13	Electric Circuit Theory	3 —	3
6.23	Electric Power Engineering	3 —	3
6.303	Electronics and High Frequency	3 —	3
10.33	Mathematics	1 —	0
G3	Contemporary Civilisation	1 —	0
G12	Language and Literature	1 —	0
G21	Human Relations	1 —	0
		16 —	13

Second Term.

		Lect.	Lab.
5.33B	Heat Engines	2 —	2
5.53	Hydraulics	1 —	2
6.13	Electric Circuit Theory	3 —	0
6.23	Electric Power Engineering	3 —	6
6.303	Electronics and High Frequency	3 —	3
10.33	Mathematics	1 —	0
G3	Contemporary Civilisation	1 —	0
G12	Language and Literature	1 —	0
G21	Human Relations M	1 —	0
		16 —	13

FOURTH YEAR.

(34 weeks—day course.)

First Two Terms.

		Lect.	Lab.
	Three Major Elective Subjects	21	
	One Professional Elective Subject	3	
G4	Contemporary Civilisation	1 —	0
G13	Language and Literature	1 —	0
G22	Human Relations	1 —	0
		27	

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.

Major Elective Subjects.

		Hours per week.	
		Lect.	Lab.
6.214	Electric Power Utilization ..	3 —	4
6.224	Power Generation and Transmission	3 —	4
6.304	Industrial Electronics	3 —	4
6.314	High Frequency Engineering ..	3 —	4
6.324	High Frequency Design	3 —	4
6.334	Line Communication Engineering	3 —	4

Professional Elective Subjects.

Steam Engineering.
Ultra High Frequency Applications.
Telephone and Telegraph Systems.
Measurements (High Frequency).
Illumination Engineering.
Protection Engineering.
Electrical Control.
Applications of Modern Physics to Electrical Engineering.
Electroacoustics.
Industrial Heating.
Electrical Measurements.

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 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.

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:

1. Complete the following subjects given by the Department of Technical Education in the evening, as one year courses spread over three terms. The student enrols with the Department of Technical Education for these subjects.

	Hours per week.
Conversion Mathematics	3
Conversion Course in Physics	3
Strength of Materials (Conversion) ..	1
Humanities (Conversion)	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 University of Technology with advanced standing (Conversion) and if accepted, will be required to attend 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:

1. Complete the following subjects given by the Department of Technical Education in the evening as one year courses spread

over three terms. The student enrols with the Department of Technical Education for these subjects.

	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)	3	

2. On completion of the work prescribed in (1) above the student may seek enrolment in the University of Technology with advanced standing (Conversion) and if accepted, will be required to attend 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.)

First Term.

		Hours per week.	
		Lect.	Lab.
1.41	Physics	3	3
2.111	Chemistry	3	3
5.41	Descriptive Geometry	2	3
5.11	Engineering Drawing and Materials	1½	3
10.11	Mathematics	6	0
G1	Scientific Method	1	0
G10	Language and Literature	1	0
		17½	12

Second Term.

		Hours per week.	
		Lect.	Lab.
1.41	Physics	3	3
2.111	Chemistry	3	0
*5.41	Descriptive Geometry	2	3
*8.11	Mechanics and Graphics		
5.11	Engineering Drawing and Materials	1½	3
7.21	Mining Processes and Practice ..	0	2½
10.11	Mathematics	6	0
G1	Scientific Method	1	0
G10	Language and Literature	1	0
		17½	11½

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

SECOND YEAR.

(24 weeks—day course.)

		Hours per week.	
		Lect.	Lab.
1.42	Physics	2	2½
2.122	Engineering Chemistry	1½	2
4.122	Engineering Metallurgy		
5.32	Mechanical Engineering	2	3
7.32	Mining	2	0
8.112	Strength of Materials	1½	2½
8.122	Structural Drawing and Design	1	2
7.92	Geology	2	0
10.12	Mathematics	5	0
G11	Language and Literature	2	0
G20	Human Relations		
G2	History of Science and Technology		
		19	12

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.	
		Lect.	Lab.
5.53	Hydraulics	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
G3	Contemporary Civilisation	1	0
G12	Language and Literature	1	0
G21	Human Relations	1	0
	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 end of the second term and before the student commences his practical experience.

FOURTH YEAR.

(34 weeks—day course.)

First Two Terms.

		Hours per week. Lect.		Lab.
6.74	Electrical Engineering in Mines ..	2	—	0
7.34	Mining	2	—	0
7.54	Coal Mining .. or	2	—	3
7.44	Metalliferous Mining			
7.64	Preparation of Minerals	2	—	3
8.44	Surveying	1½	—	2
7.94	Geology	1	—	2
G4	Contemporary Civilisation ..	1	—	0
G13	Language and Literature	1	—	0
G22	Human Relations	1	—	0
		13½	—	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.

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 1949 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)	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 very broad in its scope and utilizes many other branches of engineering in planning and building projects such as airports, highways, and modern industrial buildings. The civil engineer must adapt new knowledge and new skills in controlling the use of water for power, navigation and domestic and industrial uses. He must be ready to make use of new materials of construction as he designs the avenues of transportation, with their bridges, tunnels, and terminal facilities. Dealing as he does with both the forces of nature and with large projects that influence the economic and social conditions of many people, the Civil Engineer must combine fundamental knowledge of science and engineering with experience and judgment, and with personal characteristics of the highest order.

The syllabus in Civil Engineering is arranged so that all students receive training in the basic principles of mathematics and science, and in engineering applications such as Surveying, Hydraulics, Foundation Engineering, Geology, Electrical Engineering and Structural Theory and Design.

In the fourth year the student may pursue further work adapted to his special interests by electing one of the following options:—

OPTION 1. Civil Engineering Design.

Emphasis is given to structural theory and design, hydrology and soil mechanics and foundation engineering. This work can prepare men for fields of design associated with sanitary, transportation or hydraulic engineering.

OPTION 2. Civil Engineering Construction and Administration.

Emphasis is given to a broad survey of Civil Engineering activities in roads, water and sewerage schemes, and local government fields, including the planning of projects and their administrative, social and economic aspects. This is designed to prepare men for the planning of Civil Engineering projects including public works.

OPTION 3. Surveys and Investigations.

In this option attention is directed towards the preliminary investigation of large civil engineering projects. Training is provided in topographical surveying, photogrammetry, and mapping. Associated with such work is a more detailed study of the technical subjects of soil mechanics, geology and hydrology.

COURSE VIII—CIVIL ENGINEERING.

First Year.

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

(24 weeks—day course.)

First Term.

		Hours per week. Lect.	Lab.
1.41	Physics	3 —	3
2.111	Chemistry	3 —	3
5.41	Descriptive Geometry	2 —	3
5.11	Engineering Drawing and Materials	1½ —	3
10.11	Mathematics	6 —	0
G1	Scientific Method	1 —	0
G10	Language and Literature	1 —	0
		17½ —	12

Second Term.

		Hours per week.		
		Lect.		Lab.
1.41	Physics	3	—	3
2.111	Chemistry	3	—	0
*5.41	Descriptive Geometry	2	—	3
*8.11	Mechanics and Graphics			
5.11	Engineering Drawing and Materials	1½	—	3
5.21A	Workshop Processes and Practice	0	—	2½
10.11	Mathematics	6	—	0
G1	Scientific Method	1	—	0
G10	Language and Literature	1	—	0
		17½	—	11½

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

SECOND YEAR.

(24 weeks—day course.)

1.42	Physics	2	—	2½
2.122	Engineering Chemistry	1½	—	2
4.122	Engineering Metallurgy			
5.32B	Heat Engines	1	—	1½
8.112	Strength of Materials	1½	—	2½
8.122	Structural Drawing and Design	1	—	2
5.12	Mechanical Drawing and Design	1	—	2
7.92A	**Geology**	**3**	**—**	**1**
10.12	Mathematics	5	—	0
G11	Language and Literature	2	—	0
G2	History of Science and Technology			
G20	Human Relations			
		17	—	13½

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

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.

THIRD YEAR.

(24 weeks—day course.)

First Term.

		Hours per week. Lect.	Lab.
8.53	Fluid Mechanics	2 —	3
6.83	Electrical Engineering	2 —	3
8.23	Materials of Construction ..	2 —	2
8.113	Structures	1½ —	2
8.43	Surveying	2 —	2
8.63	Civil Engineering	2 —	0
8.33	Engineering Computations ..	0 —	1½
10.43	Mathematics	3 —	0
G3	Contemporary Civilisation ..	1 —	0
G12	Language and Literature	1 —	0
G21	Human Relations	1 —	0
		17½ —	13½

Second Term.

		Lect.	Lab.
6.83	Electrical Engineering	2 —	3
8.23	Materials of Construction ..	2 —	2
8.113	Structures	1½ —	2
8.43	Surveying	2 —	2
8.63	Civil Engineering	2 —	0
8.53	Fluid Mechanics	2 —	1½
8.73	Soil Mechanics	1 —	1½
8.33	Engineering Computations ..	0 —	1½
G3	Contemporary Civilisation ..	1 —	0
G12	Language and Literature	1 —	0
G21	Human Relations	1 —	0
		15½ —	13½

FOURTH YEAR.

(34 weeks—day course.)

First Two Terms.

		Hours per week. Lect.		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	
G4	Contemporary Civilisation	1	—	0
G13	Language and Literature	1	—	0
G22	Human Relations	1	—	0
			29½	

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

THIRD TERM.

Wholly 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. 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.*

Two subjects to be chosen with the approval of the Head of the Department.

(*a*) Theory and design of structures.
(*b*) Soil Mechanics and Foundation Engineering.
(*c*) Hydrology.
(*d*) Advanced Mathematics.
(*e*) Modern Foreign Language.

Option 2—*Civil Engineering Construction and Administration.*

Three subjects to be chosen with the approval of the Head of the Department.

(*a*) Construction Equipment and Methods.
(*b*) Geology.
(*c*) Powers and Duties of a Local Government Engineer.
(*d*) Management.
(*e*) Planning and Design of Civil Engineering Works.
(*f*) Road Engineering.
(*g*) Public Health Engineering.

Option 3—*Surveying and Investigations.*

The student electing this option must take the first two subjects and one other.

(*a*) Astronomy and Geodesy.
(*b*) Topographical Surveying, Aerial Surveying and Photogrammetry.
(*c*) Soil Mechanics and Foundation Engineering.
(*d*) Hydrology.
(*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:—

1. Complete the following subjects given by the Department of Technical Education in the evening as one year courses spread over three terms. The student enrols in the Department of Technical Education for these subjects.

	Hours per week.
Conversion Mathematics	3
Conversion Course in Physics	3
Strength of Materials (Conversion)	1
Fluid and Soil Mechanics (Conversion) ..	1
Humanities (Conversion)	3
	11

2. On completion of the work prescribed under (1) above, the student may seek enrolment in the New South Wales University of Technology with advanced standing (Conversion) and if accepted, will be required to attend the normal fourth year of the degree course.

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 proposed course sets out 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 proposed 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. This will both assist the assimilation of lecture and laboratory courses and give students a true perspective of the potentialities and limitations of scientific developments.

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.

(34 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
	Humanities (G1, G10)	3	—	0
		17	—	12

SECOND YEAR.

(24 weeks—day course.)

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
	Humanities (G2, G11, G20) ..	3	—	0
		16	—	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
	Humanities (G3, G12, G21) ..	2	—	0
		10	—	19

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

FOURTH YEAR.

(34 weeks—day course.)

		Lect.		Pract.
9.74	Wool Science	2	—	2
9.84	Project	0	—	5
	Humanities (G4, G13, G22) ..	3	—	0
		5	—	7

Plus elective subjects of either Option I or Option II.

Option I:

		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 practical and professional employment in architecture and building—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. 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 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 training is included during the third term of first year, and throughout the third and fourth years, and the lectures in the Humanities and the Fine Arts are an integral part of the course. Before an undergraduate is awarded the degree of Bachelor of Architecture, he has to provide evidence that, in addition to the completion of the subjects of his University course, he has had at least five months' practical outdoor experience in building, plus at least two years' employment as an assistant in an architect's office.

COURSE XI—ARCHITECTURE.

First Year.

