UTS

UNIVERSITY
OF TECHNOLOGY
SYDNEY

SCHOOL OF

Biological and Biomedical Sciences

HANDBOOK 1990

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School of

Biological and Biomedical Sciences

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OF TECHNOLOGY
SYDNEY

University of Technology, Sydney
School of Biological and Biomedical Sciences
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Telephone (02) 436-6222
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INTRODUCTION TO THE SCHOOL

The School of Biological and Biomedical Sciences has, since its inception in 1970, built up a proud record in teaching, research and consultancy. Located at the North Shore Campus of the University of Technology, Sydney, the School offers four undergraduate degrees:

- Biomedical Science
- Biotechnology
- Environmental Biology
- Urban Horticulture

Three Masters Degrees by Course Work are also offered:

- Clinical Biochemistry
- Clinical Measurement
- Environmental Toxicology

In addition, the following research degrees are available:

- Honours
- Masters
- Doctor of Philosophy

Most programs are available on a full-time and part-time basis or a combination of both these attendance patterns.

While the University of Technology, Sydney maintains traditional university standards of scholarly excellence in the granting of its awards, it is continually seeking to instruct students in new and innovatory areas in keeping with the needs of our highly technological society.

The School of Biological and Biomedical Sciences has a strong record of research and development, essential to the strength of both undergraduate and postgraduate programs. The School has been funded by the following bodies for research work:

National Health and Medical Research Council;
Australian Research Grants Committee;
American Muscular Dystrophy Foundation;
Australian Muscular Dystrophy Foundation;
State Pollution Control Commission;
Department of Science and the Environment;
Australian Water Resources Council;
Ramaciotti Foundations;
Private Donations;
UTS Research Grants.

RESEARCH UNITS WITHIN THE SCHOOL

NEUROBIOLOGY UNIT

The Neurobiology Unit was established in 1973 within the Department of Biochemistry and Physiology. The unit carries out applied and basic research into the nervous system and the effect of emotional states on the immune system and cancer recurrence. It also trains postgraduate research students. The unit is funded through donations by the community and business sectors.

IMMUNOBIOLOGY UNIT

The Immunobiology Unit was established in 1989 as a multidisciplinary laboratory undertaking research into basic and applied aspects of the immune system.
The activities of the Unit are funded almost entirely by external competitive research grants such as those awarded by NHMRC, ARC and various private foundations.

COLLABORATIVE RESEARCH UNITS

CENTRE FOR ENVIRONMENTAL TOXICOLOGY

The State Pollution Control Commission (SPCC) in conjunction with the University of Technology, Sydney, has set up a Centre for Environmental Toxicology in the School of Biological and Biomedical Sciences. The centre has facilities for toxicological testing and chemical analysis. It carries out applied research in the area of environmental toxicology and develops toxicological tests and monitoring procedures for the Australian environment. It also provides a research centre for students, visiting scientists and a toxicological testing service for industry. Staff of the Centre are involved in teaching aspects of the Masters in Environmental Toxicology program.

GORE HILL RESEARCH LABORATORIES

Gore Hill Research Laboratories, which includes an animal house, greenhouse, plant tissue culture laboratory, and an electron microscope unit, is situated in the grounds of the Royal North Shore Hospital. The building is a joint venture between the Hospital and the UTS and is used by both institutions.

Animals are used by the hospital for diagnostic and surgical investigations and by the School for teaching and research work.

The Department of Applied Biology uses the glasshouse area in conjunction with the new glasshouse in the Dunbar Building for growing plants in controlled environments and for various experiments in plant biology. The general plant biotechnology and tissue culture laboratories are used extensively by Environmental Biology and Urban Horticulture students.

There is an electron microscope facility which is jointly operated by the Royal North Shore Hospital and UTS. The transmission electron microscope and scanning electron microscope are used for teaching, diagnostic medical work and research.

COURSE ADVISORY COMMITTEE

The Course Advisory Committee is comprised of representatives from public instrumentalities and private industry related to the courses offered by the School of Biological and Biomedical Sciences. Its contribution to the School is in areas of curriculum development, forward planning at both undergraduate and postgraduate levels and support for the work of the School in general.

Ex Officio Members

Head, School of Biological and Biomedical Sciences (Chairman)
Dean, Faculty of Life Sciences
Head, Department of Applied Biology
Head, Department of Biochemistry and Physiology
Head, Department of Cellular Pathology
Head, Department of Microbiology
Head, Immunobiology Unit

Members

Dr V P Ackerman
Head, Department of Microbiology
Royal North Shore Hospital
Institute

Mr D Blaxell
Assistant Director
Living Collection Division
Royal Botanic Gardens

Dr J H B Christian
Chief of Division
Division of Food Research, CSIRO
Authorities, Australia

Dr A Cunningham
Chief Virologist
ICPR Department Water Resources
Westmead Hospital

Professor E Finckh
Prev. Director
ICPMR
Westmead Hospital

Dr J P Isbister
Head, Department of Haematology
Royal North Shore Hospital
Royal Prince Alfred Hospital

Dr P Kable
Principal Research Scientist
Biological & Chemical Research

Dr M Meerkin
Pathologist
Macquarie Pathology Services

Dr R D Rothfield
Pathologist
National Association of Testing

Mr I Smalls
Principal Scientist

Dr G B Thompson
Manager, Ecotoxicology &
Director, CET
State Pollution Control Commission

Dr P Vincent
Director
The Kanematsu Laboratories

INTERNAL COMMITTEES

The following committees exist within the School. For the smaller committees the Chairman's name only has been listed.

1. School Assembly
   Chairman: Associate Professor M D Burchett
   All members of academic staff
   All members of non-academic staff
   All members of the student body

   A meeting of the School Assembly is held each semester. Students have the opportunity to present items for the agenda and to discuss matters which affect them.

2. School Board
   Chairman: Associate Professor M D Burchett
   Members: All members of academic staff and Technical Manager

3. School Management Committee
   Chairman: Associate Professor M D Burchett

4. Library Committee
   Chairman: Dr R T Buckney

5. Safety Committee
   Chairman: Dr J I M Stevenson

6. Seminars Committee
   Chairman: Dr A Piper

7. Glasshouse Committee
   Chairman: Dr R Buckney

8. Senior Technical Staff Committee
   Chairman: Mr D Edwards

9. Higher Degree Committee
   Chairman: Associate Professor R O'Grady

10. Computer Committee
    Chairman: Dr L F Holley

11. Research Committee
    Chairman: Professor R. Raison

12. Publicity Committee
    Chairman: Associate Professor M D Burchett

Head of School
M D Burchett, BSc PhD(Syd) DipEd(UNE) MAIH
Teaching: General and Environmental Biology, Botany
Research: Coastal Vegetation and the impact of pollution; effects of hazardous chemicals on native plants.

Deputy Head of School
A G Dawson, BSc PhD(Sheff) DipTer Ed(UNE)

Administrative Officer
B Dunston BA (Education) (UNE) FGAA

Technical Manager
D Edwards, E&C Cert

DEPARTMENT OF APPLIED BIOLOGY

Head of Department and Senior Lecturer
R T Buckney, BSc PhD(Tas)
Teaching: Environmental Biology
Research: Wetlands, plant ecology and toxicology.

Associate Professor
J F Skidmore, BSc(McGill) MSc(West Ont) PhD(ANU) FZS MIBiol
Teaching: Environmental Biology
Research: Fish Toxicology.

Senior Lecturers
K R Brown, BSc PhD(NSW)
Teaching: General Biology and Environmental Biology.
Research: Competitive and evolutionary relationships of blowflies; oil and dispersant pollution of oysters. Ecology of urban polluted waterways.

C J Clarke, BSc PhD(Syd)
Teaching: Human Biology and Environmental Biology
Research: Intertidal animal communities.

L F De Filippis, BSc PhD(La Trobe) MAIH
Teaching: Horticulture, Botany and Plant genetics
Research: Protoplast rubridization, tissue culture and nursery propagation of ornamentals.

L F Holley, BAppSc(DDIAE) MAppSc(QIT) PhD (Macq)
Teaching: Clinical Measurement; Biological Modelling and Instrumentation.
Research: Biological instrumentation and clinical measurement.

Lecturers

K A Johnson, MScAgr(Acad.Krakow)

Teaching: Horticulture, Tissue Culture and Botany.

Research: *In vitro* propagation of Australian native plants, transplanting and CO_2 application.

R Lim, BSc(Hons) MSc(Mal) PhD(Waterloo)

Teaching: Environmental Biology and Toxicology.

Research: Aquatic ecology and management, Zooplankton taxonomy.

D A Morrison, BSc PhD(Syd)

Teaching: Environmental Biology and Physical Biology

Research: Plant ecology and taxonomy.

J Tarran, BSc(Hons) Dip Ed PhD(UNSW)

Teaching: Horticulture, Landscape Studies, Botany and Biology

Research: Plants in open space areas, plant pathology.

Senior Tutors

A Pulkownik, BSc MSc(Syd)

Teaching: General Biology and Environmental Biology

Research: Coastal ecosystems and the impact of pollution; effects of hazardous chemicals on native plants.

J Renwick, BAppSc(Biomed.Sc) (NSWIT)

Teaching: Physical Biology

Research: Measurement of blood pressure and assessment of the vascular system.

Senior Technical Officers

G Goldsack, AAIMLS

N Richardson, AAIMLS

DEPARTMENT OF BIOCHEMISTRY AND PHYSIOLOGY

Head of Department and Associate Professor

A G Dawson, BSc PhD(Sheff) DipTertEd(UNE)

Teaching: Metabolism and Enzymology

Research: Ethanol metabolism and the antimetabolic action of drugs.

Senior Lecturers

A D Kidman, BSc(Syd) MSc(NSW) PhD(Hawaii)

Teaching: Metabolism and Endocrinology

Research: Biochemistry of neuromuscular disease.

P F Miller, BSc MSc PhD(Man) FRES DipTertEd(UNE)

Teaching: Bioscience and Toxicology

Research: Effectiveness of pesticides.

Senior Lecturers

R L Orwell, BSc PhD(NSW) MABS
Teaching: General and Analytical Biochemistry
Research: Biochemical diagnostic methods.

J C Swann, BSc PhD(Adel)
Teaching: Analytical Biochemistry
Research: Biochemistry of connective tissues.

D R Williams, MSc(NSW) ASTC DipMT FAIMLS
Teaching: Clinical Biochemistry
Research: Vitamin assays.

Lecturers

A M George, BSc MSc PhD(Syd)
Teaching: General Biochemistry and Molecular Biology
Research: Molecular biology of drug resistance.

B M Harrison, BSc PhD(Lond)
Teaching: Bioscience
Research: Myelination of nervous systems.

G Nicholson, BSc PhD(Syd)
Teaching: Bioscience and Toxicology
Research: Electrophysiological investigations of animal venoms and toxins.

A Piper, BSc(Hons)(Monash) DPhil(Oxford)
Teaching: Bioscience and Toxicology
Research: Molecular Biology. Marsupial X-chromosome inactivation.

Senior Tutor

L F Chew, BSc(Hons) MSc(NSW)
Teaching: General Biochemistry
Research: Biochemistry of neuromuscular disease.

Scientific Officer

D Campbell, BSc(NSW)

Senior Technical Officer

B Peters, BAppSc(App.Biol)(NSWIT)

DEPARTMENT OF CELLULAR PATHOLOGY

Head of Department and Associate Professor

R L O'Grady, BSc BDS(Hons) PhD(Syd) MASEP
Teaching: Pathology
Research: Neutral proteinases and inhibitors in biology and pathology.

Head of Immunobiology Unit and Professor

R L Raison, BSc (Syd) MSc (Syd) PhD (Monash)

Teaching: Immunology

Research: Evolution of immune system; Immunotoxins; B cell development; genetic manipulation of immunoglobulins

Lecturers

K W Broady, BSc PhD(UNSW) MASM

Teaching: Immunology and Pathobiology

Research: Activated macrophage interaction with tumour cells.

T Sztynda, BSc(Hons) MSc PhD(Melb) MASEP

Teaching: Pathobiology, Immunology, Tissue Culture

Research: Factors influencing malignant tumour spread and metastasis, and endothelial growth in rheumatoid arthritis.

Senior Tutor

N B Woodland, BSc(UNE)

Teaching: Blood Bank, Haematology, Immunology

Research: Study of cell surface markers in lymphoid malignancies.

Scientific Officers

K Cordatos, BSc(GenSc)(Syd) DipEd(Syd) CFIAC AAIMLS CT(ASC) MEd(UNE)

Teaching: Pathobiology, Diagnostic Cytology, Haematology, Immunology.

Research: Immunology to chemistry of colonic adenocarcinomas in human ascites.

DEPARTMENT OF MICROBIOLOGY

Professor and Head of Department - Vacant

Acting Head of Department (Autumn Semester)

J I M Stevenson, BSc(Birm) PhD(Edin) MASM

Teaching: Microbial Physiology, Genetics & General Microscope

Research: Genetics of streptomyces and electron microscopy.

Acting Head of Department (Spring Semester)

L F Gibson, BSc(Edin) PhD(Melb) MASM MAIBiol

Teaching: Clinical Bacteriology and Parasitology

Research: The application of computerised pyrolysis-GLC methods for the rapid identification of microbial species.

Lecturer

B J Bloomfield, ASTC BSc(NSW) MSc(Syd) PhD(Rutgers)

Teaching: General and Food Microbiology.

Research: Microbial degradation of oils and industrial pollutants and microbial production of alternate fuels.

Senior Tutor

B J MacDonald, BSc(BCol) MA(Macq) MEdAdmin(NSW) MASM

Teaching: General Immunology, Mycology and Bacteriology

Research: Epidemiological study of student performance and progression in relation to formal and informal selection criteria.

Chief Medical Technologist

J Phillips, BSc(NSW) MASM

HONORARY VISITING PROFESSORS

V P Ackerman, BA MB BS(Syd) PhD(ANU) FRCPA MASM
Head, Dept of Microbiology
Royal North Shore Hospital

J Isbister, BSc (Med) (Hons) UNSW MB BS Hons UNSW FRACP FRCPA
Head, Dept of Haematology
Royal North Shore Hospital

P Kable , BSc Agr (Syd) MSc Agr (Syd) PhD (Cornell)
Principal Research Scientist
Biological and Chemical Research Institute
Dept of Agriculture and Fisheries

M Meerkin, BSc (Melb) MB BS (Monash) FRCPA FAACB FACB
Pathologist
Macquarie Pathology Services

HONORARY VISITING ASSOCIATE PROFESSORS

D Ma MB BS (Hons) (UNSW) MD (UNSW) FRACP FRCPA
Dept of Haematology,
Royal North Shore Hospital

G Thompson, BA (Hons) (Oxon) MSc (Wales) PhD (Wales) MAIBiol
Director, Center for Environmental Toxicology

HONORARY VISITING LECTURERS

J Chapman, B Sc (Hons) (UNSW) PhD (Syd) Dip Env Stud (Macq)
Manager, Centre for Environmental Toxicology

G. Grohman, B Sc (Hons) (UNSW) PhD (Syd)
Snr Virologist
ICPMR
Westmead Hospital

D Groot Obbink, B Sc (Melb) M Sc (W Ontario) PhD (Brit Columbia)
Dept of Microbiology
Royal North Shore Hospital

B. Munro, Dip MT AIMLT FAIMLS
Professional Officer
University of Sydney

K. Robinson, BSc (Hons) (Witwatersrand) PhD (Witwatersrand)
Experimental Pathologist

L Thomas, B App Sc (Melb) M App Sc (Melb)
Director of Biomedical Engineering
Royal North Shore Hospital

STAFF OF THE CENTRE FOR ENVIRONMENTAL TOXICOLOGY

DIRECTOR:
G Thompson, BA (Oxon) MSc (Wales) PhD (Wales) MAIBiol

J Chapman, BSc (Hons) (UNSW) PhD (Syd) Dip Env Stud (Macq)
M Julli, B App Sc (NSWIT)
T Manning, BSc (Hons) (Syd)
R Sunderam, BSc (Hons) (Sri Lanka)
D Heinke, Dip Elect Eng (Yallourn) BE (Elect) (Melb)

GENERAL UNDERGRADUATE INFORMATON

ADMISSION REQUIREMENTS

Applicants are considered for admission in accordance with the Rules and By-Laws of the UTS as set out in the Calendar, on the basis of meeting the general requirements in one of the following categories:

- The N.S.W. Higher School Certificate
- An appropriate T.A.F.E. Certificate
- An appropriate Associate Diploma
- Equivalent Qualifications
- Adult Entrance (see UTS Calendar for details)
- Accumulated Matriculation (see UTS Calendar for special circumstances)

ASSUMED KNOWLEDGE / COURSE PREREQUISITES

There are no mandatory pre-requisite subjects from the Higher School Certificate; all Science subjects taught in the first semester assume no H.S.C. knowledge of the subject. However, it is assumed that all students entering the course will have studied at least 2 Unit Mathematics plus one 2 Unit Science course. You will be very well prepared if you have done 2 Unit Maths plus 4 Units of Science. Common combinations include Chemistry/Physics, Chemistry/Biology, or Multistrand with Biology. Over the last few years the minimum weighted H.S.C. aggregate needed for entry to Biotechnology, Environmental Biology and Urban Horticulture, has been 280-300, and for Biomedical Science 325-335, but these alter from year to year.

WHERE TO GET MORE INFORMATION

Information relating to Higher Education Contribution Scheme [HECS], Austudy, 1990 UTS calendar, library services and academic progression etc., is available in this Handbook. If you are having trouble finding the section you want, consult the index at the back. For further information:

General enquiries at the North Shore Campus should be directed to the Enquiry Office, ground floor.

SCHOOL OF BIOLOGICAL AND BIOMEDICAL SCIENCES
University of Technology, Sydney
Westbourne Street
GORE HILL NSW 2065
Phone: (02) 436 6222 Fax: (02) 906 6045

Advice on academic matters or administrative procedures :
Contact the Administrative Officer, at the above address.
or The Central Information Centre, Broadway Campus ,
The University of Technology, Sydney
Postal: PO Box 123, Broadway 2007
Phone: (02) 20930

COURSE STRUCTURE

The School offers four undergraduate degree programs, in **Biomedical Science, Biotechnology, Environmental Biology** and **Urban Horticulture**.

Our degree programs are organised into 'Stages'. Each Stage represents a full -time study load for one semester. Thus for full-time students subjects for Stages 1, 3 and 5 run in the Autumn Semester, while subjects for Stages 2, 4 and 6 run in Spring Semester.

Full-time and part-time programs for Stages 1 and 2 are the same in each of the first three degree programs mentioned above, while Urban Horticulture students do not share all first year subjects in common with the other degrees. Most subjects in Stages 1 and 2 are offered in both semesters. Repeat subjects are not offered unless student numbers warrant it. This means that:

STUDENTS WHO HAVE FAILED SUBJECTS CANNOT BE GUARANTEED A COMPLETE PROGRAM OR 'NORMAL PROGRESSION'

Students having difficulty devising a program, should consult the Administrative Officer, or an academic adviser. Where a student experiences legitimate difficulty enrolling in sufficient subject hours to make up a full-time load (see 1. b, below), a minimum of 75% of a normal full-time program is deemed adequate to maintain designation as a full -time student provided the whole degree is completed within 150% of the normal progression period, ie a 3 year full -time degree should be completed in or under, 4.5 years..

Similarly, there is no minimum number of subject hours for a part-time program for any one semester, but the whole degree should be completed within 150% of the normal progression period, ie a 6 year part -time degree should be completed in or under, 9 years.

REQUIREMENTS FOR AWARD OF THE DEGREE

A Degree will be awarded to students satisfactorily completing the following requirements:

HOURS

1. (a) A minimum of 135 semester hours class work, accumulated by:

   (b) Full-time attendance in bachelor's degree courses involving attendance at the University for 24 hours per week for the first four stages of the course, 21 hours for the fifth stage and 18 hours per week for the last stage of the course:

OR

   (c) Part-time attendance in bachelor's degree courses involving attendance at the University for 12 hours per week for the first four and a half stages of the course and 9 hours for the last one and a half stages of the course:

OR

   (d) Any other approved combination of full-time and part-time attendance.

PROFESSIONAL / WORK EXPERIENCE

2. Full-time students in Biomedical Science, Biotechnology or Environmental Biology who desire to complete a period of industrial experience during their degree program may either insert a sandwich year of full-time employment between Stages 4 and 5 or may complete Stages 5 and 6 on a part-time basis. Students are required to inform the University officially if they intend not to appear for formal courses during a sandwich year, by enrolling for the subject 91997 Professional Experience.

3. Part-time students who are employed on a full-time basis in an area relevant to their course should enrol in the subject 91999 - Professional Experience in every semester for which they are employed.

4. DOUBLE MAJORS IN BIOMEDICAL SCIENCE

It is possible for Biomedical Science students to complete two major strands of subjects in the degree programs. This entails undertaking an additional 15 semester hours. (Double major programs approved prior to 1986 required a minimum additional 12 semester hours only, although most students completed at least an additional 15 semester hours).

The following double major combinations are available:

Biochemistry / Microbiology
Microbiology / Cellular Pathology
Cellular Pathology / Biochemistry

In order to be credited with a double major students must:

(a) apply to the School for approval to complete a double major and obtain an approved program,

(b) complete all mandatory and elective subjects of a single major totalling 135 semester hours,

(c) complete all remaining mandatory subjects and/or extra elective subject(s) totalling 15 semester hours minimum under the second major. A minimum total of 150 semester hours is required to be eligible for graduation with a double major,

(d) students must complete all subjects before applying for graduation. The double major must be indicated on the application for award. The names of both completed majors will appear at the bottom of their academic record.

SPECIAL REQUIREMENTS - URBAN HORTICULTURE DEGREE

5. (a) Students of Urban Horticulture must, in addition to hours requirements detailed in 1., complete 48 weeks or equivalent of relevant work experience and present a record book of that experience. The recommended patterns for completion of the degree are two years full-time, followed by two years part-time study, or wholly by part-time attendance; with accompanying work experience being recorded after the first year of the course. Students can, however, elect to take a sandwich year of employment before the final two stages of coursework. Note that, because of the recommended attendance patterns a full-time third year program cannot be guaranteed.

   (b) Urban Horticulture students can become eligible for consideration for the award of the degree with honours by completing a minimum of 144 semester hours, including an Advanced Horticultural project of nine semester hours. This project is not compulsory for students seeking a pass award only.

   (c) Students entering with an Associate Diploma in horticulture, or equivalent, qualify for two part-time years of advanced standing, and may therefore complete their degree in four years of part-time study, or first year part-time, second year full-time and third year part-time study.

   (d) Students entering with a Technical Certificate in horticulture are exempted from the subjects Horticultural Procedures 1 and 2 (total 12 semester hours).

BEQUESTS AND PRIZES

AUSTRALIAN INSTITUTE OF MEDICAL LABORATORY SCIENTISTS' PRIZE IN HAEMATOLOGY
Offered annually to the student who obtains the highest mark in Hematology. The prize consists of a cash award and a bronze medallion.

AUSTRALIAN INSTITUTE OF MEDICAL LABORATORY SCIENTISTS' PRIZE IN CLINICAL BACTERIOLOGY AND PARASITOLOGY
Offered annually to the student who obtains the highest mark in Clinical Bacteriology and Parasitology. The prize consists of a cash award and a bronze medallion.

COLIN FIELD PRIZE
Established by Dr. Colin Field, former Head of School of Biological and Biomedical Sciences. Awarded annually to the Biomedical Science, Environmental Biology or Biotechnology student who achieves the highest overall weighted average mark from all subjects undertaken in stages 1 and 2 and with an average of Credit or better for the biology subjects. The prize consists of a cash award and a certificate.

DR DAVID SUGERMAN PRIZE IN PATHOLOGY
Awarded annually to the student who achieves the highest aggregate mark, of Credit or better, in Pathobiology 1 and 2. The prize consists of a cash award.

ENVIRONMENTAL BIOLOGY PRIZE
Awarded annually to the student enrolled in Environmental Biology who obtains the highest aggregate mark in the subjects Plant Ecophysiology, Animal Ecophysiology, Acquatic Ecology, Terrestrial Ecology, Pest Control and Toxicology and Applied Ecology. The prize consists of a cash award.

LEONARD J. LAWLER PRIZE
Presented by the Australian Institute of Medical Technologists in dedication to the past services of Mr. L.J. Lawler to the NSW Branch of the AIMT and his great interest in the education of clinical chemists. Awarded annually to the student who obtains the best aggregate in the subjects Clinical Biochemistry 1 and 2. The prize consists of a cash award and a bronze medallion.

MACQUARIE PATHOLOGY SERVICES PRIZE IN BIOMEDICAL SCIENCE
Awarded annually to the student who obtains the highest weighted average mark in Stages 3 to 6 of the degree course leading to the award of BAppSc - Biomedical Science. The prize consists of a cash award and a medal.

M.Y. ALI PRIZE IN DIAGNOSTIC CYTOLOGY
Established by Dr. M.Y. Ali, former Head of Department of Cellular Pathology. Awarded annually to the student who achieves the highest aggregate mark, of Credit or better, in the Diagnostic Cytology subjects. The prize consists of a cash award.

ADMINISTRATIVE MATTERS

FEES

Students are required to pay the following compulsory fees:-

	New Students	Re enrolling/continuing Students
Student's Association Fee	37.00	37.00
University Union Fees		
• entrance fee (non-refundable; not applicable to former UTS/NSWIT students)	15.00	
• general fee	100.00	100.00
Student Identification Card Fee	3.00	-
Total	$ 155.00	$137.00

Students are required to pay these fees before enrolment.

IDENTIFICATION CARD

An Identification (ID) Card showing Student's number and photograph will be issued to new students during enrolment. Carry this with you at all times as such identification is required for the use of computer and library facilities and for admission to formal examinations. A lost card will be replaced on payment of a fee of $5. Contact the Student Information Office, Broadway.

HIGHER EDUCATION CONTRIBUTION SCHEME [HECS]

Most undergraduate students are required to pay the Federal Higher Education Contribution. HECS is calculated according to the subjects in which you enrol. There are two modes for payment , "Upfront" and "Deferred".

HECS PAYMENT OPTIONS

Upfront payment

This means payment of the HECS liability, in advance and in full, for those subjects you are enrolled in for the current semester. Charge notices will be posted to you. by UTS.

Deferred payment

Refers to payment of the HECS liability through taxation on wages earned following completion of your studies. UTS will send all students a 'Liability Notice' advising their HECS liability.

DATES TO REMEMBER!

As HECS liability is calculated on a 'per subject enrolled in' basis, it is very important for you to let the Administrative Officer at Gore Hill campus or Central Information Service at Broadway campus, know if you decide to vary your subject program after enrolment.

AUTUMN SEMESTER 1990

Requests for Change of Program	Must be received by
• Exemption from a subject	March 9
• Addition of subject	March 9
• Transfer of course	March 9
• Deletion of subject	March 30
• Withdrawal from course	March 30
• Approval for Leave of Absence	March 30

Requests for Change of Payment option	Must be received by
• Change of HECS payment option	March 30

SPRING SEMESTER 1990

Requests for Change of Program	Must be received by
• Exemption from a subject	August 9
• Addition of subject	August 9
• Transfer of course	August 9
• Deletion of subject	August 30
• Withdrawal from course	August 30
• Approval for Leave of Absence	August 30

Requests for Change of Payment option	Must be received by
• Change of HECS payment option	August 30

NOTE: Forms for all the above changes to academic program are available from the Administrative Officer.

CHANGING YOUR ACADEMIC PROGRAM

LATE ENTRY TO SUBJECTS

For coursework subjects, students will be accepted for entry to classes until the end of the third week of semester under the special circumstances specified in Rule 2.15.1 of the University Rules. It is, however, entirely the student's responsibility to catch up on work already covered. The assessment caveat that students are required to attend at least 80 per cent of practical classes covers only the time from when the student commenced, as no special classes will be offered.

The UTS Student Administrative Unit is responsible for administering the Rules which relate specifically to the student body. These rules are set out in the University of Technology, Sydney Calendar for each year. Enquiries regarding any of these matters may be directed to the Student Information Office, Level 3A, the Tower Building.

Remember it is the YOUR responsibility to monitor your own academic program.

To add subject/s after enrolment day

To vary your program by adding subject/s to those in which you have already enrolled, you must complete an Autumn or Spring 'Variation Form', available from the Administrative Officer, or the Ground Floor Enquiry Counter, at Gore Hill and the Student Information Office, at Broadway Campus. You must submit this form to the Administrative Officer at Gore Hill or direct to the Registrar by March 9 in Autumn Semester and August 9 in Spring Semester ,1990.

To delete subject/s after enrolment day

To vary your program by deleting subject/s from those in which you have enrolled, you must complete an Autumn or Spring 'Variation Form', available from the Administrative Officer, or the Ground Floor Enquiry Counter, at Gore Hill campus and the Student Information Office, at Broadway Campus. You must submit this form to the Administrative Officer or direct to the Registrar by March 30 in Autumn Semester and August 30 in Spring Semester. 1990.

HOW TO MONITOR YOU ACADEMIC PROGRAM

Variations to your academic program will be acknowledged via computer printouts of complete lists of students' academic programs. These are displayed in the foyer at Gore Hill campus and are updated as frequently as possible. These lists should be checked regularly and particular attention should be paid to the date on which they have been produced. It is your responsibility to monitor your own academic program. Should a variation/change be necessary please proceed as described above to delete/add subjects.

ACADEMIC PROGRESSION

Each student is assessed and allocated a progression status of either satisfactory or normal progression or unsatisfactory progress. In the assessment of a student's progress in any UTS course, account may be taken of work completed in the laboratory and in class exercise tests, or assignments given throughout each semester, as well as results obtained at formal examinations.

A student's performance in an assessment period (one or two semesters as indicated below) is measured in terms of a Weighted Average Mark (WAM).

WAM is calculated as follows: $WAM = \frac{\Sigma(WF \times Mark)}{WF}$

where WF is the subject weighting factor which is usually the number of class hours required in a subject per semester and Mark is the subject assessment (%).

The Assessment period in this School is over one semester for full-time students and over two semesters for part-time students.

PROBATION

Students may be placed on probation if during an assessment period:

- their WAM is less than 45%;
- they fail all subjects in which they are enrolled;
- a subject is failed for the second time (regardless of their WAM).

Students placed on probation will continue on probation if:-

- their WAM at the end of the next assessment period is less than 50%;
- a subject is failed for a second time while on probation.

EXCLUSION

Exclusion from a course may occur if:-

- a student placed on probation does not obtain a WAM greater than 40% on his/her next assessment period;
- a student on probation for two consecutive assessment periods has a WAM for the second assessment period on probation of less than 50%;
- a student fails a subject for the third time (regardless of their WAM).

NOTE: A student may appeal against exclusion if clearly relevant, accredited evidence can be produced.

Notwithstanding any of the above, a student may be placed on probation or continuing probation or be excluded for generally unsatisfactory academic performance.

CHANGES OF NAME, ADDRESS, EMPLOYMENT

Keep your student record up to date by notifying changes in address, employment details and name changes, etc., by completing a 'Change Form'.These forms are available from the Administrative Officer, or the Ground Floor Enquiry Counter, at Gore Hill and the Student Information Office, at Broadway Campus.

It is in your best interest to ensure the University is informed of changes in your personal particulars, as :

- The UTS does not accept responsibility if official mail does not reach you due to a failure to notify a change of address.
- Academic and administrative staff need to make contact with students from time to time to advise on various matters. Please make sure we can reach you.

EXAMINATION TIMETABLES

Provisional and final examination timetables are displayed on the School's notice boards.

It is the your responsibility to notify the Registrar if a clash of times occurs in your examination program.

Forms are available for this purpose and are available from he Administrative Officer, or the Ground Floor Enquiry Counter, at Gore Hill and the Student Information Office, at Broadway Campus.

INABILITY TO ATTEND EXAMINATION

If, due to illness or misadventure, you are unable to attend an examination, you are required to advise the appropriate member of University staff immediately. In the case of informal and practical examinations, this would be a member of academic staff responsible for that subject. In the case of a formal examination, the Administrative Officer (436 6222) or a staff member from Exams Branch at Broadway Campus (20930). In the case of ill health, it is essential for you to obtain a medical certificate for the date of the missed examination, which also indicates the date from which you will be fit to undertake a supplementary examination. This medical certificate must be supplied immediately to the Administrative Officer.

OTHER RULES PPLICABLE TO STUDENTS

Details of rules applicable to all students are contained in the Calendar which may be purchased from the University Co-operative Bookshop in the Tower Building. Copies of the Calendar are also available for viewing in the Libraries, and from the Administrative Officer.

BIOMEDICAL SCIENCE DEGREE COURSE

The Biomedical Science Degree offered by the School of Biological and Biomedical Sciences consists of an initial program of biology, chemistry, physics, mathematics, statistics and computing followed by microbiology, biochemistry, pathology and bioinstrumentation. Students then select a major strand to follow for the remainder of the course, either Biochemistry, Microbiology or Cellular Pathology, the students undertake a number of electives which introduce them to important areas of biomedical science.

The undergraduate training provides a solid background in the physical sciences and emphasizes practical experimentation. In the final stages of the course, research activities are encouraged through project assignments. Students acquire familiarity with advanced instruments and technology. They are encouraged to participate in seminar activities. The purpose of the course is to educate people in a number of interface areas between modern technology, biology and medicine.

Employment Opportunities

A wide range of employment opportunities is available to graduates. Biomedical scientists work closely with clinical pathologists, surgeons and other medical specialists in the control and elimination of disease. There is a growing demand for Biomedical Scientists in the Commonwealth and State Health Departments, the Repatriation Department, CSIRO, Universities, pharmaceutical firms, veterinary laboratories and private pathology laboratories.

Course Structure

You can complete the degree in three years full -time or six years part -time or a combination of both these attendance patterns. Subjects are divided into core subjects and 'elective' subjects. All students enrolled in the degree must satisfactorily complete all core subjects for award of the degree and, in addition, must satisfactorily complete the required number of hours of elective subjects. Students generally choose elective subjects with a particular theme or area of expertise in mind.Examples of recommended electives are given in Elective Options Table, however, it should be noted that timetable constraints may prevent the undertaking of some elective combinations.