(24 weeks full-day course covering first and second terms, and 11 weeks part-time course of one half-day and two evenings per week covering third term.)

First and Second Terms.

		Hours per week.			
		Lect.		Pract.	
1.91	Physics	2	—	2	
2.131	Chemistry	2	—	2	
11.11	Mathematics	3	—	0	
10.51	Descriptive Geometry	1	—	2	
11.21	Freehand Drawing and Sketching	0	—	2	
11.31	Architectural Studies and Design	1	—	4	(1st term)
11.41	History of Architecture I ..	1	—	0	
11.51	Introduction to Architecture and Building Science	1	—	0	
11.61	Building Trades and Crafts ..	1	—	2	
11.71	Building Construction I	1	—	2	
G1	Scientific Method	1	—	0	
G10	Language and Literature	1	—	0	
		15	—	16	

Third Term.

11.101	Structures	2	—	3
11.41	History of Architecture I ..	1	—	0
11.71	Building Construction I	1	—	2
		4	—	5

During the third term, students are required to gain practical experience in building work in the day time while attending evening lectures.

SECOND YEAR.

(34 weeks full-day course over three terms.)

First and Second Terms.

		Hours per week. Lect.	Pract.
8.22	Materials of Construction ..	1 —	2
11.102	Structures	1 —	2
7.92B	Geology	1 —	0
11.32	Architectural Studies and Design	1 —	12
11.42	History of Architecture II ..	1 —	0
11.82	Theory of Architecture A (2 terms)	1 —	0
11.52	Building Science	1 —	0
11.72	Building Construction II	1 —	5
G11	Language and Literature ..	2 —	0
G20	Human Relations		
G2	History of Science and Technology		
		10 —	21

During the first two terms students are required to attend on Saturday mornings for instruction in Land Surveying (8.34). Field excursions for Geology will also be conducted on several Saturdays.

Third Term.

		Lect.	Pract.
11.102	Structures	1 —	2
11.92	Architectural Design and Construction A	1 —	12
11.42	History of Architecture II ..	1 —	0
11.82	Theory of Architecture A ..	1 —	0
11.72	Building Construction II	1 —	5
11.212	Outdoor Measuring	0 —	6
		5 —	25

THIRD YEAR.

(37 weeks part-time course over three terms, requiring attendance for one half-day and two or three evenings per week.)

		Hours per week.
11.103	Structures III	1
11.73	Architectural Design and Construction B ..	3
11.93	History of Architecture III	1
11.83	Theory of Architecture B	1
11.43	Building Services and Equipment	1
11.203	Building Construction III	2
G3	Contemporary Civilization	2
G12	Language and Literature	
G21	Human Relations	
G30	Painting, Sculpture and Allied Arts	1
		12

FOURTH YEAR.

(37 weeks part-time course over three terms, requiring attendance for one half-day and two or three evenings per week.)

		Hours per week.
8.124	Structures	1
	or	
11.114	Architectural Research	1
11.94	Architectural Design and Construction C	3
11.204	Building Service and Equipment	2
11.124	Professional Practice	1
11.134	Specifications and Estimating	1
11.144	Building Research Review	1 (1 term)
11.154	Interior Furnishing and Decoration	1 (1 term)
11.164	Acoustics and Sound Insulation	1 (1 term)
11.44	History of Architecture IV	1
G4	Contemporary Civilization	2
G13	Langauge and Literature	
G22	Human Relations	
		12

FIFTH YEAR.

(34 weeks full-time course over three terms in the senior school.)

		Hours per week.
11.95	Architectural Design and Construction D	14
11.185	Civic Architecture	9
11.175	Architectural Science and Research	5
8.125	Structural Design	5
11.195	Town Planning	2
		35

In addition to the formal times set out, the student is expected to devote as much time as possible in the Atelier set aside exclusively for his needs. The studio will be open from 9 a.m. to 9 p.m., except Saturdays and Sundays. Students may spend their evenings till 9 p.m. in the studio on design projects rather than studying at home or elsewhere.

A written thesis is required to be presented to the Professor of Architecture before 31st October of this senior year. The subject of the thesis will be discussed with each student by the Professor at the commencement of the year.

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 1.94.

I, II and I-IIA 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 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.

1.41 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. Hydrides of carbon and their derivatives.

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; hetrocuclic 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 bioligical principles. Introductory biology, *e.g.,* living and non-living, vital activities, plants and animals, protoplasm, the cell, etc. Outline of classifications: Animal and plant kingdoms. Diversity of living organisms. Evolution and genetics.

2.92 BIOCHEMISTRY.

An introduction to the following topics:—

The chemistry of the more important components of living tissues.

The properties of the colloidal state of matter and their relation to vital phenomena.

The nature of enzymes and their mode of action.

The more important enzymic systems and their relation to metabolic processes in animals and plants.

Practical work to illustrate the above course of lectures.

2.94 GENERAL BIOCHEMISTRY.

The chemical composition of living organisms. The physical properties of biological materials. The chemical activities of biological systems.

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.

This course consists of one hour lecture on theory, one hour lecture on equipment, one hour tutorial on assigned problems, and three hours laboratory work for an entire year. Half of the year will be devoted to a detailed mathematical and descriptive study of fluid flow and heat transfer, and half of the year to an introductory mathematical and descriptive study of the most important unit operations. The following subjects will be treated theoretically:—

> Fluid flow and heat transfer; evaporation; distillation; gas absorption; solvent extraction; humidification and drying.

Co-ordinated lectures are given on the commercial equipment for the above unit operations and for other miscellaneous operations which do not require extensive theoretical study. The subjects covered are—

> Pipes; fittings; pumps; pressure and flow instrumentation; furnace construction; kilns; waste-heat recovery; evaporators; distillation and gas-absorption equipment; cooling towers; dryers; filters; centrifuges; crushing, grinding and mixing equipment.

Unit operation experiments are provided to illustrate the theory and commercial practice. Representative experiments on fluid flow, heat transfer, the diffusional unit operations, evaporation and filtration will be assigned.

3.25 CHEMICAL ENGINEERING II.

This course consists of one lecture on theory, one hour tutorial on assigned problems, and three hours laboratory weekly for an entire year. This course will be devoted to advanced detailed study of the theory of unit operations, concentrating on the non-ideal more complicated treatment not covered in Chemical Engineering I.

Representative unit operation experiments will be assigned in the laboratory. Some of the subjects to be covered are—

> Continuous distillation calculations, where constant molal overflow cannot be assumed; multicomponent distillation; azeotropic, extractive, and molecular distillation; sublimation; gas absorption accompanied by chemical reaction; solvent extraction with partially-miscible solvents; dialysis; absorption; and crystallisation.

3.25A CHEMICAL ENGINEERING III.

This course consists of two hours lecture per week for an entire year. Part of this lecture time will be devoted to tutorial work as required. This course is devoted to a detailed, advanced study of the equipment required in unit operations. In some cases a more detailed study of subjects covered in Chemical Engineering I will be provided. However, the bulk of the time is devoted to mechanical handling of materials. Some of the subjects to be covered are—

Classification; sedimentation; filtration; centrifuges; dust and mist collection; flotation; cyclones; elutriation; crushing, grinding, mixing; gas dispersion; plastic moulding and spraying; flocculation and conveying.

3.34 CHEMICAL ENGINEERING DESIGN.

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

It covers the essentially mechanical part of chemical engineering design in the first part of the year and the latter part is devoted to elementary design of unit operation equipment together with lectures on elementary instrumentation.

The topics will include—

Transmission.—Power shafting, bearings, belt drives, pulley and sheaves, applications of belt drives, chain drives, gears and simple gear design, motorised equipment.

Pressure Vessels.—Codes, materials and fabrication methods, design for pressure, temperature and combined temperature and pressure, valves, pipes and fittings, autoclaves and reaction vessels.

High pressure design up to 1,500 atmospheres, closures, valves, pipes, fittings, glands, stirrers.

Safety practice.

Unit Operations Equipment Design.—Elementary design of heat exchangers, condensers, evaporators, fractionating columns, gas absorption powers, rotary driers.

Instrumentation.—Discussion of primary elements used in instrumentation.

In the laboratory, calculation for, and drawings of specified equipment will be made.

3.35 ADVANCED CHEMICAL ENGINEERING DESIGN.

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

It consists of the following topics:—

Advanced treatment of welded pressure vessels (all types of heads, vessels subjected to external pressure).

Riveted pressure vessels, cast-iron vessels and elementary mould design.

Advanced bolt and chain drives, toothed gearing, shafts and bearings.

Non-ferrous construction—copper, lead, aluminum.

Advanced unit operations equipment design.

Structural analysis and theory of structures concerned with design of attachments and brackets for pipes, supports for chemical engineering equipment, analysis of existing structures to see if they will take extra loads.

Footing analysis and design, machinery foundations self-supporting tower foundations for fractionating columns.

Advanced instrumentation—theories of automatic control—operation and adjustment of controllers—automatic control engineering.

Lectures will be given on various miscellaneous topics of interest to the design engineer.

Major assignment.—The student will be issued with a complete plant design problem which may be linked up with an assignment from "Special Project" whereby operating data will be obtained from a pilot plant, and this will be used to design a full scale plant.

Development of a chemical engineering project, factory layout and construction, patent law, economics and preconstruction cost accountancy.

3.44 CHEMICAL ENGINEERING CALCULATIONS.

Two hours per week of lecture time is allocated to the course for one year. It will include the following subjects:—

Behaviour of ideal gases and approximate calculations for real gases.

Liquid—vapour relationships.

Vapour—pressure plots for pure liquids, critical point phenomena, saturated and superheated vapours, vapour pressures of solutions.

Solubility.

Crystallisation.

Use of equilibrium solubility diagram; fractional crystallisation; vapour pressure and relative humidity; distribution in binary and ternary systems; solubility of gases; adsorption.

Material balances—stoichiometric relationships, incomplete and consecutive reactions.

Energy balances—enthalpy in energy balances.

Thermochemistry—conventions and definitions; heats of combustion, neutralisation, formation, etc.; thermochemistry of solutions; effect of temperature and pressure on heat of reaction.

Fuel calculations—furnaces and kilns.

Application of differential equations to Chemical Engineering.

Curves—fitting—method of successive approximations, least squares.

Graphical methods—nomographs.

Elementary statistics and probability; theory of errors, precision of measurements; distributions—normal, skewed, etc.; means—arithmetic, geometric, quadratic median, mode.

Gas and Fuel Analysis Lab. by roster.

3.54 CHEMICAL ENGINEERING MATERIALS I.

This course consists of two hours lecture per week for one year.

Materials used in chemical engineering plant construction are treated under the following broad headings:—

1. Materials for strength.
1. Materials for creep resistance.
3. Materials for wear resistance.
4. Materials for fatigue resistance.
5. Materials for chemical and corrosion resistance.

Under each heading, representative materials, metallic and/or non-metallic are treated, use being made of metallurgical history and properties where applicable to explain the important features of the material.

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.

Three hours lectures per week are devoted to this subject.

Introduction—distinction between kinetic and thermodynamic line of attack.

Thermodynamic Function. First law—enthalpy, internal energy. Second law—temperature, entropy, free energy, maximum work function.

Thermochemistry. Flame temperatures. Explosion temperatures and pressures.

Thermodynamics of Fluids. P-V-T relationships for real gases. Calculation of thermodynamic functions from P-V-T data. Compressible flow.

Phase Equilibria. Liquid—vapour. Solid—liquid.

Chemical Reaction Equilibria. Gas reactions (*a*) effect of deviations from ideal behaviour or equilibrium constant; (*b*) effect of temperature and pressure on yield. Reactions in solution.

Thermodynamics of Solutions. Non-electrolyte (*a*) liquid—liquid; (*b*) liquid—vapour. Electrolytic solutions.

Applied Kinetics. Homogeneous reactions. Heterogeneous reactions: (*a*) catalysis; (*b*) mass and heat transfer in catalyst beds; (*c*) reactor design.

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 flowsheet 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 sheet scales. Projections of simple solids. Freehand and sectional sketching.

Plane Geometry.—Parabola; ellipse; hyperbola; involute; evolute; cycloidal and trochoidal curves.