Elective combinations include:

1 a particular area of study via subjects available from within the School of Biological and Biomedical Sciences
2 further study in areas of interest via subjects from other faculties of UTS
3 other individual elective sequences as may be approved by the Head of School, for example from another university.

BIOMEDICAL SCIENCE

FULL-TIME PROGRAM

Stages 1 to 4 are common to all three major strands of the Biomedical Science degree.

Stage 1:	Autumn Semester		Hours/Week
	33101	Mathematics 1 (L/S)	3
	33103	Statistics (L/S)	3
	62416	Chemistry 1 (L/S)	6
	63111	Physics 1 (L/S)	6
	91311	Biology 1	6
Stage 2:	Spring Semester		
	33105	Introductory Biometrics	3
	62426	Chemistry 2 (L/S)	6
	91312	Biology 2	6
	91317	Human Biology	6
	91395	Biocomputing	3
Stage 3:	Autumn Semester		
	91313	Biochemistry 1	6
	91314	Microbiology 1	6
	91316	Bioinstrumentation	6
	91354	Pathobiology 1	6
Stage 4:	Spring Semester		
	91320	Biochemistry 2	6
	91326	Analytical Biochemistry	6
	91330	Microbiology 2	6
	91355	Pathobiology 2	6

BIOMEDICAL SCIENCE

PART-TIME PROGRAM

Stages 1 to 4 are common to all three major strands of the Biomedical Science degree.

		Hours/Week
Stage 1		
Autumn Semester		
33101	Mathematics 1 (L/S)	3
62417	Chemistry 1 (L/S) (P/T) (2 Sem)	3
63112	Physics 1 (L/S) (P/T) (2 Sem)	3
91301	Biology 1 (P/T) (2 Sem)	3
Spring Semester		
33103	Statistics (L/S)	3
62417	Chemistry 1 (L/S) (P/T) (2 Sem)	3
63112	Physics 1 (L/S) (P/T) (2 Sem)	3
91301	Biology 1 (P/T) (2 Sem)	3
Stage 2		
Autumn Semester		
91312	Biology 2	6
91317	Human Biology	6
Spring Semester		
33105	Introductory Biometrics	3
62426	Chemistry 2 (L/S)	6
91395	Biocomputing	3
Stage 3		
Autumn Semester		
91313	Biochemistry 1	6
91314	Microbiology 1	6
Spring Semester		
91316	Bioinstrumentation	6
91330	Microbiology 2	6
Stage 4		
Autumn Semester		
91326	Analytical Biochemistry	6
91354	Pathobiology 1	6
Spring Semester		
91320	Biochemistry 2	6
91355	Pathobiology 2	6

BIOCHEMISTRY MAJOR

FULL-TIME

Stage 5: Autumn Semester

	91321	Biochemistry 3	6
	91342	Clinical Biochemistry 1	3
And either:-			
	91331	Microbiology 3	6
or	91358	Haematology	6
Plus	*	Electives	6

Stage 6: Spring Semester

	91322	Biochemistry 4	6
	91343	Clinical Biochemistry 2	3
Plus	*	Electives	9

TOTAL ELECTIVE HOURS TO BE COMPLETED - 15

* For details of the electives available for the Biochemistry Major Biomedical Science see Elective Options Table - Page 30

PART-TIME

Stage 5

Autumn Semester

	91321	Biochemistry 3	6
	91342	Clinical Biochemistry 1	3
	*	Electives	3

Spring Semester

	91322	Biochemistry 4	6
	91343	Clinical Biochemistry 2	3

Stage 6

Autumn Semester

	91331	Microbiology 3	6
or	91358	Haematology	6
Plus	*	Electives	3

Spring Semester

Plus	*	Electives	9

TOTAL ELECTIVE HOURS TO BE COMPLETED - 15

* For details of the electives available for the Biochemistry Major Biomedical Science see Elective Options Table - Page 30

CELLULAR PATHOLOGY MAJOR

FULL-TIME

Stage 5: Autumn Semester			Hours/Week
	91356	Diagnostic Cytology 1	6
	91358	Haematology	6
Plus	*	Electives	9
Stage 6: Spring Semester			
	91341	Blood Bank	3
	91357	Diagnostic Cytology 2	6
Plus	*	Electives	9

TOTAL ELECTIVE HOURS TO BE COMPLETED - 18

* For details of the electives available for the Cellular Pathology Major Biomedical Science see Elective Options Table - Page 30

PART-TIME

Stage 5			Hours/Week
Autumn Semester			
	91356	Diagnostic Cytology 1	6
Plus	*	Electives	6
Spring Semester			
	91357	Diagnostic Cytology 2	6
Plus	*	Electives	3
Stage 6			
Autumn Semester			
	91358	Haematology	6
Plus	*	Elective	3
Spring Semester			
	91341	Blood Bank	3
Plus	*	Electives	6

TOTAL ELECTIVE HOURS TO BE COMPLETED - 18

* For details of the electives available for the Cellular Pathology Major Biomedical Science see Elective Options Table - Page 30

MICROBIOLOGY MAJOR

FULL-TIME

Stage 5: Autumn Semester			Hours/Week
	91331	Microbiology 3	6
And either:-			
	91321	Biochemistry 3	6
or	91358	Haematology	6
Plus	*	Electives	9

Stage 6: Spring Semester			
	91372	Clinical Bacteriology & Parasitology	9
Plus	*	Electives	9

TOTAL ELECTIVE HOURS TO BE COMPLETED - 18

* For details of the electives available for the Microbiology Major Biomedical Science see Elective Options Table - Page 30

PART-TIME

Stage 5			Hours/Week
Autumn Semester			
	91331	Microbiology 3	6
Plus	*	Electives	6
Spring Semester			
	91372	Clinical Bacteriology & Parasitology	9

Stage 6			
Autumn Semester			
	91321	Biochemistry 3	6
or	91358	Haematology	6
Plus	*	Electives	3
Spring Semester			
Plus	*	Electives	9

TOTAL ELECTIVE HOURS TO BE COMPLETED - 18

* For details of the electives available for the Microbiology Major Biomedical Science see Elective Options Table - Page 30

ELECTIVES TABLE FOR UNDERGRADUATE COURSES

BIOMEDICAL SCIENCE

SUBJECT		Semester		BIOMEDICAL SCIENCE		
No	Name	Hrs	A/S	Biochem	CellPath	Micro
62311	Geology	6	A			
62443	Chemical Analysis 2	6	S			
62462	Environmental Chemistry	6	A			
77024	Environmental Law	3	A			
91205	Plant Breeding & Genetics	6	S			
91206	Plant Production	6	A			
91208	Plant Protection	6	A			
91218	Australian Plants	6	S			
91313	Biochemistry 1	6	A	---	---	---
91321	Biochemistry 3	6	A	---	5	5
91322	Biochemistry 4	6	S	---	6	6
91330	Microbiology 2	6	S	---	---	---
91331	Microbiology 3	6	A	5	5	---
91337	Clinical Microbiology -Virology	3	A	5	5	5
91341	Blood Bank	3	S	6	---	6
91342	Clinical Biochemistry 1	3	A	---	5	5
91343	Clinical Biochemistry 2	3	S	---	6	6
91348	Radioactive Isotopes	3	S	6	6	6
91351	Introductory Immunology	3	S			
91358	Haematology	6	A	5	---	5
91359	Advanced Immunology	6	S	6	6	6
91363	Animal Ecophysiology	6	S			
91364	Aquatic Ecology	6	A			
91366	Pest Control & Toxicology	6	S			
91368	Microbial Technology 1	6	A	5		5
91369	Microbial Technology 2	6	S	6		6
91372	Clinical Bacteriology & Parasit	9	S	6	6	---
91373	Clinical & Applied Mycology	3	A	5	5	5
91374	Tissue Culture	3	A	5	5	5
91396	Advanced Biocomputing	3	S	6	6	6
	Electives from other schools	3	A&S	5 or 6	5 or 6	5 or 6

KEY:

--- = Core subject for that Course
Hrs.= Hours per week for that subject
A = Timetabled for Autumn Semester
5 = Recommended Elective for Stage 5 F/T
6 = Recommended Elective for Stage 6 F/T
S = Timetabled for Spring Semester

NOTES:
1. Subjects marked 5 and 6 can be undertaken by Part Time students when programmable provided the prerequisite requirements are met
2. Due to timetabling constraints, not all electives may be available to all students in any given semester.
3. Subjects not marked may be able to be taken as electives following discussion with a member of Academic Staff.

DOUBLE MAJORS IN BIOMEDICAL SCIENCE

An additional 15 semester hour subject load is the requirement for award of an undergraduate degree with a double major, giving a total of 150 hours. Therefore, in addition to the 96 semester hours required for completion of stages 1 to 4 of the Biomedical Science degree, the following combinations of subjects are recommended for completion of a double major.

BIOCHEMISTRY / CELLULAR PATHOLOGY		Hours/Week
91321	Biochemistry 3	6
91322	Biochemistry 4	6
91342	Clinical Biochemistry 1	3
91343	Clinical Biochemistry 2	3
91358	Haematology	6
*	Elective	15
Plus Cellular Pathology subjects		
91341	Blood Bank	3
91356	Diagnostic Cytology 1	6
91357	Diagnostic Cytology 2	6

BIOCHEMISTRY / MICROBIOLOGY		Hours/Week
91321	Biochemistry 3	6
91322	Biochemistry 4	6
91342	Clinical Biochemistry 1	3
91343	Clinical Biochemistry 2	3
91358	Haematology	6
*	Electives	15
Plus Microbiology subjects		
91331	Microbiology 3	6
91372	Clinical Bacteriology & Parasitology	9

CELLULAR PATHOLOGY / BIOCHEMISTRY		Hours/Week
91341	Blood Bank	3
91356	Diagnostic Cytology 1	6
91357	Diagnostic Cytology 2	6
91358	Haematology	6
*	Electives	15
Plus Biochemistry subjects		
91321	Biochemistry 3	6
91322	Biochemistry 4	6
91342	Clinical Biochemistry 1	3
91343	Clinical Biochemistry 2	3

*For details of the electives available for Biomedical Science see Elective Options Table - Page 30

CELLULAR PATHOLOGY / MICROBIOLOGY		Hours/Week
91341	Blood Bank	3
91356	Diagnostic Cytology 1	6
91357	Diagnostic Cytology 2	6
91358	Haematology	6
*	Electives	18
Plus Microbiology subjects		
91331	Microbiology 3	6
91372	Clinical Bacteriology & Parasitology	9

MICROBIOLOGY / BIOCHEMISTRY		Hours/Week
91331	Microbiology 3	6
91358	Haematology	6
91372	Clinical Bacteriology & Parasitology	9
*	Electives	15
Plus Biochemistry subjects		
91321	Biochemistry 3	6
91322	Biochemistry 4	6
91342	Clinical Biochemistry 1	3
91343	Clinical Biochemistry 2	3

MICROBIOLOGY / CELLULAR PATHOLOGY		Hours/Week
91331	Microbiology 3	6
91358	Haematology	6
91372	Clinical Bacteriology & Parasitology	9
*	Electives	18
Plus Cellular Pathology subjects		
91341	Blood Bank	3
91356	Diagnostic Cytology 1	6
91357	Diagnostic Cytology 2	6

* For details of the electives available for Biomedical Science see Elective Options Table - Page 30

BIOTECHNOLOGY DEGREE COURSE

The UTS Bachelor of Applied Science - Biotechnology, is fully recognised for membership of both the Australian Institute of Biology Inc. (AIB) and the Australian Society of Microbiology (ASM) as well as being a professional qualification with emphasis on DNA technology and its applications. The course encompasses basic sciences plus microbiology, biochemistry, immunology and genetics, industrial biotechnology and molecular biology. At the completion of the course students will have acquired a sound background in industrial microbiology, and competence in a wide range of standard biological, microbiological and biochemical laboratory techniques.

Employment Opportunities

Today's biotechnologist has an expanding variety of career opportunities, and graduates from this degree can expect to find employment opportunities in the food, beverage, chemical, pharmaceutical and fermentation industries, particularly in production, quality control, or research and development areas. These industries depend on a high level of professional competence in standard techniques of microbiology and biochemistry. An increasing number of products involve the application of some of the molecular or other aspects of biotechnology in their manufacture. A variety of research and development opportunities, such as AIDS or Legionnaire's disease research, or the production of transformed plants or animals with 'designer genes'. Good employment opportunities also exist with state and federal government scientific instrumentalities, and in research and other laboratories in tertiary institutions, hospitals and industry. In recent years a number of smaller, specialised development and consulting companies have developed from biotechnology research programs, these organisations require graduates with a strong basis in biotechnology and applied microbiology. Many employers in the biotechnology field, being themselves active in research and development, have close links with tertiary education institutions, and can offer graduates the possibility of higher degree studies in conjunction with employment.

Course Structure

You can complete the degree in three years full -time or six years part -time or a combination of both these attendance patters. Subjects are divided into core subjects and 'elective' subjects. All students enrolled in the degree must satisfactorily complete all core subjects for award of the degree and, in addition, must satisfactorily complete a total of twelve hours of elective subjects.Students generally choose elective subjects with a particular theme or area of expertise in mind. Examples of recommended electives are given in Elective Options Table, however, it should be noted that timetable constraints may prevent the undertaking of some elective combinations.

Elective combinations include:

1 a particular area of study via subjects available from within the School of Biological and Biomedical Sciences
2 further study in areas of interest via subjects from other faculties of UTS
3 other individual elective sequences as may be approved by the Head of School, for example from another university.

TRANSFER TO BIOTECHNOLOGY

Students initially enrolled in the Applied Science Degrees of Applied Biology or Biomedical Science prior to 1990, who wish to transfer to the Biotechnology Degree may replace the following subjects:

Quantitative Ecology (91360) or Pathobiology 1 (91354)

with

Biomonitoring (91315) and Environmental Measurement (91376)

Advanced Biocomputing (91396)

with

Introductory Molecular Biology (91334)

Biochemistry 4 (91322)

with

Advanced Molecular Biology (91335)

Note:
1. Applied Science - Applied Biology is not available for enrolment from 1990. This course has now become two new degree courses, Environmental Biology being nearest to the Applied Biology degree course, and Biotechnology.
2. Full credit will be given for subjects completed prior to transfer in 1990

BIOTECHNOLOGY

FULL-TIME PROGRAM

			Hours/Week
Stage 1:	Autumn Semester		
	33101	Mathematics 1 (L/S))	3
	33103	Statistics (L/S)	3
	62416	Chemistry 1 (L/S)	6
	63111	Physics 1 (L/S)	6
	91311	Biology 1	6
Stage 2:	Spring Semester		
	33105	Introductory Biometrics	3
	62426	Chemistry 2 (L/S)	6
	91312	Biology 2	6
	91317	Human Biology	6
	91395	Biocomputing	3
Stage 3:	Autumn Semester		
	91313	Biochemistry 1	6
	91314	Microbiology 1	6
	91315	Biomonitoring	3
	91316	Bioinstrumentation	6
	91376	Environmental Measurement	3
Stage 4:	Spring Semester		
	91320	Biochemistry 2	6
	91326	Analytical Biochemistry	6
	91330	Microbiology 2	6
	91334	Introductory Molecular Biology	3
	91351	Introductory Immunology	3
Stage 5:	Autumn Semester		
	91331	Microbiology 3	6
	91368	Microbial Technology 1	6
	91373	Clinical & Applied Mycology	3
Plus	*	Electives	6
Stage 6:	Spring Semester		
	91335	Advanced Molecular Biology	6
	91369	Microbial Technology 2	6
Plus	*	Electives	6

TOTAL ELECTIVE HOURS TO BE COMPLETED - 12

* For details of the electives available for the Biotechnology Degree see Elective Options Table - Page 50.

BIOTECHNOLOGY

PART-TIME PROGRAM

Stage 1		Hours/Week
Autumn Semester		
33101	Mathematics 1 (L/S))	3
62417	Chemistry 1 (L/S) (P/T) (2 Sem)	3
63112	Physics 1 (L/S) (P/T) (2 Sem)	3
91301	Biology 1 (P/T) (2 Sem)	3
Spring Semester		
33103	Statistics (L/S)	3
62417	Chemistry 1 (L/S) (P/T) (2 Sem)	3
63112	Physics 1 (L/S) (P/T) (2 Sem)	3
91301	Biology 1 (P/T) (2 Sem)	3

Stage 2		
Autumn Semester		
91312	Biology 2	6
91317	Human Biology	6
Spring Semester		
33105	Introductory Biometrics	3
62426	Chemistry 2 (L/S)	6
91395	Biocomputing	3

Stage 3		
Autumn Semester		
91313	Biochemistry 1	6
91314	Microbiology 1	6
Spring Semester		
91316	Bioinstrumentation	6
91330	Microbiology 2	6

Stage 4		
Autumn Semester		
91326	Analytical Biochemistry	6
91376	Environmental Measurement	3
91315	Biomonitoring	3
Spring Semester		
91320	Biochemistry 2	3
91334	Introductory Molecular Biology	3
91351	Introductory Immunology	3

BIOTECHNOLOGY

PART-TIME PROGRAM

Stage 5

Autumn Semester			
	91331	Microbiology 3	6
Plus	*	Electives	3 or 6
Spring Semester			
	91335	Advanced Molecular Biology	6
Plus	*	Electives	3 or 6

Stage 6

Autumn Semester			
	91368	Microbial Technology 1	6
	91373	Clinical & Applied Mycology	3
Spring Semester			
	91369	Microbial Technology 2	6
Plus	*	Electives	3 or 6

TOTAL ELECTIVE HOURS TO BE COMPLETED - 12

* For details of the electives available for the Biotechnology Degree see Elective Options Table - Page 50.