Descriptive Geometry.—Projections; sections.

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 MECHANICAL DRAWING AND DESIGN.

Design procedures, loadings and factors of safety standards. Stresses in bolts. Design examples involving simple stresses. Design of shafts and bearings, belt drives and pulleys (leather, V pivot drives), friction clutch, springs (safety valve, etc.) and screws (valve or similar).

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

5.13 ENGINEERING DESIGN.

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 ENGINEERING DESIGN.

Design of machine elements with due consideration to acceleration effects. Design of reciprocating mechanisms.

Students will work in groups of two or three in the drawing office on one of the following assignments:—

Air Compressor.
Internal Combustion Engine.
Steam Engine.

5.21 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 and practice in shops of University and 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 (uni-dimensional 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. Combusion 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, multicylinder 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 MECHANICAL ENGINEERING PRACTICE.

Discussion and design of mechanical systems involving applications of hydraulic, pneumatic, and electronic equipment. Consideration of simple closed cycle control systems, control problems in temperature, pressure, flow, speed and position.

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 HYDRAULICS.

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.

5.64 PRODUCTION DESIGN.

Analysis of design for ease in production and inspection, dimensional analysis, limits and fits, preferred sizes, standardisation.

Principles of interchangeable manufacture and its relation to design.

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.

PROFESSIONAL ELECTIVES.

STEAM ENGINEERING.

Modern power plants, including a study of the design and installation of high pressure boiler, economizers, air preheaters, modern fuel burning furnaces and automatic combustion controls. Study of the various steam cycles and types of auxiliary drive to show their effect on station heat balance. Discussion of de-aerators, evaporators, condensers, heating, etc., including turbine and machinery foundations and layouts. Special characteristics associated with the driving of electrical generators.

INTERNAL COMBUSTION AND HOT AIR ENGINES.

Discussion of combustion, friction, cooling, carburetion, and other factors affecting power, efficiency, and general performance. Selection of the most suitable type of engine for various specific applications. Fuels, lubricants, ignition and supercharging. Use of instruments, with special emphasis on precision measurements. Engine design, engine dynamics, stresses, materials. Laws of similitude, properties of engine materials, design of important elements. Aircraft engines, automotive and diesel. Valve gear, superchargers and auxiliary equipment. Balancing and vibration problems.

REFRIGERATION, AIR CONDITIONING AND VENTILATION.

Operation of various types of compressors, evaporators, condensers, and automatic controls used in commercial refrigeration systems. Heat flow problems in condensers and evaporators. Physical properties of low temperature insulants. Heat transfer through typical walls of cold storage plants. Moisture and temperature conditions necessary for the preservation of important foods. Study of the thermal, physical and toxic properties of the chief refrigerants. Ice freezing, frost formation, calculation of size of cooling towers, application of refrigeration to skating rinks, shaft sinking, breweries, petroleum and the manufacture of ice cream. Application of low-level refrigeration to the purification of industrial gases such as oxygen, nitrogen, hydrogen, methane, etc.

Study and calculation of load, direct and indirect heating systems, heating boilers and water heaters, ventilation and the fundamentals of air conditioning. Thermal balance in the human body in relation to the thermal balance in a surrounding building enclosure. Thermal relationships of the building to climate and weather. Insulation of the building to provide a suitable enclosure. Techniques of heating, heat generation and their control. Fundamental problems and techniques of cooling for comfort. Typical air conditioning equipment and controls with their application to various types of problems.

INDUSTRIAL HEATING.

The scientific principles underlying the various phases of furnace design and operation and the application of these principles to achieve operating improvement. Heating capacity of furnaces, economy and thermal efficiency. Strength and durability of furnaces. Combustion devices and heating elements. Control of furnace temperature. Control of furnace atmosphere. Critical comparison of fuels and of furnace types.

HYDRAULIC MACHINES.

Indicating, recording and integrating instruments for flow measuring and control installations. Corrections to the Euler Theory of centrifugal pumps. The relative eddy theory. Hydraulic prime movers, turbines, types and general theory of turbine design, performance, characteristics, cavitation. Fluid couplings, fluid torque converters. Dynamic lift and propulsion. Dynamics of compressible flow. Flow of compressible viscous fluids in pipes. Axial flow pumps and fans. Blade element theory. Momentum theory. Modern boundary layer theory.

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 UTILIZATION.

A.C. and D.C. Motors, characteristic curves, effect of design, control, selection, applications. Industrial distribution systems. Industrial heating. Illumination. Industrial control. More detailed study of work given in 6.23 with particular attention to the latest developments.

6.224 POWER GENERATION AND TRANSMISSION.

Alternators, circle diagrams, regulation and regulators, short circuit conditions, reactances, ventilation. Transformers, magnetizing current, harmonics, leakage reactance, parallel operation, design, insulation. Transmission, reactance and capacitance, solution of long lines, voltage control, power transmitted and limits, stability. Symmetrical components, applications to transformers, transmission lines, protection. Protection methods, overload, overvoltage. Circuit breakers, arc extinction. More detailed study following on 6.23.

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.

The following subjects will be dealt with, using as a background work already covered in 6.303, Electronics and High Frequency:—

Cathode ray tubes and associated circuits.

X-ray equipment for medical, industrial and research work.

Photo-electric devices and applications to control, television and photometry.

Electronic lamps, ultraviolet, fluorescent, etc.

Mercury arc rectifiers for power applications.

Inversion, frequency conversion, applications to high voltage D.C. transmission.

Radiofrequency heating, dielectric and induction.

Power line carrier.

Electronic control circuits, applications to motors, welding, regulations, etc.

Servomechanisms.

Electrostatic precipitation.

Electronic instruments and applications.

6.314 HIGH FREQUENCY ENGINEERING.

Propagation of radio waves: The ground wave, the space wave, the ionospheric and reflection of radio waves, propagation characteristics of radio waves of different frequencies, solar activity and meteorological conditions, noise and static.

Antennas: Radiation and directional characteristics, effect of ground, arrays, radiation resistance, directivity and gain, practical transmitting antennas, receiving antennas, special antennas.

Radio transmitters, receivers and communication systems: amplitude and frequency modulated systems, radio telephone and telegraph transmitters, broadcast and other receivers, pulse communication systems, radio relay systems.

Radio aids to navigation and radar: Radar transmitting and receiving systems, radar beacons, pulse navigation systems (Loran, Gee, etc.), radio altimeters, radio ranges, airplane landing systems, radio direction finding.

Television: Television system operation, camera tubes, scanning, synchronization, blanking, frequency band and resolution, transmitters, receivers, colour television.

Sound and sound equipment: Characteristics of the ear, elements of acoustics, speakers, microphones, recording, distortion, sound systems and high fidelity reproduction.

6.324 HIGH FREQUENCY DESIGN.

Principles of design and drawing office work associated with jobs such as—

> Multimeters, public address installations, signal generators, oscillographs, small communication transmitters and receivers, special amplifiers, vacuum tube voltmeters, oscillograph time base circuits, etc.

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.

6.74 ELECTRICAL ENGINEERING IN MINES.

General regulations for the use of electricity in mines, economics of generation and power supply substations. Mining switchgear, systems of supply, cables and methods of installation, electrical pumping, winding and haulage, speed control, electrical coal cutters, safety devices, signalling and lighting.

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.

PROFESSIONAL ELECTIVES.

ELECTRICAL CONTROL.

Theory and application of electrical methods in industrial control. Study of cable circuits, relays, insulation measurements and performance, circuit analysis and grounding systems. Electronic devices for control and measurement. Phototube devices, voltage regulators, water level controls, spot welder controls. Use of impulse type control equipment. Servo mechanisms, components, synchro (magslips) and follow up links. Metadyne, amplidyne, rototrol, Ward Leonard, two-phase motors.

APPLICATION OF MODERN PHYSICS TO ELECTRICAL ENGINEERING.

Atomic and Nuclear structure and fundamental particles. Radioactivity and mass-energy relations. Particle accelerators. Nature and property of X-rays. Influence of matter on X-rays and of X-rays on matter. Thermionic emission, photoelectric effect. Electron theory of matter, metals, semi-conductors and dielectrics. Production and detection of X-rays. Radiographic measurements. Industrial radiographic equipment and installations. Radiographic procedure, interpretation of radiographs. Industrial fluoroscopy. Radiography with gamma rays. X-ray diffraction and analysis. Electron diffraction and applications, the electron microscope. Dangers of X-rays and protection of personnel.

ELECTROACOUSTICS.

Dynamical systems, electrical, mechanical and acoustic elements and systems of elements. Fundamental acoustic measurements. Microphones, loudspeakers. Architectural acoustics. Noise. Physiological acoustics. Supersonic developments.

INDUSTRIAL HEATING.

Generation of heat, heat transfer. Electric heating elements. Arc furnaces, induction furnaces. Dielectric heating methods. Heating circuit controls. Furnace drives and controls. Applications and economics.

ELECTRICAL MEASUREMENTS.

Survey, study and critical analysis of commercial and prevision methods (D.C. and A.C.) for measurement of electro-motive force, current, resistance, power and energy, reactive power, capacitance and inductance. Metering in general. Magnetic properties and hysteresis loss. Dielectric constant, resistivity, dielectric strength, dielectric losses, in insulating materials. Conductivity of electrolytes; *p*H measuring equipment. Electrical methods of measuring various mechanical quantities.

ELECTRIC POWER GENERATION AND UTILIZATION.

Generation of electricity as it affects the prime mover, steam, hydraulic or internal combustion engine. Characteristics of electric generators and alternators, load factor, power factor, synchronisation and paralleling. Governors and flywheels. Power station layout and operation, economics of electric power generation.

ULTRA HIGH FREQUENCY APPLICATIONS.

Frequency modulation systems of transmission and reception. Television systems, principles, theory and practice. Navigational aids for ships and aviation, radio and radar systems, direction finding.

TELEPHONE AND TELEGRAPH SYSTEMS.

More advanced work on 6.334 for students wishing to specialise in this field. Functions of and construction details of equipment commonly used in exchange systems, including P.A.B.X. and R.A.X. systems. Exchange system planning, including line surveys and network layout. Traffic studies and exchange trunking. Exchange building and equipment layout and cabling. Testing and routining devices and procedures; fault clearance.

MEASUREMENTS (HIGH FREQUENCY).

Measuring techniques at high frequencies of current, voltage, frequency, impedance, radiation, aerial characteristics. Effect of frequency on measurement, high frequency, ultra high frequency, microwaves.

ILLUMINATION ENGINEERING.

Principles of illumination engineering. Review of physics of light and colour. Visibility and illumination. Light sources, point sources with symmetrical and asymmetrical distributions, surface sources. Calculations and applications. Photochemical theory of vision, data on the visual thresholds and application to lighting design. Design of lighting systems, reflectors, glassware. Measurement and testing. Economic considerations.

PROTECTION ENGINEERING.

Faults in electrical systems and equipment. Behaviour of electrical systems and equipment under fault conditions. Basic principles of protective devices. Relay types. D.C. and A.C. arc extinction. Air and oil circuit breakers. Coupling protective equipment to high tension circuits. Protection of equipment. Protection of transmission lines. Calculation of fault currents.

MINING ENGINEERING.

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 in Mines. Mining Hygiene. Mine Lighting.)

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.

Miners' diseases; silicosis; pneumoconiosis; nystagmus; sporotrichosis; ankylostomiasis; dermatitis.

Compensation and treatment; dust measurement; dust measuring instruments. Dust prevention:—Boring; cutting; loading; travelling roads; ore bins and shoots; screens. Air cleaning. Dust extraction. Dust suppression.

Mine Lighting.

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.

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

Shaft Sinking.

Types of mineral deposits; prospecting, methods of boring; shothole drilling; breaking ground, types of drilling machines.

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 Shotfiring.

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. Arrangement of shotholes. Substitutes for explosives.

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. Gas detectors.

7.34 MINING.

(Winding, haulage and pumping. Power supply, mine organisation and management.)

Winding and Haulage.

Winding haulage and power transmission. Ropes, chains, capels and detaching hooks; headframes, cages, guides and keps; decking arrangements; winding engines; drums; brakes; reversing; overwinding and slow banking gear. Koepe and other winding systems; steam and electric winding engines; control gear; characteristic curves; load balancing. Signalling systems. Skip winding.

Rails; tracks; skips. Rope and horse haulage; locomotive haulage; signalling systems; safety devices; haulage calculations.

Pumping.

Adit levels; direct acting and reciprocating pumps; multi-throw pumps; centrifugal and turbine pumps; megator and other recent types of pumps. Sumps and standages; drainage of flooded workings.

Power Supply.

Transmission of power; comparison of forms of power. Air compression; types of air compressors, receivers; transmission lines; pressure drop in lines; meters; air consumption of various types of motors. The application of electrical machines, supplementary to 6.74.

Transmission and distribution of electricity; transmission loss; transformation; efficiency of transmission; design of transmission lines; cables for mining use; switchgear, installation of shaft cables and inbye cables; earthing; leakage detection and protective devices; methods of mechanical transmission of power.

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.

Surface mining methods. (*a*) Alluvial mining; panning; long-form 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.

Blasting in stopes; long hole blasting; churn, calyx and diamond drilling.

Transfer of broken ore from stopes to chutes and cars.

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

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*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; beneficiation realisation 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. Ignitions of gas and coal dust. Spontaneous combustion. Explosions. Inundatory and mine rescue work.)

Methods of Working.

Longwall, bord, pillar and other methods. Factors influencing choice of method of working. Advancing longwall, retreating longwall; "Barry" system; panel longwall. Methods of working thin seams; thick seams; inclined seams; contiguous seams; opencut working. Mechanical coalcutting; conveying; loading; power loading; layouts suitable for power loading.

Subsidence; angle of draw for horizontal and inclined seams; prevention of surface damage; size of shaft pillar. Support of main roadways and subsidiary roadways; support of roof at coal face. Stowing. Roof control; crush and creep; hand stowing; pneumatic stowing; hydraulic stowing; mechanical stowing; caving; withdrawal of supports.

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

Spontaneous Combustion and Mine Fires.

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.

Explosions, Inundations, 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. Sources of water under pressure; precautionary measures when working under or approaching water; water blast; dams.

Outbursts of gas; causes; effects and prevention.

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 and scope of coal preparation and mineral dressing. Arrangement and types of screening, crushing and picking plants. Types of breakers. Grinding mills, tube mills, ball mills and stamps. Sizing screens. Grizzlies, shaking and revolving screens. Flow diagrams for coal and ore mineral screening and classifying plants.

The theory of free fall in water and its application to mineral separation. Characteristics of coal and their effect on coal washing. Distribution of ash in coal. Float and sink tests. Washability curves. Principles of separation. Jig and trough washers. Upward current washers. Baum and Rheolaveur washers. Gravity washers. Chance process. Barvoys process, Loess process, Tromp process, Dreissen cyclone separator.

Water and dense media circulating and purification systems. Refuse disposal.

Pneumatic separation. Dry cleaners. Flotation. Examples of plant in operation. Electrostatic and magnetic separation. Filtering and de-watering.

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 Palaentology 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.

7.92B GEOLOGY.

Basic considerations in Geology relative to the study of building materials, soil mechanics, foundations, etc. Study of the earth's crust, the source of all materials; its composition and structure. Definitions—geology, mineralogy, petrology, geophysics, geochemistry, palaeontology, economic geology and geography; formation of the earth's crust, erosion and deposition; igneous rocks, sedimentary rocks, metamorphic rocks, marine deposits; geological identification of strata in divisions; special subdivisions of the main classification of rocks. Movements in earth's crust and their results. Basic mineral constituents of the earth's crust—silica, calcium carbonate, calcium sulphate, alumina, iron and compounds of iron, magnesium and soda compounds; silicate minerals; chief metal ores; the various iron ores—limonite, haemotite, and magnetite; copper pyrites, the chief ore of copper, galena, the chief ore of lead; blende, the chief ore of zinc; the oxides, including bauxite, the chief ore of aluminium; cassiterite, the chief ore of tin.

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; photogeology.

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 thrust.

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—physical and chemical properties—testing and selection of basic constituents—design and proportioning of mixes—admixtures, placing, curing and testing—methods of mixing, transporting, placing. Formwork. Aggregates, selection, treatment, transportation —plant.

Timber—types and sources of structural timbers—identification and constitution—defects, tests and selection of timber—preservation. Erection of timber structures.

Steel—basic manufacturing processes—general types used in civil engineering for specific applications—defects, testing, selection, processing. Transportation, erection.

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

Pipes—earthenware, cement, steel, etc., and use in civil engineering —defects, tests and selection. Methods of transporation, laying.

Chains and ropes—types, sizes and uses—tests, selection.

Elements of soil stabilization technique.

Work in the materials testing laboratory.

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.

8.43 SURVEYING.

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

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.

Fluids and their properties. Static pressures. Fluids in motion. Flow through orifices and over weirs. Flow in closed conduits and open channels. Pipe systems. Control of water in open channels. Resistance of immersed bodies. Dimensional similarity. Scale models.

Hydraulic machinery. Transmission and storage of hydraulic energy.

Elements of hydrology—precipitation. Stream gauging—the run-off process—infiltration—water losses—determination of available flow—flood flows—movement of ground water.

Erosion and movement of silt.

8.63 CIVIL ENGINEERING.

(*a*) *Engineering Construction.*

Moving and transporting plant, methods. 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.

8.64 CIVIL ENGINEERING.

(*a*) *Roads and Railways.*

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.

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.

(*b*) *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.

(c) *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.

(d) *Hydro-electric Engineering.*

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

(e) *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.

(f) *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.

(g) *Applied Hydraulics.*

Equations of flow. Conformal transformation. Flow nets. Percolation.

Water hammer. Distribution systems.

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 in problems relative to stabilities of embankments, cuts, retaining walls, shallow footings and pile foundations. Soil sampling, excavation, coffer dams, caissons, types of piles and types of foundations. Closely correlated with the related field of engineering geology.

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.

Surveying and Investigations.

Students electing to take this option are required to take Astronomy and Topographical Surveying, Aerial Surveying and Photogrammetry together with advanced work on Soil Engineering, either theoretical or practical in nature, dealing with stability of slopes and retaining walls, 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.

or

Advanced work on hydrology and flood control, water power engineering, water supply and purification. Analysis of stream flow data and frequency and magnitude of flood flows and the effect of reservoirs in reducing them. Problems involved in the location, design, construction and economics of hydro-electric developments. Estimates of water power from stream flow data, hydraulic turbines, elements of design of dams, waterways and power houses, cost and value of water power.

or

Students may undertake the advanced study of geology set out in Civil Engineering Construction and Administration.

Work in these subjects is to be of an investigatory nature as would be required in the initial planning of large civil engineering projects, starting with a topographical and aerial survey of the country involved and a survey of the geological formations, soil and rock involved in the foundation work.

Astronomy.

More advanced knowledge of subject matter of Astronomy and Geodesy dealt with in Surveying 8.44.

Geodetic Astronomy—field observations and reductions of precise measures of latitude, longitude and azimuth, including theoretical basis of methods and derivation of formulae, elements of gravity and magnetic surveys.

Tidal observations, reduction and prediction. Computation on the spheroid and on plane surveyors projections of First Order triangulation, precise traverses and geodetic levels—orthomorphic and dynamic corrections, elements of map projections—theory and calculation of Transverse Mercator Projection—station, figure and chain adjustments, weighting of observations—computation of long lines on the spheroid and on surveyors' projections with particular reference to radar distances triangulation by radar. Methods for determining the shape and size of the earth.

TOPOGRAPHIC SURVEYING, AERIAL SURVEYING AND PHOTOGRAMMETRY.

Review of optical application to cameras, general principles of terrestrial photographic surveying, elementary aerial photogrammetry stereoscopy, mosiacs, plotting, and map compilation. Mathematical theory of aerial photogrammetry, rectification of aerial photographs and general study of photogrammetry and stereoscopic mapping instruments.

Principles and practice of controlling air photo compilations by radar measurements to or from aircraft in flight, reduction and use of radar measurements for air surveys. Drawing, photography and reproduction of maps.

CIVIL ENGINEERING CONSTRUCTION AND ADMINISTRATION.

This option is designed for the student intending to enter construction work or local government work where supervision over construction work is an important part of his work. The student may take work on Construction Equipment and Methods, covering analysis of construction procedure and selection of equipment for carrying out civil engineering projects. Includes cost estimating, job planning, production capacity and operating costs for different types of construction plant and equipment, scheduling of materials, safety, and methods applicable to specific kinds of construction. It may also include a study of the problems of management and organisation for construction operations.

and/or

Advanced work on the planning and design of civil engineering works, such as railways, highways, water power, water supply and sewerage, and similar projects with particular attention to town and city planning. Includes estimates and reports, contracts and specifications, methods of economic comparison, financing of engineering projects, engineering organisation and duties and construction methods illustrated by typical projects.

The student may also take additional work in geology and soil engineering and for those interested in entering local government engineering a special course is given in powers and duties of a local government engineer. The additional geological work will include some or all of the following topics:—Geophysics as applied to Civil Engineering; studies in the geological evolution of the Australian Continent, including stratigraphical, orogenic, structural and physiographic considerations; the examination of a wide range of rock types which the Civil Engineer is likely to meet in professional practice; practical instruction in the methods of geological surveying. Students will be required to map and analyse a small area and submit a report embodying the results of the survey. Photogeology and its applications to structural geology, route location, military geology, etc. Subsurface geological surveying and the solving of underground problems by stereographic projection.

CIVIL ENGINEERING DESIGN.

Special advanced work on civil engineering design adapted to the student's interests. This covers important problems encountered by structural designers, such as choice of type, general proportions, economics, methods of preliminary design, organisation of design procedure, influence of erection methods, with applications to structures of complicated types such as suspension bridges, arch dams, building frames and structural analysis.

and/or

Advanced studies of either theoretical or practical nature in various phases of soil engineering, stability of slopes and retaining walls; 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

Advanced work on hydrology and flood control, water power engineering, water supply and purification. Analysis of stream flow data and frequency and magnitude of flood flows and the effect of reservoirs in reducing them. Problems involved in the location, design, construction and economics of hydro-electric developments. Estimates of water power from stream flow data, hydraulic turbines, elements of design of dams, waterways, and power house, cost and value of water power.

Coupled with these the student may undertake additional mathematical studies and/or the study of a modern foreign language.

Library reading, participation in research and special lectures by experts from the relevant fields will form part of the course

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 (BREEDS AND MANAGEMENT).

Sheep breeds—descriptions and uses. Sheep judging. Sheep management—principal sheep areas in the Commonwealth, calendar of operations on a sheep farm, cross breeding, fat lamb production. Elementary anatomy and physiology. Factors affecting efficiency of sheep and wool production—pasture improvement, supplementary feeding, fodder conservation, drough feeding. Principal sources of loss and their control. Modern developments in sheep improvement. Wool sheds. Dips and yards. Fertility, record keeping, stud sheep.

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 SYNTHETIC FIBRES.

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.

Review of raw materials used in industry. Fibre identification. Textile calculations. Yarn manufacture. Cloth analysis. Standard cloths. Finishing processes.

9.43 GENERAL TEXTILES II.

Cloth analysis. Standard cloths. Finishing processes. Textile testing. Structure of the textile industry. Chemistry of textile fibres.

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 WOOL SCIENCE.

Biology of fibre growth—histology, fibre arrangement, morphology and fleece genetics. Fibre physics. Microscopic and sub-microscopic structures. Fine structure investigations. Fibre chemistry. Principles of protein chemistry and special reactions of keratin. Moisture relationships. Carbonising. Finishing processes. Chemistry of skin secretions. Wool wax recovery and utilisation. Wool metrology. Conditioning house procedure.

9.94. GENETICS.

Applied Genetics in relation to sheep and other farm livestock. Mendelian theory. Chromosomes and the physical basis of heredity. Mechanisms of crossing over. Genetics of sex differentiation. Sex linkage. Multi-factor inheritance. Principles of statistical genetics. Strength of inheritance. Selection—phenotypic, family lines, progeny test. Relation of genetics to sheep improvement. In-breeding and line breeding.