ENVIRONMENTAL BIOLOGY DEGREE COURSE

The UTS Bachelor of Applied Science - Environmental Biology, is fully recognised for membership of the Australian Institute of Biology Inc.and fully qualifies you as a biological scientist with specialisation in environmental science.

The course provides you with a degree in biological science and the advanced technological skills to tackle complex environmental problems such as an ability to apply sampling and measurement methods for such purposes as pollution monitoring or the preparation of environmental assessments. After foundation studies in the basic sciences, you will specialise in the ecology and physiology of plants, animals and micro-organisms, and in freshwater, marine and terrestrial ecosystems. You will also take part in field trips to many parts of the State, for example north and south coastal areas, Snowy Mountains, the Murrumbidgee Irrigation Area and the far west.

Employment Opportunities
Graduates of the course may be employed as scientific officers with government agencies such as the Water Board, State Pollution Control Commission, Department of Environment and Planning, National Parks and Wildlife Service, museums and herbaria; with local government authorities; or as technical and research officers with universities and colleges, or as environmental consultants or environmental, toxicological or biological scientists in private enterprise. Many organisations provide opportunities for graduates to undertake research projects for a higher degree in the School.

Course Structure
You can complete the degree in three years full-time or six years part-time or a combination of both attendance patterns.

Subjects are divided into 'core' subjects and 'elective' subjects. All students enrolled in the degree must satisfactorily complete all core subjects for award of the degree., and in addition, must satisfactorily complete a total of fifteen hours of elective subjects. Students generally choose elective subjects with a particular theme or area of expertise in mind.Examples of recommended electives are given in Elective Options Table, however, it should be noted that timetable constraints may prevent the undertaking of some elective combinations.

Elective combinations include:
1 a particular area of study via subjects available from within the School of Biological and Biomedical Sciences
2 further study in areas of interest via subjects from other faculties of UTS
3 other individual elective sequences as may be approved by the Head of School, for example from another university.

ENVIRONMENTAL BIOLOGY
FULL-TIME PROGRAM

			Hours/Week
Stage 1:	Autumn Semester		
	33101	Mathematics 1 (L/S))	3
	33103	Statistics (L/S)	3
	62416	Chemistry 1 (L/S)	6
	63111	Physics 1 (L/S)	6
	91311	Biology 1	6
Stage 2:	Spring Semester		
	33105	Introductory Biometrics	3
	62426	Chemistry 2 (L/S)	6
	91312	Biology 2	6
	91317	Human Biology	6
	91395	Biocomputing	3
Stage 3:	Autumn Semester		
	91313	Biochemistry 1	6
	91314	Microbiology 1	6
	91316	Bioinstrumentation	6
	91360	Quantitative Ecology	6
Stage 4:	Spring Semester		
	91362	Plant Ecophysiology	6
	91363	Animal Ecophysiology	6
Plus any 2 of:			
	91326	Analytical Biochemistry	6
	91330	Microbiology 2	6
	91320	Biochemistry 2	6
Stage 5:	Autumn Semester		
	91364	Aquatic Ecology	6
	91365	Terrestrial Ecology	6
Plus	*	Elective	9
Stage 6:	Spring Semester		
	91366	Pest Control and Toxicology	6
	91367	Applied Ecology	6
Plus	*	Electives	6

TOTAL ELECTIVE HOURS TO BE COMPLETED - 15

* For details of the electives available for the Environmental Biology see Electiv Options Table - Page 50.

ENVIRONMENTAL BIOLOGY
PART-TIME PROGRAM

		Hours/Week
Stage 1		
Autumn Semester		
33101	Mathematics 1 (L/S))	3
62417	Chemistry 1 (L/S) (P/T) (2 Sem)	3
63112	Physics 1 (L/S) (P/T) (2 Sem)	3
91301	Biology 1 (P/T) (2 Sem)	3
Spring Semester		
33103	Statistics (L/S)	3
62417	Chemistry 1 (L/S) (P/T) (2 Sem)	3
63112	Physics 1 (L/S) (P/T) (2 Sem)	3
91301	Biology 1 (P/T) (2 Sem)	3
Stage 2		
Autumn Semester		
91312	Biology 2	6
91317	Human Biology	6
Spring Semester		
33105	Introductory Biometrics	3
62426	Chemistry 2 (L/S)	6
91395	Biocomputing	3
Stage 3		
Autumn Semester		
91313	Biochemistry 1	6
91314	Microbiology 1	6
Spring Semester		
91316	Bioinstrumentation	6
91330	Microbiology 2	6
	or	
91320	Biochemistry 2	6
Stage 4		
Autumn Semester		
91326	Analytical Biochemistry	6
91360	Quantitative Ecology	6
Spring Semester		
91362	Plant Ecophysiology	6
91363	Animal Ecophysiology	6

ENVIRONMENTAL BIOLOGY

PART-TIME PROGRAM

Stage 5

Autumn Semester

	91364	Aquatic Ecology	6
Plus	*	Electives	3 or 6

Spring Semester

	91366	Pest Control and Toxicology	6
Plus	*	Electives	3 or 6

Stage 6

Autumn Semester

	91365	Terrestrial Ecology	6
Plus	*	Electives	3

Spring Semester

	91367	Applied Ecology	6

TOTAL ELECTIVE HOURS TO BE COMPLETED - 15

* For details of the electives available for the Environmental Biology Degree see Electives Option Table - Page 50.

URBAN HORTICULTURE DEGREE COURSE

The Bachelor of Applied Science - Urban Horticulture, is fully recognised for membership of the Australian Institute of Biology Inc., as a professional qualification in plant science and as a specialist qualification in ornamental and amenity, landscape and environmental horticulture. The course gives a scientific education in the basic sciences plus plant physiology, ecology, genetics and biogeography, soil science, biochemistry and microbiology. You also gain advanced technological skills in plant cultivation, protection, breeding and management. Excursions will be undertaken in the Sydney metropolitan area and to other parts of the State.

Employment Opportunities
Graduates of the course are in increasing demand as professional horticulturists. As an urban horticulturist you might be a researcher in a plant sciences laboratory, work on the selection and breeding of new ornamental varieties, including Australian native species, be responsible for the planning and management of nursery production, park and recreation areas, or the revegetation and management of natural areas disturbed by human impact. Many graduates also enter universities and research organizations.

Course Structure
The UTS Degree in Urban Horticulture is unique in incorporating the equivalent of a year of relevant work experience within the academic component of the course. That is, a period of 48 weeks of relevant work experience is a requirement for award of this degree. Many students choose to complete the course by undertaking the first two years of study full-time followed by two years of part-time study with relevant work experience. You may, however, choose to complete the degree full-time, with a 'sandwich-year' of work experience or complete the course over six years part-time. . The undergraduate program emphasizes practical experimentation and research activities are encouraged through project assignments. The students acquire familiarity with advanced instruments and technology, and are encouraged to participate in seminar activities. The program has been developed in close liaison with all branches of the industry, and with the Ryde School of Horticulture, whose glasshouse and associated facilities are used in addition to those of the UTS.

Subjects are divided into core subjects and 'elective' subjects. All students enrolled in the degree must satisfactorily complete all core subjects for award of the degree and, in addition, must satisfactorily complete a total of twelve hours of elective subjects.Students generally choose elective subjects with a particuiar theme or area of expertise in mind.Examples of recommended electives are given in Elective Options Table, however, it should be noted that timetable constraints may prevent the undertaking of some elective combinations.

Elective combinations include:
1 a particular area of study via subjects available from within the School of Biological and Biomedical Sciences
2 further study in areas of interest via subjects from other faculties of UTS
3 other individual elective sequences as may be approved by the Head of School, for example from another university.

HONOURS IN URBAN HORTICULTURE

Note: Honours students only may undertake an optional 9 Hours Advanced Horticultural Project (91223)

NEW SUBJECTS INTRODUCED IN 1990

Students initially enrolled in the Applied Science Degree - Urban Horticulture at UTS prior to 1990, will have undertaken the subjects: listed under 'Equivalent to' below:

Current:	Equivalent to:
Landscape Horticulture (91210) with Horticultural Botany (91211)	Horticultural Science 1 (91202)
Soils & Growth Media (91204)	Horticultural Science 2 (91204)
Plant Breeding & Genetics (91205)	Horticultural Science 3 (91205)
Plant Production (91206)	Horticultural Science 4 (91206)
Plants in the Landscape (91207)	Horticultural Science 5 (91207)
Australian Plants (91218))	Horticultural Procedures 3 (91218)
Horticultural Management 1 (3 Hrs)(91229) with Special Horticultural Topics (91235)	Horticultural Management 1 6 Hrs
Terrestrial Ecology (91365)	Australian Ecology (91209)

URBAN HORTICULTURE
FULL-TIME PROGRAM

			Hours/Week
Stage 1:	Autumn Semester		
	62416	Chemistry 1 (L/S)	6
	91201	Horticultural Experimentation	3
	91210	Landscape Horticulture	3
	91216	Horticultural Procedures 1	6
	91311	Biology 1	6
Stage 2:	Spring Semester		
	62426	Chemistry 2 (L/S)	6
	91217	Horticultural Procedures 2	6
	91211	Horticultural Botany	3
	91312	Biology 2	6
	91395	Biocomputing	3
Stage 3:	Autumn Semester		
	91206	Plant Production	6
	91208	Plant Protection	6
	91314	Microbiology 1	6
	91360	Quantitative Ecology	6
Stage 4:	Spring Semester		
	91204	Soils & Growth Media	6
	91205	Plant Breeding & Genetics	6
	91218	Australian Plants	6
	91362	Plant Ecophysiology	6
Stage 5:	Autumn Semester		
	91207	Plants in the Landscape	6
	91229	Horticultural Management 1	3
	91235	Special Horticultural Topics	3
	91365	Terrestrial Ecology	6
Plus	*	Electives	3
Stage 6:	Spring Semester		
	91215	Horticultural Research Project	6
	91220	Horticultural Management 2	6
Plus	*	Electives	6

TOTAL ELECTIVE HOURS TO BE COMPLETED - 9

* For details of the electives available for Urban Horticulture see Elective Options Table - Page 50.

URBAN HORTICULTURE

PART-TIME PROGRAMS

ENTRANTS OTHER THAN THOSE WITH ASSOCIATE DIPLOMA IN HORTICULTURE OR EQUIVALENT.
One year of work experience must be completed.

Year 1		Hours/Week
Autumn Semester		
62417	Chemistry 1 (L/S) (P/T) (2 Sem)	3
91201	Horticultural Experimentation	3
91226	Horticultural Procedures 1 (2 Sem)*	3
91301	Biology 1 (P/T) (2 Sem)	3
Spring Semester		
62417	Chemistry 1 (L/S) (P/T) (2 Sem)	3
91226	Horticultural Procedures 1 (2 Sem)*	3
91301	Biology 1 (P/T) (2 Sem)	3
91395	Biocomputing	3

Year 2		
Autumn Semester		
91227	Horticultural Procedures 2 (2 Sem)*	3
91210	Landscape Horticulture	3
91312	Biology 2	6
Spring Semester		
62426	Chemistry 2 (L/S)	6
91211	Horticultural Botany	3
91227	Horticultural Procedures 2 (2 Sem)*	3

Year 3		
Autumn Semester		
91314	Microbiology 1	6
91206	Plant Production	6
Spring Semester		
91204	Soils & Growth Media	6
91205	Plant Breeding & Genetics	6

URBAN HORTICULTURE

PART-TIME PROGRAMS

Year 4

Autumn Semester			
	91360	Quantitative Ecology	6
	91208	Plant Protection	6
Spring Semester			
	91362	Plant Ecophysiology	6
	91218	Australian Plants	6

Year 5

Autumn Semester			
	91207	Plants in the Landscape	6
	91365	Terrestrial Ecology	6
Spring Semester			
Plus	*	Electives	6

Year 6

Autumn Semester			
	91229	Horticultural Management 1	3
	91235	Special Horticultural Topics	3
Plus	*	Electives	3
Spring Semester			
	91220	Horticultural Management 2	6
	91215	Horticultural Research Project	6

TOTAL ELECTIVE HOURS TO BE COMPLETED - 9

* For details of the electives available for Urban Horticulture see Elective Options Table - Page 50.

Note: Holders of Technical Certificate in Horticulture or equivalent are exempted fro Horticultural Procedures 1 and 2.

URBAN HORTICULTURE
PART-TIME PROGRAMS

ENTRANTS WITH ASSOCIATE DIPLOMA IN HORTICULTURE
(OR EQUIVALENT)

One year of work experience must be completed.

		Hours/Week
Year 1		
Autumn Semester		
62417	Chemistry 1 (L/S) (P/T) (2 Sem)	3
91201	Horticultural Experimentation	3
91210	Landscape Horticulture	3
91378	Concepts in Biology (P/T) (2 Sem)	3
Spring Semester		
62417	Chemistry 1 (L/S) (2 Sem)	3
91211	Horticultural Botany	3
91378	Concepts in Biology (P/T) (2 Sem)	3
91395	Biocomputing	3
Year 2		
Autumn Semester		
91314	Microbiology 1	6
91206	Plant Production	6
Spring Semester		
62426	Chemistry 2 (L/S)	6
91204	Soils & Growth Media	6
Year 3		
Autumn Semester		
91208	Plant Protection	6
91360	Quantitative Ecology	6
Spring Semester		
91362	Plant Ecophysiology	6
91205	Plant Breeding & Genetics	6
Year 4		
Autumn Semester		
91207	Plants in the Landscape	6
91229	Horticultural Management 1	3
91235	Special Horticultural Topics	3
Spring Semester		
91215	Horticultural Research Project	6
91220	Horticultural Management 2	3

ELECTIVES TABLE FOR UNDERGRADUATE COURSES

ENVIRONMENTAL BIOLOGY, BIOTECHNOLOGY URBAN HORTICULTURE

SUBJECT No	Name	Semester Hrs	A/S	Environ Biology	Biotech	Urban Hort
62311	Geology 6	A		5		5
62443	Chemical Analysis 2	6	S	6		
62462	Environmental Chemistry	6	A	5		
77024	Environmental Law	3	A	5		5
91205	Plant Breeding & Genetics	6	S	5	6	---
91206	Plant Production	6	A	5		---
91208	Plant Protection	6	A	5	5	---
91218	Australian Plants	6	S	6	6	---
91313	Biochemistry 1	6	A	---	---	5
91321	Biochemistry 3	6	A	5	5	
91322	Biochemistry 4	6	S	6	6	
91330	Microbiology 2	6	S	---	---	6
91331	Microbiology 3	6	A	5	---	
91337	Clinical Microbiology (Virology)	3	A		5	
91341	Blood Bank	3	S			
91342	Clinical Biochemistry 1	3	A			
91343	Clinical Biochemistry 2	3	S			
91348	Radioactive Isotopes	3	S	6	6	6
91351	Introductory Immunology	3	S		---	
91358	Haematology	6	A			
91359	Advanced Immunology	6	S		6	
91363	Animal Ecophysiology	6	S	---	6	6
91364	Aquatic Ecology	6	A	---	6	5
91366	Pest Control & Toxicology	6	S	---	6	6
91368	Microbial Technology 1	6	A	5	---	
91369	Microbial Technology 2	6	S	6	---	
91372	Clinical Bacteriology & Parasit	9	S	6	6	---
91373	Clinical & Applied Mycology	3	A	5	---	5
91374	Tissue Culture	3	A		5	
91396	Advanced Biocomputing	3	S	6	6	6
	Electives from other schools	3	A&S	5 or 6	5 or 6	

KEY:

--- = Core subject for that Course
Hrs.= Hours per week for that subject
A = Timetabled for Autumn Semester
5 = Recommended Elective for Stage 5 F/T
6 = Recommended Elective for Stage 6 F/T
S = Timetabled for Spring Semester

NOTES: Subjects marked 5 and 6 can be undertaken by Part Time students when programmable provided the prerequisite requirements are met

Due to timetabling constraints, not all electives may be available to all students in any given semester.

Subjects not marked may be able to be taken as electives following discussion with a member of Academic Staff.

BACHELOR OF APPLIED SCIENCE - HONOURS

An Honours program gives basic training in biological or biomedical research. Students may then enter occupations for which an Honours degree is the minimum entry requirement or continue with postgraduate research.

The course is offered either as a full-time program involving eighteen hours attendance per week over two semesters, or as a part-time program involving nine hours attendance per week over four semesters. The first stage of the course contains course work partly devoted to research methodology, including experimental design, and partly to expanding the students' knowledge in areas other than those in which they are undertaking research. The research project, which is the major component of the course and extends over both semesters, normally takes the form of an experimental or analytical investigation, undertaken either in the laboratory or in the field. The work is in an area of biomedical science (biochemistry, cellular pathology or microbiology), biotechnology or environmental biology and the results are presented in an oral seminar and in a written report, both of which are formally assessed.