MATHEMATICS.

Subjects 10.00 to 10.94.

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.

10.22 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.

10.23 MATHEMATICS III.

Applied.

Dynamics of a particle. Laws of motion. Friction. Impulsive forces. Elastic body collision. Simple harmonic motion. Constrained motion. Motion in a resisting medium.

Dynamics of a rigid body. Centre of gravity. Moment of inertia. D'Alemberts' principle of reversed effective forces. Motion about a fixed axis. Reaction at a hinge.

Elementary fluid mechanics. Differential equations for lines of flow. Bernoulli's theorem.

Differential equations and complex algebra. Complex numbers, De Moivre's theorem, trigonometrical and hyperbolic functions. Second order differential equations of the first degree with constant coefficients, higher orders—by conventional and Laplace methods. Linear simultaneous differential equations. Series solution of linear second order differential equations (as an example—application to Bessel's and Legendre's functions). Partial differential equations.

Co-ordinate geometry of three dimensions. Introduction to solid geometry. Cartesian co-ordinates, spherical and cylindrical co-ordinates. Equations of a straight line. Equation of a plane. Equation of a surface.

Vector analysis. Introduction. Differentiation of vectors. The operation gradient, circulation and curl, flux and divergence. Divergence theorem and Stoke's theorem.

Harmonic analysis.

10.33 MATHEMATICS FOR ELECTRICAL ENGINEERS.

A course of advanced mathematics specially chosen for students in Electrical Engineering Courses. 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, complex variable, contour integration. Engineering computations, nomography and graphical methods.

10.43 MATHEMATHICS FOR CIVIL ENGINEERS.

A course of advanced mathematics specially chosen for students in Civil Engineering Courses. Spherical trigonometry. Finite differences, numerical integration and differentiation. Fourier analysis and solution of selected differential equations in series of Fourier type. Complex variable and conformal transformation.

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 11.95.

11.101-11.103 STRUCTURES FOR ARCHITECTS.

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 a leaning towards the structural side 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 STRUCTURES.

Revision of Statics.

Composition and resolution of forces in one plane. Equilibrium of concurrent forces, force polygons. Moments, couples, equilibrium of non-concurrent coplanar forces, funicular polygon, equations of equilibrium.

Forces in Framed Structures. Force diagram, resolution at joints, method of sections. Frames with loads applied away from joints.

Internal forces in a rigid bar. Bending moment and shear force. B.M. and S.F. diagrams for simple cases.

Simple Machines.

Velocity Ratio, Mechanical Advantage and Efficiency. Simple lifting devices, block and tackle, wheel and axle, etc.

Stress, Strain, Elasticity.

Definitions, Hooke's Law, description of stress strain curves for common materials.

Simple Stresses.

Riveted Joints, Welded Joints, Compound Bars, Temperature Stresses. These cases to be used to illustrate the relation between stress, strain and elasticity.

11.102 STRUCTURES.

Bending of Beams.

B.M. and S.F. diagrams, distribution of bending stresses and position of Neutral Axis (with proofs). Derivation of $\frac{M}{I} = \frac{T}{V}$. Distribution of Shear stresses in beams (without proof). Significance of formula in connection with plated R.S.J.'s, etc. Brief mention of slope and deflection.

Combined Bending and Compression.

Calculation of extreme fibre stresses in this case.

Brief mention of the effect of shock loads and stresses caused. Also brief mention of the types of loading producing torsion in members and the type of stresses set up thereby.

Columns.

Reasons for failure of columns. Elementary treatment of column theory and application to design of simple building columns. Buckling of compression flanges of beams.

Drawing Office Work.

Design of simple beams, plated R.S.J.'s and beam connections.

Design of simple steel roof truss with steel purlins.

Design of simple steel column and footing.

11.103 STRUCTURES.

Timber Design.

Timber as a structural material; strength and mechanical properties. Design of bolted joints and timber connector joints. Design of beams; failure due to horizontal shear, buckling, and end notching. Design of timber struts. Design of composite trusses.

Reinforced Concrete.

Theory of reinforced concrete design. Distribution of stresses in a R.C. beam with tension reinforcement only. Derivation of design and analysis formulae for this case. Function of web reinforcement, bond and anchorage. Application of beam design to design of simply supported one-way slabs.

Descriptive treatment only of double-reinforced beams, T-beams, two-way slabs, continuous slabs, hollow tiled floors, flat-slab construction.

Axially loaded columns.

Drawing Office Work.

Design of composite timber and steel roof truss together with purlins, rafters, etc.

Design of simple reinforced concrete slabs and beams together with web reinforcement.

11.11 DESCRIPTIVE GEOMETRY.

About twenty-four lecture-demonstrations, followed by drawing. Students are required to complete about twenty-two sheets of drawings dealing with the following: Simple lines and plain geometry; shadows cast by various geometrical features on vertical and horizontal planes, particularly applied to architectural subjects; orthographic, isometric, oblique, axonometric and perspective projection; solid geometry; sections through geometrical solids; development of intersections and surfaces; roof developments and layout.

11.114 ARCHITECTURAL RESEARCH.

(Alternative to 8.124 Structures.)

In this subject the student is allowed freedom to pursue some study of his own choosing such as a particular period in the history of architecture, art, or some specialised aspect in the planning and equipment of buildings. But certain definite exercises will be set, particularly in relation to the design, problems being given under architectural design and construction Thus, though all students have to complete the design problems as given in the programmes, some students may choose to go into greater detail on structural calculations relative to the design in the period given as "structures," while those taking architectural research will go into greater detail in such matters as furnishing, equipment, and engineering services relative to the design project. This extra work will be marked separately.

11.114A PLANNING RESEARCH.

(An optional alternative to 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.

11.124 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.

11.134 SPECIFICATION WRITING AND ESTIMATING.

Specification Writing.—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 difference 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 résumé of first two terms.

Estimating.—Units of measurement; methods employed for estimating and costing; establishment and overhead charges; profit, plant, council fees, etc.; measuring and estimating under the various trades, excavator, drainer, concretor, reinforcement and form work, bricklayer, mason, smith, and founder, carpenter and joiner, plumber, plasterer, painter, decorator, and glazier; variations and records; adjustments to contracts; charges and schedules; professional duties; fees and charges.

11.144 BUILDING RESEARCH REVIEW.

A series of lectures by experts from the building research stations on the work they are doing at the stations and the work that has been done in building research in Australia, Great Britain and other countries.

Special attention to contemporary problems in building production, new materials, and methods, prefabrication, pre-assembly, standardization, dimensional co-ordination; relation of building regulations with new materials and methods; review of standard specifications and building codes.

11.154. INTERIOR FURNISHING AND DECORATION.

A series of lectures on furniture, cabinetmaking, the aesthetics of interior finishes, furniture, carpets, curtains and furnishings. Colour, materials and techniques in interior decoration.

11.164 ACOUSTICS AND SOUND INSULATION.

A series of lectures on the main considerations in the design of auditoria; the planning of buildings so as to minimise the effects of air-borne and structure-borne noises; structural techniques and methods for insulation and reduction of noise.

11.175 ARCHITECTURAL SCIENCE AND RESEARCH.

(An optional alternative to 8.125, Structural Design.)

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.

11.185 CIVIC ARCHITECTURE.

A limited number of class lectures on the principles of civic architecture, given by the Professor of Town and Country Planning. These lectures are largely related to improvements and the re-development from an 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, Newcastle, Wollongong, etc., who indicate the basic economic, social and industrial conditions, etc., within which the student may have to re-plan and re-design the particular streets or areas.

11.195 TOWN PLANNING.

An introductory course of lectures given by the Professor of Town and Country Planning. There is a small amount of studio work associated with this, such as a civic survey of a part of Sydney or its environs. The course of lectures is preparatory to the post graduate diploma course in Town Planning conducted jointly by the University of Sydney and The New South Wales University of Technology: this introductory course of lectures provides a brief outline of what is comprised within town and country planning, and touches on the history of town planning, the theory and practice of town planning, and draws attention to the social, economic, geographic, and architectural factors involved.

11.203 BUILDING SERVICES AND EQUIPMENT A.

Drainage, sullage disposal, septic tanks, sub-soil drainage, house drainage, by-laws, etc.; laying, joining, and testing drains; ventilation of same: water supply, fittings and materials, water storage tanks, pumps, etc.: meters; fire services; sanitary plumbing: types of soil and waste fittings: design and installation of sanitary fittings, soil stacks, waste stacks, flushing systems, hospital and laboratory fittings and appliances; domestic layout including storage tanks, etc.

Gas service and domestic gas service and installation, appliances, flues, etc., heaters, stoves, fires, etc., refrigerators.

Hot water services of various kinds, solid fuel, gas, electric, separate and individual types, various appliances, hot water boilers and heating units: relative costs for different types of building.

11.204 BUILDING SERVICES AND EQUIPMENT B.

Generation and use of steam; sources of heat, combustion, selection of boilers: flues, stacks: layout of boiler rooms.

Hot water supply: types of calorifiers: hot water storage tanks, layout of plant: hot water boilers.

Heating of buildings: heat transmission through walls and floors, etc.: types of radiators, accessories, pipe systems: equipment and fittings.

Pumps: application to specific jobs.

Ventilation: natural and mechanical: air change, fans, ducts, registers: requirements of local authorities.

Refrigeration: refrigeration cycle; machines and accessories; location of plant: cool rooms, construction and insulation.

Air Conditioning: description of sensible heat: latent heat, dew point, humidity, heat content of air; relation of aspect to head load, human occupancy, etc.

Fire Protection: sprinkler systems: requirements of controlling authorities: fire extinguishers.

Lifts: application of lifts to buildings: types of lifts: requirements of controlling authorities: size of lift cars: size of walls: motor rooms; enclosures.

Lighting: Natural and artificial: light intensity: requirements for lighting: lighting intensity: types of lamps and fittings: calculation of lighting requirements: methods of installation: switch rooms, etc.

Call systems: application of call systems in hospitals, hotels, business premises, factories, etc.; telephones for inter-communication.

Kitchen equipment: items for kitchen equipment, their application and use: methods of operation, gas, electricity, steam, fuel oil, coal, coke. Servery equipment and accessories.

11.21 FREE-HAND DRAWING AND SKETCHING.

Drawing from casts and geometric models, in line and tone: shading, and elementary work in water colour: instruction in free sketching in class and out-doors (generally Saturday mornings): elementary measuring and plotting in association with sketching of simple buildings: instruction in sketch notes.

Each student must have a sketch-book, which is marked monthly.

11.212 OUT-DOOR MEASURING.

A special period devoted to the complete study of an actual building in the Sydney area of historic and artistic importance: drawings in plan, elevations, sections, and details, some to be fully rendered with properly cast shadows.

11.31 ARCHITECTURAL STUDIES AND DESIGN.

Part A.

Mainly the elements of architectural drawing and presentation: use of T square and instruments: simple geometric pattern exercises: lettering, forms and characteristics, spacing and composition: elementary rendering of exercises in various media: study of simple patterns in architectural design: elementary study of abstract composition in two and three dimensions, tone and colour: drawing, orthographic, isometric, and axonometric projection: elementary perspective drawings: projection and shadows. Elements of working drawings and drawing office practice.

Part B.

Visual design and analytical study of composition in pictures, patterns, historical buildings: analytical study of the orders of architecture and other architectural elements: study of basic structural forms: drawing, rendering, and presentation, in connection with the above. Lectures on elementary composition, visual design, theory of observation, and theory of colour: analytical study related to the history of architecture as being taught concurrently.

11.32 ARCHITECTURAL STUDIES AND DESIGN.

Part C.

Studio work relative to study of design and construction in historical examples: Drawing, rendering, and presentation, relative to the above.

Advanced theory of visual design: exercises in abstract form, two dimensional, and three dimensional: geometric forms and solids, as related to architectural composition: further consideration of the theory of colour: exercises in free design, in monochrome and colour. Presentation in various types of media relative to the above exercises: more advanced work in architectural perspective: One small measured study to be fully rendered.

Part D.

Design and construction of simple architectural structures and planning elements. Further study in working drawings and drawing office practice. Three-hour and seven-hour sketch design problems with accent on development of ideas: class research and class criticism.