Admission

The program is open to students who possess, or have fulfilled all the requirements for a Bachelors Degree in Biomedical Science, Biotechnology or Environmental Biology from the UTS or equivalent with an average credit grade in the final year of the undergraduate program.

Application

Prospective candidates should make an application to the Registrar by October 1, for entry to the Honours Degree program in the first semester of the following year.

Selection

Applications for entry to the Honours Degree will be considered by the Honours Degree Committee of the School of Biological and Biomedical Sciences. Applicants will be notified of acceptance by the Registrar.

Award

The Bachelor of Applied Science (Honours) will be awarded with the following grades: Class 1, Class 2 Division 1, Class 2 Division 2, and Class 3.

Further Information

Interested students should discuss the program with Heads of Departments or with individual members of academic staff.

HONOURS PROGRAM
FULL-TIME

Year 1		Hrs/Wk
Autumn Semester		
91392	Research Methodology	3
91393	Reading Assignment/ Elective Coursework	6
91394	Project (Honours) (2 Sem)	9
Spring Semester		
91394	Project (Honours) (2 Sem)	18

HONOURS PROGRAM
PART-TIME

Year 1		Hrs/Wk
Autumn Semester		
91392	Research Methodology	3
91393	Reading Assignment/ Elective Coursework	6
Spring Semester		
91384	Project (Honours) (3 Sem)	9
Year 2		
Autumn Semester		
91384	Project (Honours) (3 Sem)	9
Spring Semester		
91384	Project (Honours) (3 Sem)	9

POSTGRADUATE COURSES

GENERAL INFORMATION

The School offers PhD and Masters Degrees by thesis and Masters by course work programs on a full-time, part-time and in some cases, external basis. These programs cover a wide field of applied biological science in an interdisciplinary environment. Brief outlines of the programs are provided below. For further formal information students should consult the general rules for postgraduate degree programs, plus individual brochures available from the School.

Postgraduate Degree	Attendance Modes available for study		
Doctoral Program	Full-Time	Part Time	External
Masters By Thesis	Full-Time	Part Time	External
Masters by Coursework			
Clinical Biochemistry		Part Time	
Clinical Measurement	Full-Time	Part Time	
Environmental Toxicology	Full-Time	Part Time	

Note: Students applying for external study mode are required to show, prior to enrolment, that appropriate external supervision, research support and facilities are available, in addition to the normal requirement of internal supervision of an agreed upon research project.

COURSE FEES

UTS postgraduate course fees apply in 1990 to Masters by Coursework courses only and are based on attendance mode.

full-time course fee for each Semester, Autumn and Spring, is $1,000
Part-time course fee for each Semester, Autumn and Spring, is $500

Students will not be required to pay these postgraduate course fees on enrolment day. Notices will be sent to students each semester advising them of their liability and requesting payment. However, students will be required to pay the Student Service Charge of $155 for new students and $137 for continuing students, on enrolment day.

EXEMPTIONS

Due to completion of undergraduate degree in 1989

Completion of a appropriate undergraduate degree at any University or College in 1989 and proceeding directly to a postgraduate course provides automatic exemption from the postgraduate course fee. Such students will then incur the normal HECS liability. Students who gained this exemption in 1989 from study in 1988 will automatically be entitled to the same exemption in 1990.

Higher Education Contribution Scheme [HECS]

Exemptions for course fees can be approved by the Head of School in cases where disadvantage or hardship applies. Students need to apply in writing and this letter, with notation of approval, must be presented at the HECS desk on enrolment or to the UTS Information Service within one week of enrolling. Students shall then incur the normal HECS liability for their study load.

DEGREES BY THESIS

The Masters and Doctoral programs are designed for graduates who wish to develop a career in a field of medical or biological science, environmental toxicology, biotechnology, horticulture or plant biotechnology; by undertaking an appropriate research investigation under professional supervision.

Applications are invited for these research programs. Consult with a potential academic supervisor or appropriate Head of Department.

PhD PROGRAM

The PhD or Doctoral program is normally a minimum of three years duration on a part-time basis and two years duration on a full-time basis if applicants hold a Masters degree, or four years part-time, and three years full-time for applicants with a Bachelor's degree.

Admission requirements:

(a) an Honours degree of UTS, or
(b) a Masters degree of UTS, or
(c) an equivalent qualification.

MASTERS DEGREE BY THESIS

The course can be completed in two years of full-time study or over a minimum of three years part-time. External study is generally carried out by means of a co-operative arrangement with the candidate's employer.

Admission requirements:

(a) a bachelor's degree of UTS; OR
(b) an equivalent qualification; OR
(c) other general or professional qualifications as will satisfy the Academic Board that the applicant possesses the educational preparation and capacity

MASTERS DEGREE BY COURSEWORK

Masters Applied Science - Clinical Biochemistry

Masters Applied Science - Clinical Measurement

Masters Applied Science - Environmental Toxicology

Admission Requirements and Selection
As laid down under the University "General Rules for Masters Degrees by Course Work" candidates may be admitted to the course with either:

(a) a bachelor's degree of UTS; OR
(b) an equivalent qualification; OR
(c) other general or professional qualifications as will satisfy the Academic Board that the applicant possesses the educational preparation and capacity

Requirements for Subject Assessment and Student Progression
Students enrolled for Masters Degree by Coursework shall have each subject assessed according to the normal rules of this University, however, there is no allowance for conceded pass and Weighted Average Mark will not be calculated.

A student who fails in any two subjects, or any one subject twice, or who fails to submit their Project Report at the specified time, will be seen as making unsatisfactory progress and will have their registration discontinued. Students may appeal against such discontinuation of registration as explained in the University Calender - Rule 8.

MASTERS DEGREE IN CLINICAL BIOCHEMISTRY

The course is available to science and medical graduates with a good background in general biochemistry and is designed mainly for those working in clinical laboratories. It extends their knowledge and professional expertise in the discipline of clinical biochemistry and in the efficient operation of a clinical laboratory. The course also provides an opportunity for research training in clinical biochemistry.

Admission to the course is open to graduates in the biological sciences or chemistry. Admission to the course will be limited and the selection process may involve personal interviews. Concurrent employment in a clinical biochemistry laboratory or related area is a usual requirement for admission.

The course is offered on a part-time basis over six semesters, normally involving attendance at the UTS for nine hours per week. The program of study consists of formal lectures, discussion groups, laboratory sessions, seminars and a supervised research project. In the early stages of the course, students are introduced to analytical aspects of biochemistry and to fundamental areas of clinical biochemistry. Other subjects include the use of computing in the biological and medical sciences, aspects of laboratory management, the statistical analysis of data and experimental design. Later stages of the course focus on more advanced areas of clinical biochemistry and include case study analysis and the development of problem solving and consulting skills.

The final third of the course is devoted to a research project involving investigatory or developmental work in an appropriate area of clinical biochemistry. Projects are undertaken in co-operation with the employing laboratories and the results of the work are presented in an oral seminar and in a written report prepared in accordance with the formal requirements laid down by the School.

Students who have already demonstrated their competence in any of the foundation subjects may be offered alternative subjects of equivalent length.

MASTERS DEGREE IN CLINICAL BIOCHEMISTRY

PART-TIME ONLY
PROGRAM OF STUDY FOR STUDENTS ENTERING IN 1990 & 'EVEN' YEARS

Year 1			Hours per Week
Stage 1	Autumn Semester		
	91326	Analytical Biochemistry	6
	91342	Clinical Biochemistry 1	3
Stage 2	Spring Semester		
	91343	Clinical Biochemistry 2	3
	91423	Clinical Biochemistry -Advanced Aspects A	6
Year 2			
Stage 3	Autumn Semester		
	91408	Principles of Biocomputing	3
	91417	Clinical Laboratory Management	3
	91433	Biostatistics	3
Stage 4	Spring Semester		
	91424	Clinical Biochemistry - Advanced Aspects B	6
	91453	Project (Clinical Biochemistry)	3
Year 3			
Stage 5	Autumn Semester		
	91419	Case Studies in Clinical Biochemistry	3
	91456	Project (Clinical Biochemistry)	6
Stage 6	Spring Semester		
	91459	Project (Clinical Biochemistry)	9

MASTERS DEGREE IN CLINICAL BIOCHEMISTRY
PART-TIME ONLY

PROGRAM OF STUDY FOR STUDENTS ENTERING IN 1991 & 'ODD' YEARS

Year 1			Hours per Week
Stage 1	Autumn Semester		
	91342	Clinical Biochemistry 1	3
	91408	Principles of Biocomputing	3
	91433	Biostatistics	3
Stage 2	Spring Semester		
	91343	Clinical Biochemistry 2	3
	91424	Clinical Biochemistry - Advanced Aspects B	6
Year 2			
Stage 3	Autumn Semester		
	91326	Analytical Biochemistry	6
	91419	Case Studies in Clinical Biochemistry	3
Stage 4	Spring Semester		
	91423	Clinical Biochemistry -Advanced Aspects A	6
	91453	Project (Clinical Biochemistry)	3
Year 3			
Stage 5	Autumn Semester		
	91417	Clinical Laboratory Management	3
	91456	Project (Clinical Biochemistry)	6
Stage 6	Spring Semester		
	91459	Project (Clinical Biochemistry)	9

MASTERS DEGREE IN CLINICAL MEASUREMENT

The course offers postgraduate education to graduates in physical or biological science wishing to enter careers in clinical measurement, medical physics, biomedical engineering and related areas of hospital and medical science such as cardiology, respiratory physiology, neurophysiology, biochemistry, nuclear medicine, radiotherapy and orthopaedics.

The program can be completed in two years full-time or in three years of part-time attendance. The part-time pattern normally involves nine hours per week for six semesters. In the first semester most students undertake two appropriate foundation subjects. In the next three semesters six advanced subjects are offered, covering essential knowledge and skills in the area of clinical measurement. The formal course work comprises lectures, tutorials and supervised laboratory work, some of which may be conducted at teaching hospitals in Sydney. Students will undertake assignments and complete formal examinations. In the final year students undertake a project in an applied field relevant to their interests.

In the full-time attendance pattern the student must complete the requirements of the degree in two years.

Admission to the course is open to science, engineering and medical graduates of universities and colleges of advanced education, or persons with equivalent qualifications. Basic human anatomy and physiology, or basic electronics and computer programming, are normally pre-requisites. Foundation subjects are available to those who need extra background in either of these areas.

CHANGES TO CLINICAL MEASUREMENT PROGRAM IN 1990

The following subjects which had a six semester hour designation have been replaced or have been split into two equivalent three semester hour subjects

Six Semester Hour Subject:		Replaced by 2 Three Semester Hour Subjects:
Principles of Bioinstrumentation 91422	*and*	Bioelectronics 91405 Advanced Mathematics in the Life Sciences 91436
Clinical Measurement A 91451	*and*	Physiological Measurement 91439 Biosensors and Transducers 91438
Clinical Measurement B 91452	*and*	Medical Imaging & Signal Processing 91462 Physics in Medicine 1 (Part) 91403
Advanced Bioinstrumentation 91430	*and*	Hardware for Clinical Data Acquisition & Control 91463 Advanced Bioinstrumentation 91437
Laboratory Biocomputing 91432	*and*	Laboratory Biocomputing 91464 Advanced Programming 91465
Physics in Medicine 91435	*and*	Physics in Medicine 1 (Part) 91403 Physics in Medicine 2 91404

MASTERS DEGREE IN CLINICAL MEASUREMENT
PROGRAM OF STUDY PART-TIME

Year 1			Hours per Week
Autumn Semester			
	91405	Bioelectronics	3
	91408	Principles of Biocomputing	3
	91436	Advanced Mathematics in the Life Sciences	3
or			
	91420	Principles of Bioscience	3
	91421	Principles of Human Biology	6
Spring Semester *			
Any 3 of:	91434	Radiation Protection	3
	91403	Physics in Medicine 1	3
	91404	Physics in Medicine 2	3
	91437	Advanced Bioinstrumentation	3
	91438	Biosensors and Transducers	3
	91439	Physiological Measurement	3
Year 2			
Autumn Semester			
	91462	Medical Imaging and Signal Processing	3
	91461	Physiological Modelling	3
	91433	Biostatistics or	3
Spring Semester *			
	91463	Hardware for Clinical Data Acquisition & Control	3
	91464	Laboratory Biocomputing	3
	91465	Advanced Programming	3
Year 3			
Autumn Semester			
	91407	Project and Industrial Experience (Clinical Measurement)	9
Spring Semester			
	91407	Project and Industrial Experience (Clinical Measurement)	9

* Sets of Spring Semester subjects alternate each year, which means entrants in odd and even years will undertake slightly different programs.

NOTES:

1. Subjects will be prescribed in the first semester according to theeducational background of the entrant,.
2. Each semester normally consists of 9 semester hours study load.
3. Full-time students must complete the requirements of the degree in two years.
4 A minimum of 54 semester hours must be successfully completed for award of the degree.

MASTERS DEGREE IN ENVIRONMENTAL TOXICOLOGY

Environmental toxicology is the science which deals with the toxicity of chemicals in the environment to organisms, communities and ecosystems. A wide range of chemicals is in current use and their toxic effects need to be monitored. New chemicals are constantly being introduced and toxicological data are needed to assess potential hazard.

The course provides relevant postgraduate education and training in the developing science of environmental toxicology and is offered in conjunction with the Centre for Environmental Toxicology. This Centre is a joint initiative between the State Pollution Control Commission and the University of Technology, Sydney, and is housed in the School of Biological and Biomedical Sciences.

Admission to the course is open to graduates in the biological sciences or chemistry. Admission to the course will be limited and the selection process may involve personal interviews.

The course is offered on a full-time or part-time basis. The part-time program normally involves attendance for nine hours per week for a total of six semesters. In the first two years there are eight formal courses which cover the essential knowledge and skills for the practising environmental toxicologist. The formal course work comprises lectures, tutorials and supervised laboratory work. Students will undertake written assignments and formal examinations. The final year involves a project which enables students to apply their knowledge to problems in environmental toxicology through experimental investigation, extensive critical reviews or other suitable activities. Projects may be undertaken in conjunction with industry or government institutions. All students must complete a report based on the project undertaken. The report must be prepared in accordance with the formal requirements laid down in the UTS Rules.

In the full-time attendance pattern students must complete the requirements of the degree in two years.

Objectives

The objectives of the course are to train scientific personnel to:-

1. be familiar with the groups of environmentally hazardous chemicals and their biochemical and environmental effects
2. design and implement toxicological tests on a variety of organisms including invertebrates, fish, mammals, terrestrial and aquatic plants
3. analyse and interpret the results of toxicological tests
4. use techniques of analytical chemistry to determine the nature and level of toxic materials in the environment
5. conduct field surveillance for the effects of toxic substances
6. assess the risk from toxic chemicals and advise on environmentally sound management procedures.

MASTERS DEGREE IN ENVIRONMENTAL TOXICOLOGY

PROGRAM OF STUDY PART-TIME

Year 1		Hours per Week
Autumn Semester		
91448	Introduction to Toxicology	6
91449	Experimental Design	3
Spring Semester *		
91442	Toxicological Testing - Bioassay	6
91443	Environmental Management	3
Year 2		
Autumn Semester		
91444	Analytical Techniques in Toxicology	6
91445	Biochemical Toxicology	3
Spring Semester *		
91446	Field Surveillance & Man. of Toxic Subs.	6
91447	Environ. Accumulation & Transformation of Toxic Substances	3
Year 3		
Autumn Semester		
91450	Project (Environmental Toxicology)	9
Spring Semester		
91450	Project (Environmental Toxicology)	9

* Sets of Spring Semester subjects alternate each year, which means entrants in odd and even years will undertake slightly different programs.

NOTE: Full-time students must complete the requirements of the degree in 2 years.

SYNOPSES OF SUBJECTS

Subject descriptions are listed in numerical order.

SUBJECTS OFFERED BY OTHER FACULTIES AND SCHOOLS

FACULTY OF BUSINESS

21101 Organisational Psychology
This subject gives a broad introduction to psychological theories of individual and group behaviour and their application in work situations.
Topics include: introduction to the methods of the behavioural sciences, mental abilities and personality, career decisions, stress, learning and motivation, interpersonal and organisational communication, group structure and processes, leadership, attitude change.

SCHOOL OF MATHEMATICAL SCIENCES

33101 Mathematics 1 (Life Sciences)
Three semester hours (1 s/hr lecture, 2 s/hrs workshop).

Aspects of measurement; sequences and series; convergence and limits; graphical representation of linear and non-linear relationships; sigmoid curve; differentiation; integration; introduction to differential equations; trigonometric functions. All topics are illustrated by problems relevant to biology.

Text: Arya & Lardner "Mathematics for the Biological Sciences" (Prentice Hall, 1979).

33103 Statistics (Life Sciences)
Three semester hours (2 s/hrs lectures, 1 s/hr tutorial).

Descriptive statistics; measures of central tendency and dispersion; probability; discrete distributions including binomial, Poisson; continuous distributions including uniform, Normal; simple random sampling; standard tests of significance and estimation for population means and variances; goodness of fit tests.