Part E.

Studio work related to lectures on theory of architecture and history of architecture, *e.g.*, relation between architectural form and structure, basic forms and development of masses: study of solid and void, proportion and scale, surfaces, textures, and colours.

11.41 HISTORY OF ARCHITECTURE I.

In each division the subject matter is dealt with in this order:—
List of kinds of work; building materials; the systems of design and building involved; decoration, sculpture and minor crafts.

Ancient architecture: Egyptian, Chaldean, Babylonian, Assyrian, Persian, Mycenean. Classical architecture; Greek, Roman.

11.42 HISTORY OF ARCHITECTURE II.

Mediaeval architecture: Byzantine, Romanesque, Gothic. The cathedrals and ecclesiastical buildings of Europe. The study of Mediaeval structural methods in stone, etc.

11.43 HISTORY OF ARCHITECTURE III.

Italian Renaissance, Florentine, Roman, Venetian, etc.; Middle Renaissance and Baroque, French Renaissance, German and Austrian, English Renaissance, up to the middle of the 18th century.

11.44 HISTORY OF ARCHITECTURE IV.

The later Renaissance in the European countries and United States of America. Notable examples of 19th and 20th century architecture throughout the world. History of the modern movement in architecture, contemporary work. A short history of architecture in Australia.

11.51 INTRODUCTION TO ARCHITECTURE AND BUILDING SCIENCE.

(*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, and 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 the succeeding years.

(*e*) Building science: what it comprises; functional requirements in buildings; the scientific approach to the problems of building; the nature and properties of materials, constructional techniques, workmanship, specialist engineering services and equipment in buildings.

11.52 BUILDING SCIENCE.

Further study of the mechanical and physical properties in materials and structures following upon the studies in chemistry and physics given in First Year.

Part I.

Includes the science underlying the use of constructional materials and their exposure in the fabrics of buildings: recapitulation of methods and units of measurement: density, specific gravity, capillarity, surface tension, porosity of building materials: absorption, moisture content, moisture movement, expansion and contraction in building materials: impervious materials: function of damp-proofing courses: solvent action of water, evaporation, crystallisation, deliquescence, efflorescence, mechanical changes, oxidation, calcination of limestone, slaking of lime: acids, alkalies, bases, and salts: elements and compounds: symbols, formulae, and chemical equations.

Part II.

Further work on porosity of building materials: movement of moisture in walls: weathering effects, crystallisation and acid attack: particular problems arising from expansion and contraction due to moisture and thermal changes: the laws of mechanical combination: measurement of gases: atomic theory: valency: mechanical calculations: testing of limes, portland cement and gypsum plasters: paints and painting processes: metals, manufacture and properties, corrosion. Structure of timber; natural and kiln seasoning: moisture content: causes of decay: methods of preservation.

Part III.

Production of stones, slates, bricks, tiles, terra cotta, limes, cements, plasters and other building materials: general consideration of various external materials and finishes: selection, specification, and testing of facing materials: resistance of particular materials to weathering, estimation of durability; treatment of roofs; solar radiations; protection from heat absorption and penetration: problems of flat roofs: use of asphaltic and bituminous compounds: selection and specification of floor surfaces: coloured and textured surfaces: magnesium and oxychloride cements; various other finishing materials such as glazed tiles, marble, asphaltic tiles, asbestos cement, etc., etc.: further consideration of paints: further consideration of timber products such as plywood, wood-fibre and pulp boards.

11.61 BUILDING TRADES AND CRAFTS.

Short lectures given by different specialists on the staff, both from the point of view of the employer (the master builder) and the specialist craftsman. The specialist trade instructors in the department provide demonstrations in the techniques of brick-laying, carpentry, joinery, plastering, painting and decorating. Each student is required to do a small amount of practical work, such as mixing mortar, carrying and laying of bricks, elementary practical work in carpentry and joinery, plastering and painting. Model making, in connection with the architectural studies.

The general intention of this period is to familiarise the student with the tools and terms used by the building craftsman, to give him some sense as to what the craftsman does, and some sense of the weight, nature, and texture of materials.

11.71 BUILDING CONSTRUCTION I.

Part A.

Elementary outline of basic building materials, their manufacture, and techniques employed in their use: bricks, stone, lime, cement, stones, concrete, and mortar mixes: foundations, footings, trenches, strutting; timber seasoning, conversion, defects. Study of building elements, walls, openings, lintels, arches, bonding: fireplaces and flues: floor construction, ground and first floor: roof construction, types of roofs, roof coverings, roof plumbing: timber-framed dwellings, footings, floors, walls, and roofs.

Joinery, joints, etc.: box frame and solid frame windows: doors and cupboards.

Introduction to—Drainage: domestic: Plumbing: domestic.

Plastering: rendering, fibrous plaster, etc.

Painting and glazing.

Studio work consists of a number of sheets of details followed by working drawings of a very simple building designed by the student.

11.72 BUILDING CONSTRUCTION II.

Part B.

Building sites; shoring; excavations; footings; piling; staircases; concrete; concrete formwork; treatment of concrete; dampcourses; stonework; external wall finishings; joinery; steel windows; heavy timber construction; roof trusses and roof treatment; roof lighting and drainage; decorative finishes; fire resisting construction.

Drawing Office Work.

This consists of six detailed problems, on Imperial size sheets, showing application of above-mentioned construction theory. The problems cover dwellings, workshops, warehouses, fire-resisting construction, heavy wood construction, interior and exterior wall finishes and staircase construction.

11.73 BUILDING CONSTRUCTION III.

Thirty-six periods of two hours occupying the full third year, dealing with advanced constructional work beyond that of years I and II.

The work consists of three major sections occupying approximately one term each. The first being design and full detailing of a multistoried warehouse type building; the second section is devoted to a similar type steel frame building including lifts, stairs, fire-escapes, etc., designed to the requirements of the Sydney Corporation Act; the third section is devoted to study of reinforced concrete details of a more advanced nature.

11.82 THEORY OF ARCHITECTURE—A.

Basic functions of buildings; clients needs and programme of requirements; functional planning, scientific structure, beautiful appearance; laws of composition; the study of planning; scientific study of requirements; processes in determination of plan; circulation; process diagrams in planning; site and surroundings; study of various sites and how they affect the building; prospect, aspect, orientation; drawing up a programme of requirements; requirements and human need; requirements of the site and adjoining buildings, locality, structure, economy, detail consideration of structure; classical and contemporary plan composition; symmetry and asymmetry; decisive plan forms; contrast, proportioning of plan units; principles of architectural composition; aesthetic theories; modes of thought; buildings as organisms; visual art, unity, duality, contrast, rhythm, proportion, scale, character; verticality, horizontality; the dominant, major and minor features; major and minor focal points; composition of masses; space enclosure in the third dimension; the element of decision; accentuation.

11.83 THEORY OF ARCHITECTURE—B.

Contemporary design; materials and technique; expression of planning and structural forms in walls, floors, roofs, doors, windows, etc.; non-structural elements, linings, covers, finishing, etc.; character appropriate to different types of building; character appropriate to a locality, function, and importance; style, traditional and contemporary eclectic; personal and impersonal; engineering services and equipment in buildings; colour as an element of design; the detailed composition of buildings and groups of buildings and their surroundings, paths, street design, the elements of civic design.

Critical analysis of historic examples, particularly the late Renaissance, 19th and 20th centuries. The modern movement in architecture, contemporary philosophies.

ARCHITECTURAL DESIGN AND CONSTRUCTION.

This subject 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.

11.92 ARCHITECTURAL DESIGN AND CONSTRUCTION—A.

Includes design and construction of simple architectural structures and planning elements, with sketch design problems of a varied nature, some purely pictorial and aesthetic, and some largely structural; all work is marked by jury, with class criticism and discussion.

11.93 Architectural Design and Construction—B.

More realistic approach to planning problems than in Part A; one scheme has to be worked out in different materials showing influence of materials on design; several sketch designs to encourage free design and imagination of the student; one subject is a simple two-story house, including sketch designs, working drawings and half-inch details.

11.94 Architectural Design and Construction—C.

Similar to Parts A and B, but with more advanced and increased accent on realistic approach to the problems; projects prepared for actual sites, programmes prepared by "clients."

At least two problems have to be worked out to the fullest details in sketch designs, working drawings, ½-inch details, showing all construction, and some full-sized details: specification, estimate of costs, etc. Calculations for any steel or reinforced concrete may be required in certain cases.

Sketch design and research projects relative to specialised details of planning and special types of building.

11.95 Architectural Design and Construction—D.

Architectural projects generally relative to actual sites and conditions; particularly housing and community planning; students individually or in small groups are required to do research and design relative to specialised type of building, e.g., small hospital, school, theatre, office block; this is regarded as a design thesis.

HUMANITIES.

		Hours per week.	
		Lect.	Prac.
	First Year.		
G1	Scientific Method	1	0
G10	Language and Literature	1	0
	Second Year.		
G2	History of Science and Technology	2	0
G11	Language and Literature		
G20	Human Relations		
	Third Year.		
G3	Contemporary Civilization	1	0
G12	Language and Literature	1	0
G21	Human Relations	1	0
	Fourth Year.		
G4	Contemporary Civilization	1	0
G13	Language and Literature	1	0
G22	Human Relations	1	0

Subjects G1 to G99.

G1. SCIENTIFIC METHOD.

The aim of the course in Scientific Method is to provide students with a grounding in logic and scientific methodological procedure and at the same time to inculcate an appreciation of the universal nature of science.

The course commences with an examination of the development of scientific method to bring out the basic methodological issues involved, particularly in regard to induction and deduction. The place of induction and deduction in science. Elementary material on formal logic covering terms, distribution proposition, logic relations, inference, syllogistic and hypothetical arguments. Selecting and choosing between hypotheses, verifying hypotheses, etc. Classification, definition and explanation. Observation, status of scientific laws, the nature of experiment and experimental methods.

G2. HISTORY OF SCIENCE AND TECHNOLOGY.

The aim of this course is to enable the student—

(*a*) to see the sphere of science or technology which he is entering in relation to the general perspective of scientific and technological development;

(*b*) to gain an understanding of the relation between scientific and technological development and the conditions of society.

This course is introductory to the succeeding courses on Contemporary Civilization (G3, G4). It traces the scientific and technological developments by which man has provided himself with extracorporeal equipment and gained an ever-increasing control over his environment.

It considers:—

Primitive man of the early Stone Age, his making of tools and their effect upon his way of life.

The developments of herding and agriculture by which man proceeded from parasitic dependence on nature to co-operation with nature.

Measurement of time and space and technological development in the cradles of civilization (Egypt and Mesopotamia) to approximately the 3rd Century B.C., by which time man had developed crafts and methods of transport which, despite improvement, remained essentially the same process until the period of the modern Industrial Revolution.

The beginning of theoretical science in ancient Greece.

The Alexandrian period of scientific development.

Roman civil engineering.

The Arabian contribution to science.

The Renaissance period and the dawn of experimental science.

The foundation, progress and effects of modern experimental science.

The foundation, progress and effects of modern technological development.

The position of science and technology in contemporary civilization.

There is *no prescribed text book* as students are encouraged to read widely and selectively. Throughout the course references are made to standard works treating various aspects, and students are supplied with a list of works which are available and offer helpful reading matter for the course and assignment work included as part of the course. Books on this list which are recommended are included in the general list of text books.

G3. CONTEMPORARY CIVILIZATION.

In this course an historical approach is made to Economic Theory treated in conjunction with selected aspects of Economic History.

The general aim of the course is to develop an appreciation of the practical basis of economic theory and to show how it has developed under the influence of historical situations, particularly of ideas. In this way, the close inter-connection of economic theory with life is indicated.

The treatment is critical involving analysis and comparison of material conditions, and is not merely descriptive. This serves at once to inform the student's mind and assists him to develop a critical approach and so enable him to assess economic affairs for himself without being swayed by propaganda, indoctrination or prejudice.

Emphasis in this course is based on the 18th and 19th centuries, but earlier periods are surveyed and some attempt made to evaluate 20th century developments by selecting and examining the works by those economists of the past whose contributions have significance for contemporary theories, practices and controversies.

A. *Preliminary.*

(i) Economic thought in Biblical times, Greece and Rome, leading to consideration of principles evolved during early Christian and early mediaeval eras, particularly in Europe.

(ii) The breakdown of mediaeval unity. Commercial Capitalism, Mercantilism, particularly in England: Thomas Mun.

B. *Industrial Capitalism and Political Economy.*

(i) The relationship of the Industrial Revolution and contemporaneous economic thought. The influence of Locke and Hume: connections with political theory.

(ii) The Physiocrats: Quesnay, Turgot. The French Revolution and economic thought.

C. *The Classical Tradition.*

(i) Adam Smith.

(ii) Malthus and Ricardo.

(iii) Senior and J. S. Mill.

(iv) The Labour Theory of Value: Surplus Value. The Theory of Capitalist Competition. The Theory of Economic Development.

D. *The Evolution of the Classical System.*

(i) The Classical System and European, particularly German, influences.

(ii) The Historical School. Richard Jones.

(iii) Restatement of Value Theory: implications for 20th Century Economic thought, including social democracy in Australia.

E. 20*th Century Position.*

(i) American Theory. Veblen. Burnham.

(ii) English and Australian theory: Conservative, Progressive.

(iii) Disintegration of 19th Century Revolutionaries' synthesis of politics and economics.

G4. CONTEMPORARY CIVILIZATION.

This course is one in Contemporary International Relations, and is the final course of a three year sequence and will draw upon the understanding gained in the first year of the significance of science and technology in its effect upon human relations, and in the second year of the importance of the operation of economic principles.

The aim of the course in Contemporary International Relations is to give the undergraduate a broad introduction to the basic factors underlying current international relations, some training in the interpretation of news, and sufficient knowledge to be informed upon current problems and to know where to turn and how to seek information upon an aspect of this subject, should his later professional activities demand a specialist's knowledge. It will also enable the student to appreciate the conditions and problems of other peoples, so that he will have an understanding of their outlook which will help him in his professional life should he be called upon to have contact with them.

The course is practical rather than theoretical and the time is programmed for discussion of current problems on such aspects as:—

(*a*) the conditions (geographic, historic, strategic and economic) out of which the problems are arising;

(*b*) the repercussion of such problems upon Australia;
(*c*) the policies which Australia is framing;
(*d*) possible effects of current national and international problems and policies.

The course is operated on the seminar method, the students being divided into groups of no more than ten, so that at the beginning of the year each student will be allotted two problems to investigate and upon which to write a report which he will read to his group on an appointed date as a basis for class discussion.

G10. LANGUAGE AND LITERATURE.

1. *Theory of Language. and History of the English Language.*

A brief survey of the most important theories of the origin and development of language, and a condensed, illustrated history of the English Language, showing some of the principal vocabulary changes, semantic changes, changes in accidence, and phonological changes.

2. *Literature. Involving Social Criticism.*

Treatment of five or six selected works of literature in various forms to illustrate a thesis that much good literature contains some degree of social criticism.

3. *Technical Exposition.*

A review of some of the chief principles to be observed in descriptive writing.

G11. LANGUAGE AND LITERATURE.

1. *Standard English.*

A brief treatment of some of the standards accepted by the educated in the writing and speaking of English.

2. *Literature and the Study of Personality.*

Treatment of four or five selected works of literature in various forms to illustrate the importance of literature in the analysis and recreation of human personality.

3. *Technical Exposition.*

A review of some of the chief principles to be observed in writing reports.

G12. LANGUAGE AND LITERATURE.

1. *Theory and Practice of Semantics.*

A study of the development of meaning in contemporary English, and an analysis of expressions in current controversial writings.

2. *Literature and the Study of Social Forces.*

Treatment of five or six selected works of literature in various forms to illustrate the contribution made by literature to the analysis of social forces, and to a comprehension of the most satisfactory pattern of political and social activity in particular epochs.

3. *Technical Exposition.*

A review of some of the chief principles to be observed in writing abstracts.

G13. LANGUAGE AND LITERATURE.

1. *Technical Exposition.*

A review of some of the chief principles to be observed in writing reports, abstracts, descriptions, letters.

2. *Literary Analysis, and Principles of Literary Criticism.*

Treatment of five or six selected works of literature in various forms, and a revision of works already treated in previous years to illustrate some of the basic principles in literary criticism, so that graduates may assess a work on its merits as creative writing, apart from its particular subject matter.

G20. HUMAN RELATIONS.

The series of courses on Human Relations aim at an understanding of the dynamic inter-relationship between human beings and the value of such an understanding for successful social living in general and for harmonious industrial relations in particular.

The foundation of the course is an exposition of the fundamental principles of human conduct which will lead the student to an understanding of his own behaviour and the behaviour of his fellow men. The principles enunciated are related to practical situations and are given within a social framework.

The following topics are considered:—The subject matter of the science of Psychology and its relationship to other sciences. The nature of individual differences; the principal psychological differences. Motivation, its biological background and its social significance. The learning process—social conditioning. Intelligence—theories and measurement. Personality—definition and description.

G21. HUMAN RELATIONS.

Following on G20 this course is concerned with an examination of the most important social relationships which emerge from the interaction of the individual with society. This aims to lead the student to an understanding of social relationships and thus a more thorough social adjustment.

Attention is given to the following topics. Human motives and social living. Individual differences in social reactions. Group situations—group membership—attitudes (particularly formation and change)—social distance. Social change and its effect on the individual—the effect of technological development—the influence of major social movements.

G22. HUMAN RELATIONS.

Here the industrial situation will be taken as a segment of the total social pattern as treated in G21, and examined intensively.

The influence of human relations upon the following problems are considered. Motivation and morale in the work situation. Leadership. Monotonous work. Fatigue. Environmental influences and production (atmospheric conditions, lighting, noise, etc.). Accidents and accident proneness. In addition, some of the results of the Harvard Industrial Research Programme in Human Relations will be examined and discussed.

In all courses in Human Relations, the seminar technique is used as the teaching device.

G30 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 1950.

PHYSICS—1.00 to 1.94.

	SUBJECT.	TEXT BOOK.
1.11 1.11A	Physics Physics	Lemon and Ference—*Analytical Experimental Physics.* Poynting and Thomson—*University Text Book of Physics—Properties of Matter, Vol.* 1.
1.12	Physics	Sears—*Principles of Physics—Electricity and Magnetism, Vol.* 2. Sears—*Principles of Physics—Optics, Vol.* 3. Mitton—*Thermodynamics.* Tolansky—*Introduction to Atomic Physics.*
1.41	Physics	Lemon and Ference—*Analytical Experimental Physics.*
1.42	Physics	Sears—*Principles of Physics—Electricity and Magnetism, Vol.* 2. Sears—*Principles of Physics—Optics, Vol.* 3. Mitton—*Thermodynamics.*

APPLIED CHEMISTRY—2.00 to 2.94.

	SUBJECT.	TEXT BOOK.
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. Read—*Textbook of Organic Chemistry.*
2.122	Engineering Chemistry.	Gyngell—*Applied Chemistry for Engineers.* Leighou—*Chemistry of Engineering Materials.*
4.122	Engineering Metallurgy.	Rollason—*Metallurgy for Engineers.* Sydney Technical College—Notes for C: 4a-b: *Technology for Engineers.*
2.32	Physical Chemistry	Findlay—*Practical Physical Chemistry.* *OR* Palmer—*Expiremental Physical Chemistry.* Glasstone—*Elements of Physical Chemistry.* *OR* Glasstone—*Textbook of Physical Chemistry.* Alternatively—2nd choice. Daniels—*Outlines of Physical Chemistry,* 1949.
2.33	Physical Chemistry	Findlay—*Practical Physical Chemistry.* *OR* Palmer—*Experimental Physical Chemistry.* Glasstone—*Elements of Physical Chemistry.* *OR* Glasstone—*Textbook of Physical Chemistry.* Alternatively—2nd choice. Daniels—*Outlines of Physical Chemistry.*

APPLIED CHEMISTRY—2.00 to 2.94 (*continued*)

	SUBJECT.	TEXT BOOK.
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.* Sydney Technical College—First Year Practical Chemistry Notes—Union Store. Vogel—*Textbook of Qualitative Chemical Analysis.*
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 Analysis.* *OR* Kolthoff and Sandell—*A Textbook of Quantitative Inorganic Analysis.*
2.62 2.63 2.63A	Organic Chemistry	Fieser and Fieser—*Organic Chemistry.* *OR* Karrer—*Organic Chemistry.*
2.72	Applied Mathematics for Chemists.	Porter—*The Method of Dimensions.*
2.73	Applied Mathematics for Chemists.	Chambers—*Statistical Calculations for Beginners*· Brownlee—*Industrial Experimentation*—(H.M. Stationery Office).

MECHANICAL ENGINEERING—5.00 to 5.94.

	SUBJECT.	TEXT BOOK.
5.101	Drawing & Materials	*S.A.A. Australian Standard Engineering Drawing Practice.* Sydney Technical College—Notes for Mechanical Engineering I.
5.11	Engineering Drawing and Materials.	*S.A.A. Australian Standard Engineering Drawing Practice.* Sydney Technical College—Lecture Notes for Mechanical Engineering I.
5.12	Mechanical Drawing and Design.	Black—*Machine Design.*
5.13	Engineering Design...	*B.S.S. Spur Gears.* *B.S.S. Worm Gears.* *S.A.A. Crane and Hoist Code.*
5.32	Mechanical Engineering.	Bevan—*Theory of Machines.* Grundy—*Theory and Practice of Heat Engines.* Sydney Technical College—Lecture Notes for Mechanical Engineering IIIA. **Reference.** Sydney Technical College—Lecture Notes for Mechanical Engineering II.

MECHANICAL ENGINEERING—5.00 to 5.94 (*continued*)

	SUBJECT.	TEXT BOOK.
5.33	Mechanical Engineering.	Bevan—*Theory of Machines.* Sydney Technical College—Lecture Notes for Mechanical Engineering IIIA and IIIB. Inchley—*Theory of Heat Engines.* *OR* Lewitt—*Thermodynamics Applied to Heat Engines.* *OR* Walshaw—*Applied Thermodynamics.* *OR* Wrangham—*The Theory and Practice of Heat Engines.* **Reference.** Fraas—*Combustion Engines.* Pye—*Internal Combustion Engines.* Young and Prior—*Testing of Internal Combustion Engines.*
5.41	Descriptive Geometry	Abbot—*Practical Geometry and Engineering Graphics.*
5.53	Hydraulics	Addison—*Treatise on Applied Hydraulics.* *OR* Hunsaker and Rightmire—*Engineering Applications of Fluid Mechanics.* *OR* Rouse, Hunter—*Elementary Mechanics of Fluids.*

ELECTRICAL ENGINEERING—6.00 to 6.94.

6.12	Electric Circuit Theory.	Kerchner and Corcoran—*Alternating Current Circuits* (2nd Edition, 1943). Strong, E. M.—*Electrical Engineering—Basic Analysis.* **Reference.** Frazier—*Elementary Electric Circuit Theory.*
6.13	Electric Circuit Theory.	Kimbark, Edward W.—*Electrical Transmission of Power and Signals* (1st Edition, 1949). Kerchner and Corcoran—*Alternating Current Circuits* (2nd Edition, 1943).
6.214	Electric Power Engineering.	Starr, A. T.—*Generation, Transmission and Utilization of Electric Power* (2nd Edition, 1942). McFarland—*Alternating Current Machines* (1st Edition, 1948). **Reference.** Mass. Instit. Tech.—Staff of Dept. of Electrical Engineering—*Magnetic Circuits and Transformers.* Westinghouse Electric Mfg. Co.—*Electrical Transmission and Distribution Reference Book* (3rd Edition, 1944).
6.224	Electric Power Utilization.	

ELECTRICAL ENGINEERING—6.00 to 6.94 (*continued*)

	SUBJECT.	TEXT BOOK.
6.23	Electric Power Engineering	Cook, A. L. and Carr—*Elements of Electrical Engineering* (5th Edition, 1947).
6.303	Electronics and High Frequency.	Mass. Instit. Tech.—Staff of Dept. of Electrical Engineering—*Applied Electronics.*
6.304	Industrial Electronics	**Reference.** Westinghouse Electric Mfg. Co.—*Industrial Electronics Reference Book,* 1948.
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.