33105 Introductory Biometrics
Three semester hours (1 s/hr lecture, 2 s/hrs workshop).
Pre-requisite: Statistics (Life Sciences) (33103).

Design and analysis of biological experiments; completely randomized design; randomized block design; regression analysis and correlation; multiple and polynomial regression; latin square design; two factor designs with interaction; distribution free tests.

51014 Health, Technology and Society
Three semester hours.

This course introduces the student to the changing face of medicine in its social context from 19th Century to the present day, with emphasis on current problems. After a brief historical survey, it turns to the many ethical, medico-legal and social problems engendered by new and high technology and new attitudes. Topics include transplantation, euthanasia, social problems of handicap, work and environmental health hazards. Teaching is by lecture, discussion, field work and film.

51339 Technology and Society
Three semester hours.

This is a subject concerned with the interaction between technology and society and with the impact of technological change on society. It takes a synoptic view of the process of innovation, the influence on it and its social effects, the process of industrialization, the making of public policy and its consequences. Teaching is by lecture, discussion, film.

51369 Technical and Professional Communication
Three semester hours.

This is a course in the principles and practice of effective written and oral reporting, intended to help students in researching, organising, writing and presenting material appropriate to technical and commercial subjects. Adaptation of material and communication techniques to selected channels. Letters, memoranda, reports, articles, graphs, tables, diagrams. Short talks on technical subjects and an introduction to visual aids.

51501 Industrial Sociology
Three semester hours.

Students are assumed to have no prior knowledge of sociological concepts. There is, therefore, a group of introductory lectures which deal with these concepts and terms. The lectures then go on to deal with the impact of industry and technological change on the environment, the family, education and work. There is discussion of the inter-relationship between industry, the community and political influence. Teaching is by tutorials, lectures and films.

51519 Industrial Relations
Three semester hours.

Students are given a basic understanding of the nature of industrial conflict, trade union and employer associations in Australia. There is some historical development which helps in the understanding of the nature of change - economic, organisational, political, industrial and technical - and of the reasons behind present day attitudes in industry. Teaching is by lecture and seminar.

SCHOOL OF PHYSICAL SCIENCES

62311 Geology 1 (1 Sem)
Six semester hours (2 s/hrs lectures, 4 s/hrs practical).

The Earth's surface and physical processes operating on it. Properties and processes affecting the crust of the Earth. Mineral products, especially power, metals and water. Maps and geologic structures; minerals, rocks and fossils; engineering applications. Three one-day field excursions.

62312 Geology 1 (2 Sem)
Three semester hours for two semesters.
Equivalent to 62311 above.

62416 Chemistry 1 (Life Sciences) (F/T) (1 Sem)
Six semester hours (2 s/hrs lectures, 1 s/hr tutorial, 3 s/hrs practical).
Pre-requisite: HSC Science or equivalent.

Chemistry as it is related to the Life Sciences. Basic concepts, atomic structure, periodic table, bonding, stoichiometry, thermodynamics, structure of matter.

Texts: Kotz and Purcell (1987) "Chemistry and Chemical Reactivity. (Saunders) .
Brady and Humiston (1986) "General Chemical Principles and Structures" SI Version (Wiley). 4th Ed.
Aylward & Findlay ed., "Chemical Data Book" (Wiley).
Macartney, "Chemistry, an Introductory Study" (recommended for students who have not studied Chemistry and the HSC).

62417 Chemistry 1 (Life Sciences) (P/T) (2 Sem)
Three semester hours for two semesters
Equivalent to 62416 above.

62426 Chemistry 2 (Life Sciences)
Six semester hours (3 s/hrs lectures, 3 s/hrs practical).
Pre-requisite: Chemistry 1 (L/S) (62416/62417).

Introduction to organic chemistry; functional groups; mechanism of reactions; stereochemistry. Reaction Kinetics; chemical equilibrium; acids and bases; solubility.

Texts: Brown, W.H., "Introduction to Organic Chemistry" 3rd Ed. (W.I.S.E.).
Aylward, G.H. & Findlay, T.J., "S.I. Chemical Date" 2nd Ed. (Wiley).

62443 Chemical Analysis 2

Six semester hours (2 s/hrs lectures, 4 s/hrs practical).
Pre-requisites Chemistry 1 (L/S) (62416), Chemistry 2 (L/S) (62426)
Structural Inorganic Chemistry (62431).
Environmental Chemistry (62462)

A lecture series with associated practical work on separation techniques and volumetric procedures used in analytical chemistry.

Texts: Pecsok, Shields, Cairns, William, "Modern Methods of Chemical Analysis", Wiley, 2nd ed., 1976.
Pietrzyk and Frank, "Analytical Chemistry, 2nd ed., Academic Press.

62462 Environmental Chemistry

Six semester hours (2 s/hrs lectures, 4 s/hrs practical).
Pre-requisites Chemistry 1 (62416) and Chemistry 2 (62426).

The chemical nature and control of natural and polluted systems in the atmosphere and hydrosphere. The use of modern analytical techniques in study of such systems.

63111 Physics (Life Sciences) (F/T) (1 Sem)

Six semester hours (3 s/hrs lectures, 1/2 s/hr tutorial 2.5 s/hrs practical).
Pre-requisite: HSC Mathematics and Science or equivalent.
Co-requisite: Mathematics 1 (L/S) (33101).

General introduction to mechanics, wave motion, optics, thermal physics, properties of matter and modern physics.

Text: Kane & Sternheim, "Physics SI Version" (Wiley).

63112 Physics (Life Sciences) (P/T) (2 Sem)

One point two five semester hours lecture for two semesters. Either one hour tutorial or 2.5 hours practical.
Equivalent to 63111 Full-time above.

77024 Environmental Law

The environmental law course provides a comprehensive guide to the major statutory and common law controls over the use of land and of pollution. The aim of the course is to introduce students to those areas of law which are usually or occasionally encountered when development is proposed or opposed. Thus, students are introduced to the environmental licenses and approvals required, and the procedures and problems which may be encountered for developments such as: aluminium smelters, coal mines, residential flats, forestry, industrial developments, uranium mining, developments on public land (say, by the Maritime Services Board, Elcom, State Rail Authority, etc.) and so on. Heritage legislation is also addressed.

In addition, the course covers the jurisdictions of the Supreme Court, Land and Environment Court and Magistrates Court. The choices between these courts whether for a developer, council, citizen or other body is discussed and a brief glance is given to the differing practices and procedures of these courts. These are matters with which legal practitioners and many other people in NSW are becoming increasingly involved.

91201 Horticultural Experimentation
Three semester hours (1 s/hr lecture, 2 s/hrs practical).
Pre-requisites: Nil.

Deals with the principles of biological experimentation, as applied to horticulture. These include uses of simple mathematical functions; experimental design and analysis; the use of statistics; and applications in practical situations such as testing growth media, pesticides, or plant performance.

91204 Soils and Growth Media
Six semester hours (2 hrs lecture, 4 s/hrs practical tutorial).
Pre-requisites: Chemistry 1 (62417), Biology 1 (91311) or Concepts in Biology (91378).

Physical and chemical properties of soils and horticultural potting mixtures; methods of analysis; supply of nutrients, water, air, ions; management of soils and potting mixes. Problems with soils and mixes; pH, drainage, irrigation and salinity. Natural Australian soil ecosystems; growth media, formulation and use; media used in hydroponics.

91205 : Plant Breeding and Genetics
Six semester hours (2 s/hrs lecture, 4 s/hrs practical, tutorial).
Pre-requisite: Biology 1 (91311) or
Concepts in Biology (91388) plus Microbiology 1 (91314).

Plant cell processes including molecular genetics and control of genetic activity in cells and environmental influences amongst individuals and populations. Plant tissue culture - principles and practices, and application of these by cloning, micropropagation, somatic cell genetics and hybridisation.

91206 : Plant Production
Six semester hours (2 s/hrs lecture, 4 s/hrs practical, tutorial).
Pre-requisite: Biology 2 (91312).

Cultivation of both exotic and native plants of value in urban horticulture. Skills necessary for the cultivation, selection and modification of stocks for particular situations are developed. The principles of plant physiology, water use, irrigation and associated problems, with nursery and intensive cultivation systems.

91207 Plants in the Landscape
Six semester hours (2 s/hrs lecture, 4 s/hrs practical/tutorial).
Pre-requisites: Plant Production (91206).

Explores in depth the uses of plant materials, particularly Australian natives, as part of the function of open space management. The subject deals with site evaluation, human needs, the uses, and benefits of plants in the landscape. Also considered are principles of plant selection and the cultural practices necessary to establish plants at the site and maintain their health.

91208 Plant Protection
Six semester hours (2 hrs lecture, 4 s/hrs practical/tutorial).
Pre-requisites: Horticultural Science 1 (91202), Microbiology 1 (91314).

Advances an understanding of plant pests and disease, their transmission and control. The subject deals with major groups of plant pests, the safe handling of herbicides and other control substances, and biological control approaches.

91215 Horticultural Research Project
Six semester hours (2 s/hrs, 4 s/hrs practical/tutorial).
Co-requisite: Horticultural Management 2 (91220).

Students, individually or in groups of two or three, are required to carry out a research or development project, related to personal interest or their employment situation. Each student is required to present a report of this work, which is lodged with the School's report collection.

91216 Horticultural Procedures 1 (1 Sem)
Six semester hours.

Introduction to urban horticulture, indicating its historical and cultural significance. Major world climate zones and the species and typical structural forms of vegetation. Plant features utilised in ornamental horticulture for a variety of amenity and aesthetic purposes. Annual, perennial, herbaceous, woody, exotic and native plant species for specific purposes. Plant nomenclature, and identification of selected groups. Techniques of propagation from seeds, spores, cuttings. Budding, grafting and pruning techniques. Applications of a range of construction materials and equipment to open area establishment and planting; simple surveying and levelling techniques and introduction to recording and monitoring programme.

91217 Horticultural Procedures 2 (1 Sem)
Six semester hours.
Pre-requisite: Horticultural Procedures 1 (91216).

The role of selected woody ornamentals, bulbs, and soft-wooded perennials in their natural ecosystems, and in the artificial environments of urban landscapes. The distribution of native vegetation in the Australian environment, and the choice of plants, exotic and native, for particular places and uses. Methods of plant identification. The asexual propagation of the plant material including breeding, aerial layering, semi-hardwood cuttings, grafting, introduction of leaf cuttings, tissue culture, and cultivation

of plants in controlled nursery environments. An introduction to the problems presented by different horticultural sites, and techniques of landscape construction, including drainage, postings, retention banks, and access ways.

91218 Australian Plants
Six semester hours (2 s/hrs lectures, 4 s/hrs practical/tutorial).
Pre-requisite: Quantitative Ecology (91360)

The taxonomy, identification, distribution natural ecology and biogeography of Australian plants. The potential of native plants for horticultural exploitation. Cultivation techniques for native species.

91229 Horticultural Management 1
Three semester hours (1 s/hrs lecture, 2 s/hrs practical/tutorial).
Pre-requisites: Satisfactory completion of stages 1 to 4 of the course (stages 1 to 3 for entrants with Assoc Diploma in Horticulture or equivalent)

Principles and practices of business management in a horticultural enterprise. Introduction to accounting methods, balance sheets, stock control, management and legal issues. Production management and open space management.

Strand B - Technical
Greenhouse system design and operation, and seasonal and commercial factors in production management. Design, construction and maintenance of open spaces for a variety of purposes; seasonal and budgetary management.

91220 Horticultural Management 2
Six semester hours (2 s/hrs, 4 s/hrs practical/tutorial).
Pre-requisites: Horticultural Management 1 (91219).

(Organisational): A systems approach to the operation of horticultural enterprises including nurseries and public areas such as parks and gardens, are developed. The subject includes an investigation of methods of formulating management options in terms of production, personnel, publicity and marketing in a nursery enterprise; and of resolutions of conflicts of human uses and of public utility and private rights, in the management of open areas. The utilisation of information sources, and legal aspects of management and marketing will also be considered.

91222 Advanced Horticultural Research Project (1 Sem)
Nine semester hours.
Pre-requisites: Completion of all but final one to two stages of course.

This subject is to be undertaken only by students seeking the award of the degree in Urban Horticulture with honours. Students wishing to be considered for a pass award only will not undertake this subject.

After discussion with an academic supervisor, students will choose a topic on which to carry out work of an individual investigative nature. Topics can come form a wide range, including for example selection and breeding of native species, growing media, cultivation requirements and irrigation, arboriculture, ecological horticulture, or plant protection.

91223 Advanced Horticultural Project (2 Sem)
Three semester hours for two semesters.
Equivalent to 91222 above.

91226 Horticultural Procedures 1 (2 Sem)
Three semester hours for two semesters.
Equivalent to 91216 above.

91227 Horticultural Procedures 2 (2 Sem)
Three semester hours for two semesters.
Equivalent to 91217 above.

91235 Special Horticultural Topics
Three semester hours (1 s/hrs lecture, 2 s/hrs practical/tutorial).
Pre-requisites: Satisfactory completion of stages 1 to 4 of the course
(stages 1 to 3 for entrants with Assoc Diploma in Horticulture or equivalent)

Develops and extends specialised knowledge of selected areas. The subject is also designed to introduce students to a number of areas with potential for development and application in horticulture.

91297 Professional Experience (Urban Horticulture) (F/T) (2 Sem)
Six semester hours for two semesters.

One year (48 weeks) of relevant work experience is required for the completion of the degree in Urban Horticulture. Each student must enrol in this subject for a total of twelve semester hours. Four weeks of full-time work is equivalent to one semester hour. Work experience can be completed concurrently with part-time studies, or as a sandwich year, usually taken between the second and final years of the course. This subject number is for sandwich students.

91299 Professional Experience (Urban Horticulture) (P/T) (4 Sem)
Three semester hours for four semesters.

See 91297 for description. This subject number is for students enrolled in the part-time degree program.

91301 Biology 1 (P/T) (2 Sem)
Three semester hours for two semesters.
Equivalent to 91311 below.

91311 Biology 1 (F/T) (1 Sem)
Six semester hours (2 s/hrs lectures, 1 s/hr tutorial, 3 s/hrs practical).

Diversity of living things: cell theory and use of knowledge of cell structure to distinguish kingdoms of organisms; comparative morphology and systems physiology in major phyla of the animal kingdom.

Text: Keeton, W.T. and J.L. Gould (1986). "Biological Science", 4th edition, W.W. Norton and Company N.Y.

91312 Biology 2
Six semester hours (2 s/hrs lectures, 1 s/hr tutorial, 3 s/hrs practical).
Pre-requisite: Biology 1 (91311) or equivalent.

Organisation and control at cell level; functioning of membranes and organelles, enzymes and other proteins; the dependence of protein synthesis on genetic coding from DNA, applications to genetic engineering. Organisation and control in organisms and populations; principles of genetics, and interactions of genes and environment. Organisation and control in terrestrial ecosystems. Structure and function of angiosperms as major primary producers in terrestrial ecosystems. The interaction of biotic and abiotic factors in ecosystems. The cycling of nutrients and flow of energy. Examples of Australian ecosystems. Adaptations of vegetation to the Australian environment.

Text: As for 91311, Biology 1.

91313 Biochemistry 1 - Introductory Biochemistry
Six semester hours (2 s/hrs lectures, 1 s/hr tutorial 3 s/hrs practical).
Pre-requisites: Biology 2 (91312) or equivalent. Chemistry 2 (Life Sciences) (62426)

Bioenergetics and physical biochemistry: energy flow and transformation, laws of thermodynamics, free energy considerations in equilibrium and steady-state situations; electrolyte behaviour, pH and proton equilibria; colligative properties, osmotic pressure; chemical kinetics, catalysis and enzyme action. Structure and function of biological molecules emphasizing structural, energy providing and informational characteristics: carbohydrates, lipids, amino acids, peptides, proteins (including enzymes), necleosides, nucleotides, nucleic acids. Replication and repair of DNA; recombinant DNA. Protein synthesis. Basic concepts of metabolic pathways; energetics of metabolism.

Text: Stryer, L. "Biochemistry" (Freeman & Co, 3rd Ed. 1988).

91314 Microbiology 1 - Introductory Microbiology
Six semester hours (2 s/hrs lectures, 4 s/hrs practical).
Pre-requisite: Biology 2 (91312) or Concepts in Biology (91378).

An introduction to the structure, function and taxonomy of the bacteria, fungi, protozoa and viruses. A survey of selected topics including microscopy; elementary immunology; chemotherapy; microbial ecology; sterilisation and disinfection and microbiological techniques.

Text: Pelczar, Chan & Krieg."Microbiology" (McGraw Hill, 5th Ed. 1986)
Or Brock, T.D. & Madigan. "Biology of Micro-Organisms" (Prentice Hall, 5th Ed. 1988)
Or Stanier, Adelberg & Ingraham "General Microbiology" (MacMillan, 5th Ed. 1986).