	SUBJECT.	TEXT BOOK.
7.32	Mining	Moss—*Gases, Dust and Heat in Mines.* Penman and Penman—*Principles and Practice of Mine Ventilation.* Whitaker—*Mine Lighting.* Whitaker and Willet—*Colliery Explosions and Recovery Work.* **Reference.** Beringer—*Underground Practice in Mining.* Peele—*Mining Engineer's Handbook.* Young—*Elements of Mining.*
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—*Manual of Modern Underground Haulage Methods.* Broughton—*Electric Winders.* **Reference.** Poole—*Haulage Winding.* Beringer—*Underground Practice in Mining.* Peele—*Mining Engineer's Handbook.* Young—*Elements of Mining.*
7.43	Metalliferous Mining	Beringer—*Underground Practice in Mining.*
7.44	Metalliferous Mining	Beringer—*Underground Practice in Mining.* Truscott—*Mine Economics.* **Reference.** Peele—*Mining Engineer's Handbook.*
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—*Text Book of Ore Dressing.* *OR* Gardin—*Principles of Mineral Dressing.*

Subject.		Text Book.
		MINING ENGINEERING AND GEOLOGY—7.00 to 7.94 (*continued*).
7.92	Geology	Emmons, Thiel, Stauffer and Allison—*Geology—Principles and Processes* (3rd Edition). *OR* Longwell, Knopf and Flint—*Physical Geology* (3rd Edition). **Reference.** Cotton—*Geomorphology.* Hills—*Outlines of Structural Geology.* Geikie—*Structural and Field Geology* (3rd Edition Revised). Shimer—*Introduction to the Study of Fossils.* Woods—*Palaeontology Invertebrate.*
7.92A	Geology	Emmons, Thiel, Stauffer and Allison—*Geology—Principles and Processes* (3rd Edition). *OR* Longwell, Knopf and Flint—*Physical Geology* (3rd Edition). **Reference.** Cotton—*Geomorphology.* Geikie—*Structural and Field Geology* (3rd Edition Revised). Hills—*Outlines of Structural Geology.* Ries and Watson—*Engineering Geology.*
7.93	Geology	Rutley—*Elements of Mineralogy.* Smith, H. G.—*Minerals and the Microscope.* **Reference.** David—*The Geology of the Commonwealth of Australia.* Harker—*Petrology for Students.* Hatch, Wells and Wells—*The Petrology of the Igneous Rocks* (10th Edition). Tyrrell—*The Principles of Petrology.* Dana—*Textbook of Mineralogy.* Emmons—*Geology of Petroleum.* Lahee—*Field Geology.* Bateman—*Economic Mineral Deposits.* Lindgren—*Mineral Deposits.* Reports of Scientific Societies and Geological Surveys.
7.94	Geology	**Reference.** Forrester—*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.* Bateman—*Economic Mineral Deposits.* Leggett—*Geology and Engineering.* Heiland—*Geophysical Exploration.*

CIVIL ENGINEERING—8.00 to 8.94.

	SUBJECT.	TEXT BOOK.
8.11	Mechanics and Graphics.	**Reference.** Abbot—*Practical Geometry and Engineering Graphics.*
8.112	Strength of Materials	**Reference.** Salmon—*Materials and Structures* (Vol. 1.). Case—*Strength of Materials.*
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). Pippard and Baker—*Analysis of Engineering Structures.* Husband and Harby—*Structural Engineering.* Salmon—*Materials and Structures* (Vol. II). Sutherland and Reese—*Introduction to Reinforced Concrete Design.*
8.114	Structures ...	**Reference.** Same as for 8.113—Structures. Reynolds and Kent—*Introduction to Structural Mechanics.*
8.122	Structural Drawing and Design.	*S.A.A. Code—CA*1. *S.A.A. Code—CA*8. **Reference.** Stewart, D. S.—*Practical Design of Simple Steel Structures.*
8.123	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). Pippard and Baker—*Analysis of Engineering Structures.* Husband and Harby—*Structural Engineering.* Salmon—*Materials and Structures* (Vol. II). Sutherland and Reese—*Introduction to Reinforced Concrete Design.*
8.23	Materials of Construction.	**Reference.** Bauer—*Plain Concrete*, (3rd Edition, 1949). *A.C.I. Journals.* *I.E.S. Lighting Handbook.* Greene—*Principles of Heating, Lighting and Air-Conditioning.* U.S. Bureau of Reclamation—*Concrete Manual.*
8.33	Engineering Computations.	**Reference.** Allcock and Jones—*The Nomogram.* Lipka, J.—*Graphical and Mechanical Computation* (Part II). Frazer, Duncan and Collar—*Elementary Matrices.* Whittaker and Robinson—*The Calculus of Observations.*

CIVIL ENGINEERING—8.00 to 8.94 (*continued*).

	Subject.	Text Book.
8.33	Engineering Computations—*contd.*	**Reference**—*continued.* Jahnke and Emde—*Tables of Functions.* Dwight—*Mathematical Tables.* Churchill, R. V.—*Modern Operational Mathematics in Engineering.* Pipes, L. A.—*Applied Mathematics for Engineers and Physicists.*
8.43	Surveying	Chambers—*Mathematical Tables* (7 figures). **Reference.** Clark—*Plane and Geodetic Surveying* (Vols. I and II). Thomas, W. N.—*Surveying.*
8.44	Surveying	**Reference.** Same as for 8.43—Surveying.
8.53	Fluid Mechanics ...	**Reference.** Bakhmeteff—*Hydraulics of Open Channels.* Rouse—*Fluid Mechanics for Hydraulic Engineers.* Dallavalle—*Micromeritics.* Addison—*Treatise on Applied Hydraulics.*
8.63	Civil Engineering ...	**Reference.** Steel—*Water Supply and Sewerage.* Phelps—*Public Health Enginereing.* Wisler and Brater—*Hydrology.* Webb—*Railroad Construction.* Smith, H. G.—*Minerals and the Microscope.* Leggett—*Geology and Engineering.*
8.64	Civil Engineering ...	**Reference.** Webb—*Railroad Construction.* Du Platt—Taylor, F. M.—*Docks, Wharves and Piers.* Etcheverry—*Irrigation Practice and Engineering.*
8.73	Soil Mechanics ...	Taylor, D. W.—*Fundamentals of Soil Mechanics.* *OR* Terzaghi and Peck—*Soil Mechanics in Engineering Practice.* **Reference.** Reynolds and Protopapadakis—*Practical Problems in Soil Mechanics.* Terzaghi—*Theoretical Soil Mechanics.*

MATHEMATICS—10.00 to 10.94.

10.11 10.11A 10.11B	Mathematics ...	Middlemiss—*Differential and Integral Calculus.* Middlemiss—*Analytic Geometry.* **Reference.** Courant—*Differential and Integral Calculus.* Siddons and Hughes—*Trigonometry,* (Parts 2, 3 and 4).

	SUBJECT.	TEXT BOOK.
		MATHEMATICS—10.00 to 10.94—(*continued*)
10.12	Mathematics ...	Carslaw and Jaeger—*Operational Methods in Applied Mathematics.* Rutherford—*Vector Methods.* **Reference.** Middlemiss—*Analytic Geometry.* Sokolnikoff, I. S. and E. S.—*Higher Mathematics for Engineers and Physicists.*
10.33	Mathematics ...	Carslaw and Jaeger—*Operational Methods in Applied Mathematics.* Jeans—*Mathematical Theory of Electricity and Magnetism.* **Reference.** Stratton—*Electromagnetic Theory.*
10.43	Mathematics ...	Sokolnikoff, I. S. and E. S.—*Higher Mathematics for Engineers and Physicists.*
		ARCHITECTURE—11.00 to 11.95.
11.41	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.*
11.42	History of Architecture.	Same as for 11.41—History of Architecture.
11.43	History of Architecture.	Same as for 11.41, 11.42—History of Architecture.
11.51	Introduction to Architectural and Building Science.	Geeson—*Building Science* (Vol. 1). 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	Building Construction	*Local Government Ordinance, No.* 71. *Sydney Corporation Act, By-Laws* 51 *to* 58 *inclusive.* Mitchell, G. A.—*Building Construction—Elementary Course.* Mitchell, G. A.—*Building Construction—Advanced Course.*

ARCHITECTURE—11.00 to 10.95. (*continued.*)

	Subject.	Text Book.
11.71	Building Construction—*continued.*	**Reference.** McKay, W. B.—*Building Construction* (Vols. 1, 2 and 3). Mackey, G. F.—*Gregory's Modern Building Practice in Australia.* Sharp, W.—*Ausrtalian Methods of Building Construction.* Fitzmaurice, R.—*Principles of Modern Building* Vol. 1.
11.72	Building Construction	Same as for 11.71—Building Construction.
11.82	Theory of Architecture.	Robertson, Howard—*Principles of Architectural Composition.*
11.83	Theory of Architecture.	Same as for 11.82—Theory of Architecture.

HUMANITIES—G1 to G99.

	Subject.	Text Book.
G1	Scientific Method ...	Cohen and Nagel—*An Introduction to Logic and Scientific Method.* *OR* Latta and Macbeath—*The Elements of Logic.* **Reference.** Larrabee—*Reliable Knowledge.* Passmore—*Talking Things Over.* Stebbings—*Thinking to Some Purpose.* Thouless—*Straight and Crooked Thinking.* Mill, J. S.—*A System of Logic.*
G2	History of Science and Technology.	There is no prescribed text book, but students are recommended to obtain *one* of the following:— Anthony, H. D.—*Science and Its Background.* Dampier, Sir W.—*A Shorter History of Science.* Taylor, Sherwood—*Science Past and Present.*
G3	Contemporary Civilization.	Roll, Erick—*The History of Economic Thought.*
G10	Language and Literature.	Wells, H. G.—*The History of Mr. Polly.* Butler, S.—*The Way of All Flesh.* Shaw, G. B.—*Plays Pleasant.* Galsworthy, J.—*Strife.* Wrenn, C. L.—*The English Language.*
G11	Language and Literature.	Shakespeare—*Hamlet* (any Edition). Steinbeck—*Of Mice and Men* (Penguin). Conrad—*Lord Jim* (Penguin). Hadfield—*Modern Short Stories* (No. 954, Everyman's Library).
G12	Language and Literature.	Koestler—*Darkness at Noon* (Penguin). Turgenev—*Fathers and Sons* (In some translations *Fathers and Children*) (Modern Library or Everyman). Wells—*Tono Bungay* (Penguin). Ibsen—*The Doll's House* (No. 494, Everyman's Library).

HUMANITIES—G1 to G99 (*continued*)

	SUBJECT.	TEXT BOOK.
G13	Language and Literature.	*Poems of Wilfred Owen* (Phoenix Library). Cary, J.—*The Horse's Mouth* (Penguin). Greene, G.—*Brighton Rock.* Another two texts to be prescribed have not yet been selected. Students will be advised about them at the opening of the 1951 Session.
G20	Human Relations ...	Blackburn, J.—*Psychology and the Social Pattern.* **Reference.** Cattell, R. B.—*Your Mind and Mine.* Munn, N. L.—*Psychology.*
G21	Human Relations ...	Krech and Crutchfield—*Theory and Problems of Social Psychology.* **Reference.** Newcomb, Harley and Others—*Readings in Social* Psychology. Sherif, M.—*An Outline of Social Psychology.* Whyte, F.—*Industry and Society.*
G22	Human Relations ...	Maier, W.—*Psychology in Industry.* **Reference.** Ghiselli and Brown—*Personnel and Industrial Psychology.* Mayo, E.—*Social Problems of an Industrial Civilisation.* Pigors, McKenney and Armstrong—*Social Problems in Labour Relations.* Roethlisberger and Dickson—*Management and the Worker.* Whitehead, T. N.—*The Industrial Worker.* Whitehead, T. N.—*Leadership in a Free Society.* Whyte, F.—*Industry and Society.* Great Britain Industrial Health Research Board—All available Reports.

Note.—Text books for subjects not listed will be recommended by the Lecturers in those subjects.

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