91315 Biomonitoring
Three semester hours
Pre requisites: Biology 2 (91312); Human Biology (91317)
Co requisites: Microbiology 1 (91314)

The dynamics of natural and disturbed aquatic and terrestrial ecosystems; effects of industrial pollution on these ecosystems will be investigated. Effects of pollution include chemical changes such as pH fluctuations, increases in concentrations of heavy metals and organic chemicals such as pesticides and detergents; biological contaminants resulting from sewerage, garbage and changes in the balance of the natural microorganisms biota. Sampling procedures; estimates of biomass and productivity; methods of data analysis. This subject includes compulsory field excursions.

91316 Bioinstrumentation
Six semester hours (3 s/hrs lectures, 3 s/hrs practical).
Pre-requisite: Physics (Life Sciences) (63111).

Concepts of electricity, electronic and computerised instrumentation, transducers, signal processors, recording and display equipment. Application of instrumentation in the measurement of clinical and biological parameters.

Text: Diefenderfer, A.J. "Principles of Electronic Instrumentation" (W.B. Saunders, 2nd Ed.) 1979.

91317 Human Biology
Six semester hours (3 s/hrs lectures, 3 s/hrs tutorial/practical).
Co-requisite: Biology 2 (91312).

Basic gross anatomy and detailed study of microscope structure of the human body. The structure and function of tissues and organs are related to a model of control mechanism in order to emphasise the process of homeostasis. Whenever possible, an attempt is made to integrate morphological, physiological and biochemical details in each of the functional units in the human body.

Text: Tortora, G.J. and Anagnostakos, N.P. "Principles of Anatomy and Physiology" (Harper and Row).

91320 Biochemistry 2 - Biochemical Pathways
Six semester hours (2 s/hrs lectures, 2 s/hrs tutorial 2 s/hrs practical).
Pre-requisite: Biochemistry 1 (91313).

Principles of catalysis. Purification properties and nomenclature of enzymes. Vitamins and enzyme cofactors. Localisation of enzymes. Regulation of enzyme action at genetic and molecular levels. Cellular role of ATP. Oxidative phosphorylation and the mitochondrion. The electron transport chain. Glucose catabolism and anabolism. The glycolytic sequence. The pentose phosphate pathway. The citric acid cycle. Fatty acid synthesis. Oxidation of fatty acids. Membrane models. Breakdown of proteins and metabolism of amino acids. One carbon metabolism. Synthesis and degradation of nucleotides.

Text: As for 91313, Biochemistry 1.

91321 Biochemistry 3
Six semester hours (2 s/hrs lectures, 1 s/hr tutorial 3 s/hrs practical).
Pre-requisite: Biochemistry 2 (91320).

Structure of biological membranes and implications for metabolite transport; the cell surface and recognition of extracellular modulators of cell function. Adaptive processes and enzyme regulation in metabolic control; biochemical devices for the amplification of metabolic response. Biosynthesis, secretion and action of hormones; detailed biochemistry of selected hormones.

Vitamins and trace metals in nutrition and their involvement in enzyme action as coenzymes, activators and regulators. Biochemistry of connective tissue and bone; calcium homeostasis. Specialized metabolism of nervous tissue; generation and transmission of the nerve impulse. Muscle proteins and the biochemistry of muscle contraction.

Texts: As for Biochemistry 2 and Cooper, J.R., Bloom, F.E. & Roth, P.H. "The Biochemical Basis of Neuropharmacology" (Oxford University Press, 4th Ed. 1982).

91322 Biochemistry 4
Six semester hours (2 s/hrs lectures, 4 s/hrs practical).
Pre-requisite: Biochemistry 3 (91321). Not required for Biotechnology major).

Biochemical Pharmacology and Toxicology: modes of action of widely used drugs including anti-depressants, addictive drugs, narcotics, analgesics, anaesthetics and anti-inflammatory drugs. The toxicity and metabolism of foreign compounds and their elimination from the body.

Biomedical Science Strand: Biochemical aspects of Disease States cancer and carcinogenesis, rheumatoid arthritis and other inflammatory diseases, inherited metabolic diseases, mental disorders, alcoholism.

Biotechnology Strand: Industrial and Environmental applications of Biochemistry - enzyme technology in industry and environmental analysis, biochemistry and energy production, genetic engineering for industry and agriculture.

Texts: As for Biochemistry 3.

91326 Analytical Biochemistry
Six semester hours (2 s/hrs lectures, 4 s/hrs practical).
Pre-requisite: Biochemistry 1 (91313).

Modern analytical methods in Biochemistry with emphasis on instrumentation and underlying principles. Qualitative biochemical analysis. Spectroscopic methods (spectrophotometry, spectrofluorometry, flame emission and absorption photometry, magnetic resonance methods). Separation methods (chromatography, electrophoresis, centrifugation). Electro-chemical methods (potentiometry and ion electrodes, polarography). Introduction to radiochemistry. Errors in analysis. Implications of biochemical equilibria in analysis. Molecular biology techniques.

Text: Wilson, K. & Goulding, K. H. "A Biologist's Guide to Principles and Techniques of Practical Biochemistry" (E.Arnold, London, 3rd Ed. 1986).

91330 Microbiology 2 - Microbial Physiology & Basic Applied Microbiology
Six semester hours (2 s/hrs lecture, 4 s/hrs practical).
Pre-requisite: Microbiology 1 (91314).

Bacterial physiology-nutrition, energetics; biosynthesis and growth. Mechanisms and use of growth and physiological reactions in diagnostic and applied microbiology. Features of, and factors influencing, the microbial flora of habitats such as the higher animal body, soils, water supply and disposal systems and foods. The survival, growth and death of such flora; methods for identification and quantitation. Introduction to bacterial genetic systems and processes. Antimicrobial substances in the environmental, hospital and laboratory environments.

Text: As for Microbiology 1 (91314).

91331 Microbiology 3 - Public Health Microbiology
Six semester hours (2 s/hrs lectures, 4 s/hrs practical).
Pre-requisite: Microbiology 2 (91330).

Basic epidemiological principles; mathematical formulation of epidemics; sociological aspects and case studies in epidemiology.

Microbiological safety; hygiene, health and safety in the work environment. The hospital and industrial environment; hygiene and sanitation control measures; sterilisation and disinfection. Microbiological aspects of the import and export of materials and products; quarantine.

Food, water and airborne diseases; exotic and notifiable diseases; zoonoses. Vaccine production, vaccination procedures and programs. Production of antisera.

Texts: Note: For students intending to enrol in 91372 - Clinical Bacteriology and Parasitology, see entry for that subject.

Students not intending to proceed to Subject No. 91372

Hobbs, B.C. and Roberts, D. "Food Poisoning and Food Hygiene" (Edward Arnold)

OR

Frazier, W.C. and Westhoff, D.C. "Food Microbiology" (McGraw-Hill).

AND

McFaddin, J. "Biochemical Lists for Identification of Medical Bacteria (Williams & Wilkins).

OR

Cowan, S.T. and Steele, K., "Manual for the Identification of Medical Bacteria" Cambridge University Press.

91334 Introductory Molecular Biology

Three semester hours
Pre-requisites: Microbiology 1 (91314); Biochemistry 2 (91313)
Co-requisites: Microbiology 2 (91330) and/or Biochemistry 2 (91320)

Introduction to the basis of present day molecular biology. The structure and function of DNA, RNA and protein synthesis in the prokaryotic and eukaryotic cell. The interactions of regulatory, enzymic and other proteins with DNA. Key concepts and procedures in bacteriai and bacteriophage genetics, including mutations, mechanisms of genetic exchange - DNA recombination and interaction. Introduction to the principles and procedures underlying DNA manipulation methods in the molecular biology laboratory.

91335 Advanced Molecular Biology

Six semester hours
Pre-requisite: Introductory Molecular Biology (91334)

Techniques for the isolation, handling, characterisation, manipulation, sequencing, modification and synthesis of DNA elements into cells - microbial, animal and plant. Techniques for the isolation and characterisation of proteins and the use of computer generated models for the prediction and manipulation of their structure. The applications of animal and plant cell culture procedures to the production of specific products and improved strains of organism. The utilisation of genetically modified cells for the production of industrial, therapeutic and other products. Use of radionuclides in molecular biology. Safe practice, ethical and legal issues in the application of advanced biological technologies, and molecular biology laboratory management.

91337 Clinical Microbiology - Virology and Serology
Three semester hours (1 s/hr lecture, 2 s/hrs practical).
Pre-requisite: Microbiology 2 (91330).

Tissue culture practices. Introductory virology; nature of viruses, viral multiplication; classification; identification. Diagnostic virology, involving isolation and serology of viruses of clinical and veterinary significance. Chemotherapy and interference principles.

Epidemiological principles and advanced case studies, vaccine programs or control of viral and bacterial diseases. Diagnostic serology.

White, D.O. & Fenner, F.J . Text: ."Medical Virology" Academic Press 3rd Ed).

91341 Blood Bank
Three semester hours (1 s/hr lecture, 2 s/hrs practical).
Pre-requisites: Pathobiology 1 (91354), Pathobiology 2 (91355), Haematology (91358).

ABO serum and cell grouping. Rh factor typing. Albumin and enzyme techniques. Direct and indirect Coombs' test. Pretransfusion compatibility tests. Antibody identification tests. Genetics. Organisation of a blood bank. Investigation of transfusion reactions.

Text: Pittiglio, D. Harmening "Modern Blood Banking and Transfusion Practices" (F.A Davis).

91342 Clinical Biochemistry 1 - Principles of Clinical Chemistry
Three semester hours (1 s/hr lecture, 2 s/hrs practical).
Pre-requisite: Biochemistry 2 (91320).

Laboratory hazards and quality control including appropriate statistics as used in clinical biochemical laboratories. Introduction to calculations and analyses of clinically important substances. Pre-analytical procedures. Qualitative analysis as exemplified by urine analysis. Quantitative analysis as exemplified by inorganic phosphorus analysis. Spectroscopic identification of normal and abnormal haemoglobin pigments. Blood sugar estimations and basis of abnormalities of carbohydrate metabolism. Principles of

clinical enzymology with particular reference to the methodology involved. Principle of automation involving discrete and continuous flow methods.

Text: Wootton, I.D. and Freeman, H. "Microanalysis in Medical Biochemistry" (Churchill, Livingstone 6th ed).

91343 Clinical Biochemistry 2 - Measurements of Homeostasis and its Malfunction

Three semester hours (1 s/hr lecture, 2 s/hrs practical).
Pre-requisite: Clinical Biochemistry 1 (91342).

Liver and kidney function and disorders. Regulation of electrolyte, water and acid-base balance. Serum protein patterns in health and disease. Abnormalities of lipid metabolism. Radio immunoassay, hormone evaluation with special emphasis on thyroid function, isoenzymes, malabsorption syndromes, vitamin levels in clinical investigation.

Text: Zilva,J.F. & Pannall,P.R. "Clinical Chemistry in Diagnosis and Treatment" (Lloyd-Luke, 4th Ed.)

91348 Radioactive Isotopes 1

Three semester hours (1 s/hr lecture, 2 s/hrs practical).

Basic physics of nuclear structure and radioactive decay. Modes of interaction of radiation with matter. Ionisation and scintillation detection methods. Elementary tracer methods in biology. Radiation biology and safety considerations. Radioisotopes in the environment.

91351 Introductory Immunology

Three semester hours (1 s/hr lecture, 2 s/hr practical).
Pre-requisite: Microbiology 1 (91314), Biochemistry 1 (91313).

The immune system, including immunoglobulin and hypersensitivity, methods of detecting antibodies - agglutination, precipitation, indirect agglutination techniques, immunodiffusion, immune protection.

Text: Roitt, I. "Essential Immunology" (Blackwell 6th Ed.)

91354 Pathobiology 1

Six semester hours (2 s/hrs lectures, 4 s/hrs practical).
Pre-requisites: Biology 2 (91312), Human Biology (91317), Chemistry 2 (62426).

This course provides a basic knowledge of disease processes, the body's responses to them (Pathology) and the preparation of body tissues for examination of structure (Histotechnology). The pathology strand of the subject includes the mechanisms of tissue injury and repair, the development of disease and the examination of the light

microscopic appearance of these mechanisms. The histotechnology strand incorporates the chemistry of biological dyes, their uses in the laboratory to highlight normal tissue structures and demonstrate pathological tissue changes. These two disciplines are integrated to present an understanding of disease, its morphological appearance and the laboratory techniques used to interpret these changes.

Texts: Wheater, P.R.; Burkitt, H.G; Stevens, A; Lowe, J.S;
"Basic Histopathology" (Churchill Livingstone 1985).

91355 Pathobiology 2

Six semester hours (2 s/hrs lectures, 4 s/hrs practical).
Pre-requisites: Pathobiology 1 (91354), Microbiology 1 (91314),
Biochemistry 1 (91313).

Introduction to structure and function of blood as a tissue, proteins in blood and other tissues. Structure and function of the various types of blood cells and platelets; homeostasis and disorders of the blood; congenital and acquired haemolytic states; blood collection and quality control. The immune system, including immunoglobulin and hypersensitivity; methods of detecting antibodies - agglutination, precipitation, indirect agglutination techniques, immunodiffusion; immune protection.

Texts: Roitt, I. "Essential Immunology." (Blackwell, 6th Ed.)
O'Connor, B. "A Colour Atlas and Instruction Manual of Peripheral Blood Cell Morphology" (Williams & Wilkins).
Dacie, J.V. & Lewis, S.M. "Practical Haematology".

91356 Diagnostic Cytology 1

Six semester hours (2 s/hrs lectures, 4 s/hrs practical).
Pre-requisites: Pathobiology 1 (91354), Pathobiology 2 (91355).

Cytology of the female genital tract in health and disease. Physiological and hormonal changes in enfoliated cells of the female genital tract. Differentiation of inflammatory cells from precancerous cell populations and malignant cells. Carcinoma *in situ* and carcinoma of the cervix. Cytology of neoplastic cells derived from the uterus, fallopian tube and ovary.

Text: Naib, Zuher M. "Exfoliative Cytopathology" (Little Brown & Co. 3rd Ed. 1985).

91357 Diagnostic Cytology 2

Six semester hours (2 s/hrs lectures, 4 s/hrs practical).
Pre-requisite: Diagnostic Cytology 1 (91356).

The respiratory, gastrointestinal and urinary tracts. Aspiration biopsy smears. Diagnostic features of cancer and non-cancerous cells in sputum, urine and serous diffusions.

Text: As for Diagnostic Cytology 1.

91358 Haematology
Six semester hours (2 s/hr lecture, 4 s/hrs practical).
Pre-requisite: Pathobiology 2 (91355).

Correlation of physiological processes, pathological state and diagnostic tools in haematology; quality control and automation; cytogenetics; morphology of peripheral blood films and bone marrows.

Text: Beck, William S. "Haematology" Latest Ed. (MIT Press, Cambridge Mass.).
O'Connor, B. "A Colour Atlas and Instruction Manual of Peripheral Blood Cell Morphology" (Williams & Wilkins).

91359 Advanced Immunology
Six semester hours (1 s/hr lecture, 1 s/hr tutorial, 4 s/hrs practical).
Pre-requisite: Pathobiology 2 (91355) or Introductory Immunology (91351)

This course provides current concepts of modern immunology to students who have some basic understanding of the subject, and an appreciation of the wide spectrum of applied immunology in medicine, research and industry.

Specialised areas of immunology covered include: macrophages and tumour immunology, natural killer cell activity in immunosurveillance, lymphokines and monoclonal antibodies.

In addition, techniques applicable both in laboratory and industrial research including enzyme-linked immunoabsorbent assay (EIA); cell separation techniques and monoclonal antibodies will also be examined.

91360 Quantitative Ecology
Six semester hours (2 s/hr lecture, 4 s/hr practical/tutorial).
Pre-requisites: Biology 2 (91312), Biocomputing (91395), Introductory Biometrics (33105) or Horticultural Experimentation (91201).

Measurement and analysis as part of the resource management process. Techniques of estimating population size and density of sedentary organisms; sampling methods, assessment and data analysis in aquatic and terrestrial systems. Techniques for sampling multi-species communities and mobile organisms. Estimations of biomass and productivity. Principles of identification and categorisation of key groups of indicator organisms in aquatic and terrestrial systems, including major groups of plants, invertebrates and microbial groups. The design and use of keys. Collection, preservation and identification of specimens from the field.

This subject will include a compulsory field excursion to develop skills of field identification of organisms and measurement techniques, both aquatic and terrestrial.

91362 Plant Ecophysiology
Six semester hours (2 s/hrs lectures, 4 s/hr tutorial, practical).
Pre-requisite: Quantitative Ecology (91360).

Principles of plant classification with reference to Australian groups. Introductory geology, soil formation, soil structure, classification and analysis. Anatomical and other responses of plants to environmental stress. Carbon metabolism and factors affecting growth and development. Nitrogen fixation and nutrient cycling. The role of plants in the biosphere.

This subject will include compulsory field excursions.

Text: Larcher, "Physiological Plant Ecology" translated by M.A. Biederman-Thorson (Spring-Verlag, 2nd Ed. 1980).

91363 Animal Ecophysiology
Six semester hours (2 s/hrs lectures, 1 s/hr tutorial, 3 s/hrs practical).
Pre-requisites: Human Biology (91317), Quantitative Ecology (91360).

Basic concepts in ecophysiology; limiting factors, lethal limits, acclimation. Patterns of physiological responses to natural and selected man-made stressors. Co-ordination of physiological processes with environmental factors; neuro-endocrine control of life cycles and physiological responses, stress syndrome. Population changes; basic animal population dynamics, structure, growth and regulation of populations.

This subject includes a compulsory field excursion.

Texts: Hainsworth, F.R. "Animal Physiology: Adaptations in function" (Addison Wesley).
Gordon, M.S. et al "Animal Physiology: Principles and Adaptations" (Collier MacMillan).

91364 Aquatic Ecology
Six semester hours (2 s/hrs lectures, 4 s/hrs practical).
Pre-requisites: Plant Ecophysiology (91362), Animal Ecophysiology (91363).

Australian water resources and the hydrological cycle. Structural components and functional processes of aquatic ecosystems; physical, chemical and biological features; energy flows and nutrient cycles. Distinctive features of lakes, rivers and streams, estuaries, coastal lagoons and the sea. Assessment and monitoring of water pollution problems; water quality and biological surveillance. Management of polluted and disturbed aquatic habitats. Management of water supply reservoirs.

This subject will involve a number of compulsory field excursions.

Texts: Reid, G . L. & Wood, R. D. "Ecology of Inland Waters and Estuaries" (D Van Nostrand Co.).
Hynes, H. B. N. "The Ecology or Running Waters".

91365 Terrestrial Ecology
Six semester hours (2 s/hrs lectures, 4 s/hrs practical).
Pre-requisites: Plant Ecophysiology (91362), Animal Ecophysiology (91363).

Ecosystem concepts and their application to ecological management. Ecosystem dynamics. Major world ecosystems and associated non-biotic mechanisms. Major Australian terrestrial ecosystems and their management. Fire; its ecological impacts and management. Case studies in applied ecology.

This subject will include compulsory field excursions.

Use will also be made of reports of statutory authorities, management plans and environmental impact assessments.

91366 Pest Control and Toxicology
Six semester hours (2 s/hrs lectures, 4 s/hrs practical/tutorial).
Pre-requisite: Human Biology (91317), Quantitative Ecology (91360)

Biological and chemical principles of pest control; the safe use of pesticides. Methods of toxicological testing for pesticides, heavy metals and other hazardous chemicals, in air, soil and water, using biological assays of animals and plants.

91367 Applied Ecology
Six semester hours (2 s/hrs lectures/seminars, 4 s/hrs project).
Pre-requisites: Aquatic Ecology (91364), Terrestrial Ecology (91365).

The lecture/seminar component of this subject will deal with the following:-
Environmental legislation; the NSW Environmental Acts and their associated regulations; Comparison of the Federal Acts with those from other States; Significance of socio-economic factors on decision making in environmental matters; Cost benefit analysis and prediction of social impact; Environmental impact assessment; Objectives, contents and procedures for the preparation of environmental impact statements.

Project:-
A major part of this subject will be devoted to a research project which will normally be carried out in small groups. An individual detailed report on the project will be submitted by each student.
This subject is normally to be taken in the last semester of the undergraduate work, since it draws on the expertise derived from all other subjects in the course.

This subject will involve a compulsory field excursion.

91368 Microbial Technology 1
Six semester hours (2 s/hrs lectures, 4 s/hrs practical/tutorial).
Pre-requisite: Microbiology 2 (91330).

Formation of, and extraction of, useful products of microbial, plant and animal cells.

Practices and procedures of industrial fermentations. Unit operations, process control in batch, fed batch and continuous fermentation procedures. Computer control of fermentation systems. Down stream processing of materials.

Industrial hygiene sterilisation and disinfection methods in plant operation. Methods and problems in quality control in biotechnology in the food and pharmaceutical industries. Waste disposal systems for effluents.

Industrial visits and/or a laboratory or literature project are compulsory.

91369 Microbial Technology 2
Six semester hours (2 s/hr lectures, 4 s/hr laboratory).
Pre-requisite: Microbiology 3 (91331).

A survey of the genetics of bacteria and fungi of industrial importance.

The mutation process and the development of improved strains of micro-organisms. Recombination processes and their application in biotechnology. The isolation, characterisation, manipulation and usage of plasmids, transposons and other DNA elements for the improvement of industrial micro-organisms. Introduction of DNA elements into microbial, plant and animal cells. The applications of these methods to the production of hormones, proteins, chemicals, vaccines and other products.

91372 Clinical Bacteriology and Parasitology
Nine semester hours (3 s/hr lectures, 6 s/hr laboratory).
Pre-requisite: Microbiology 3 (91331).

Quantitative methods, reliability studies, automation, data processing and numerical analysis in clinical microbiology. Pathogenic microorganisms: their handling (including safety requirements), cultivation, isolation and relationship to the indigenous flora of man and animals. A detailed study of staphylococci, streptococci, corynebacteria, mycobacteria, neisseria, enteric bacteria, pasteurellae, pseudomonads and spirochaetas. Antibiotics and antibiotic sensitivity testing. Pathogens of veterinary significance.

Parasites (protozoa and helminths) of medical and veterinary importance; methods for handling specimens and laboratory diagnosis.

Texts: Lennette, E.H., Balows, A., Hausler, W.J. and Shadomy, H. J., "Manual of Clinical Microbiology", (American Society for Microbiology).

OR

Joklik, W.K., Willett, H.P., Amos, D. B., and Wilfert, C.M. "Zinsser Microbiology" (Prentice-Hall International Inc.).

AND

MacFaddin, J. "Biochemical Tests for the Identification of Medical Bacteria" (Williams and Wilkins).

OR

Cowan, S.T. Steele, K. "Manual for the Identification of Medical Bacteria" (Cambridge Uni Press).

91373 Clinical and Applied Mycology

Three semester hours (1 s/hr lectures, 2 s/hr laboratory).
Pre-requisite: Microbiology 2 (91330).

The structure, function and classification of fungi, with particular reference to those of clinical, industrial, veterinary and agronomic significance. The growth processes and identification of fungi, as causative agents of human and animal disease; and as agents of biological breakdown and deterioration. Control procedures for fungi.

Each student will undertake a literature and/or laboratory project related to his/her major study area.

91374 Tissue Culture

Three semester hours (1 s/hr lecture, 2 s/hrs practical).
Pre-requisites: Pathobiology 2 (91355) or Introductory Immunology (91351).

Theoretical and practical aspects of the cultivation of animal cells and tissues *in vitro*. Basic principles of culture; establishment of cell lines; adherent and suspension cultures; harvesting and propagation; organ cultures; storage of cultures; cell fusion; use of cultures to produce and test for specific products; culture dynamics; flow cytometry; mutation and trans-formation *in vitro*.

Text: Paul, J. "Cell and Tissue Culture" 6th Ed. Churchill Livingstone, 1987.

91376 Environmental Measurement

Three semester hours
Pre-requisites: Biology 2 (91312) ; Introductory Biometrics (33105); Biocomputing (91395)

Measurement and analysis as part of the resource management process. Techniques of estimating population size and density of sedentary organisms; sampling methods, assessments and data analysis in aquatic and terrestrial systems. Techniques for sampling multi-species communities and mobile organisms. Estimations of biomass

and productivity. This subject involves a compulsory excursion to develop skills of field identification of organisms and measurement techniques, aquatic and terrestrial.

91378 Concepts in Biology (P/T) (2 Sem)
Three semester hours for two semesters (1 s/hr lecture, 2 s/hrs practical).
Equivalent to 91388 below.

91384 Project (Honours) (3 Sem)
Twenty seven semester hours.
This subject is normally taken by part-time students
See 91394 for description.

91388 Concepts in Biology (F/T) (1 Sem)
Six semester hours (2 s/hrs lectures, 1 s/hr tutorial, 3 s/hrs practical).
(Elective for Physical Science and other Faculties.)
NOTE: For the degree in Urban Horticulture this subject is to be taken only by entrants with an Associate Diploma in Horticulture or equivalent qualifications.

This subject is designed as a one-semester introductory course in biology, suitable as an elective subject for students in Physical Sciences, providing an introduction to the major principles of biological science, and the importance of this branch of science in a world of advanced technology. Life exists in general on three planes of organisation: cell, organism and population. Life is self-perpetuating, diverse and evolving. The biosphere represents a complexly balanced system involving a cycling of materials and a continuous flow of energy. Science, technology, industrialisation and population pressures are all having increasing impacts on the biosphere.

91392 Research Methodology
Three semester hours.

Overview of approaches to research; the Karl Popper view; defining the problem; planning the experimental work; interpretation of laboratory data; application of statistical methods and computer packages to a range of specialities.

91393 Reading Assignment
Six semester hours.

Each student is required to complete either:
(a) an extensive reading assignment and a 4,000 word written critical analysis on a topic different from his/her research project work
OR
(b) senior undergraduate and/or postgraduate subjects amounting to 6 semesters hours of study.

91394 Project (Honours) (2 Sem)
Twenty seven semester hours.

This subject is normally taken by full-time students.
The project will take the form of an in-depth experimental or theoretical investigation into a problem of social or industrial relevance. The results of the investigation, together with a critical literature review, will form the basis of a thesis to be submitted by the last week of the Spring Semester. Each student will be required to present a seminar on his or her work at the end of the year.

Each student will be individually supervised by a full-time member of the academic staff of the School throughout the course of the project.

91395 Biocomputing
Three semester hours (1 s/hr lecture, 2 s/hrs tutorial).
Pre-requisites: Statistics (L/S) (33103).

Introduction to computers and programs in the biological sciences. Analysis of the operation of computer systems with emphasis on principles of hardware architecture, operating systems, editors and file management. Comparison of various types of computers, IBM PC, Macintosh, Amdahl mainframe, PDP11 and various software packages available to the biological and biomedical sciences.

91396 Advanced Biocomputing
Three semester hours (1 s/hr lecture, 2 s/hrs practical/tutorial).
Pre-requisite: Biocomputing - (91395).

Computer programming techniques with emphasis on structured programming using PASCAL. Problem analysis and development of solution structures. Writing and verifying programs. Comparison of programming languages. Overview of specialised software packages.

Text: Chivers, I. and Clark, M. "Interactive FORTRAN" (Wiley, 1984 Student ed.).

91406 Project (Clinical Measurement) (1 Sem)
Eighteen semester hours.
See 91407 for description.

Renamed in 1990 - number to be advised.
Project and Industrial Experience - Clinical Measurement

91407 Project (Clinical Measurement) (2 Sem)
Nine semester hours for two semesters.
Pre-requisite: All foundation subjects.

All Masters candidates must undertake a project and prepare a report. The project is designed to introduce them to problem solving situations in applied fields relevant to their interests. Projects may take the form of experimental investigations, design studies, extensive critical reviews or other suitable activities. If possible, projects will be chosen in co-operation with hospital and medical institutions so that candidates have some introduction to professional practice. The project will be completed in accordance with the Rules for Masters Degree by Coursework.

Renamed in 1990 - number to be advised.
Project and Industrial Experience - Clinical Measurement

91408 Principles of Biocomputing
Three semester hours (1 s/hr lecture, 2 s/hrs tutorial).
Pre-requisites: Some knowledge of basic mathematics and statistics is assumed.

Introduction to computers and programming. Problems analysis and the development of solution structures. The PASCAL language. Writing and verifying programmes. Applications to biostatistics and other biological and medical areas. Overview of computer packages and utilities. Overview of laboratory computing techniques.

Text: Law, V.J. "Standard Pascal - An Introduction to Structured Software Design" (Brown) 1986.

91412 Biomedical Sciences 1
Six semester hours.

A selection from the following subjects, according to the student's needs:
Aspects of Immunology
General Principles of Haematology
Principles of Virology
Employment of Radioactive Isotopes
A methodology project in Clinical Biochemistry
Advanced Aspects of Analytical Biochemistry

91413 Biomedical Sciences 2
Six semester hours (2 s/hrs lecture, 4 s/hrs practical).

A selection from the following subjects, according to the student's needs:
Principles of Blood Group Serology
Pathological Haematology
Applications of Radioactive Isotopes in the Biomedical Laboratory
On-Line Computer Systems in Biological Areas
A methodology project in Clinical Biochemistry

91414 Analytical Biochemistry Project 1
Three semester hours.

A selected project related to currently used Clinical Biochemistry methodology, entailing experimental work in the laboratory or in the compilation of comprehensive review involving research into the literature.

91415 Analytical Biochemistry Project 2
Three semester hours.

A selected project related to currently used Clinical Biochemistry methodology, entailing experimental work in the laboratory or in the compilation of comprehensive review involving research into the literature.

91417 Clinical Laboratory Management
Three semester hours (2 s/hrs lectures, 1 s/hr tutorial).

Theoretical considerations of planning, staffing, organising and controlling. Problem identification in laboratories. Aspects of accounting and finance. Use of multiphasic health screening. Labour relations. Methods evaluation. Ethical and legal considerations affecting laboratory personnel.

91418 Project (Clinical Biochemistry)
Eighteen semester hours (extending over three semesters).

Students undertake investigatory and developmental work in an area of clinical biochemistry. Projects are carried out at the students' places of employment and are generally related to current problems or new developments in those laboratories. Students are expected to develop skills in research design and methodology, and also in the collection, critical evaluation and presentation of scientific data. The project will be completed in accordance with the Rules for Masters Degree by Coursework.

91419 Case Studies in Clinical Biochemistry
Three semester hours (1 lecture/tutorial).
Pre-requisite: Clinical Biochemistry 2 (91343).

A variety of case studies, each illustrative of a different kind of problem, will be introduced. Real and simulated cases which involve conceptual and practical problems stemming from uncertain or ambivalent analytical procedures, faulty instrument calibration, poor quality control, inappropriate data handling, and unexpected or apparently inexplicable relationships between sets of biochemical data are used. Students work individually or in groups, studying particular cases, leading class discussions, and suggesting alternative technical or management procedures as well as new technological innovations that might be usefully employed in each case.

91420 Principles of Bioscience
Three semester hours (1 s/hr lecture, 2 s/hrs practical/tutorial).
Pre-requisites: Some knowledge of physics, chemistry and mathematics is assumed.

A course for graduates with little previous experience in biology structure and function of cells and organs. Diffusion and transport. Bioenergetics. Cell reproduction and genetics.

Text: As for Biology 1

91421 Principles of Human Biology
Six semester hours (2 s/hrs lectures, 4 s/hrs practical/tutorial).
Pre-requisite/Co-requisite: Principles of Bioscience (91420).

Introduction to human anatomy and physiology. The structure and function of tissues and organs are related to a model of control mechanism in order to emphasise the process of homeostasis. Morphological, physiological and biochemical details of each functional unit in the human body will be integrated where possible.

Text: Tortora and Anagnostakos, "Principles of Anatomy and Physiology" 5th ed. (Harper & Row).

91422 Principles of Bioinstrumentation
Six semester hours (2 s/hrs lecture, 4 s/hrs practical).

A course for graduates with little previous experience in instrumentation or computing. Introduction to the concepts of electricity, electronic and computerised instrumentation, transducers, signal processing, recording and display equipment. Application of instrumentation in the measurement of clinical and biological parameters.

Text: Diefenderfer, A.J. "Principles of Electronic Instrumentation" (2nd. Ed., Saunders).
(See over)
Replaced in 1990 by two three semester hour subjects - numbers to be advised.
Bioelectronics
Advanced Mathematics in the Life Sciences

91423 Clinical Biochemistry - Advanced Aspects A
Six semester hours (2 s/hrs lectures, 4 s/hrs practical/tutorials).
Pre-requisite: Clinical Biochemistry 1 (91342).

Toxicology and drug metabolism; modern methods for the screening, identification and quantitation of drugs of abuse.

Clinical biochemistry of foeto-placental function, gastrointestinal function, the porphyrias and the catecholamines.

Principles and practice of instrument evaluation.

Advanced techniques in clinical biochemistry; IR Spectroscopy, GLC, GC/Mass spectrometry, HPLC, ion-selective electrodes.

91424 Clinical Biochemistry - Advanced Aspects B
Six semester hours (2 s/hrs lectures, 4 s/hrs practical/tutorials).
Pre-requisite: Clinical Biochemistry 1 (91342).

Chemical pathology and biochemistry of liver and kidney function; pathophysiological effects of alcohol abuse, viral infection and choleostasis.
The endocrine tissues; thyroid, adrenal and gonadal function. Theoretical and practical aspects of immunoassay.

Inborn errors of metabolism; screening methods and investigation of the genome.

Chemical diagnosis of diabetic states, hypertension and myocardial infarction.

Immunological disorders; detection and diagnosis.

Text: Ryan, W.G. "Endocrine Disorders - a Pathophysiologic Approach" 2nd Ed. Year Book Medical Publishers, 1980.

91430 Advanced Bioinstrumentation
Six semester hours (2 s/hrs lectures, 4 s/hrs practical/tutorial).
Pre-requisite: Principles of Bioinstrumentation (91422) or equivalent.

An advanced course on the theory, practice and applications of electronic instrumentation in clinical measurement. Analog instrumentation; impedance concepts, complex and vector techniques; linear filters, transient response; operational amplifiers and their uses; biomedical amplifiers; other analog building blocks. Digital instrumentation; logic families; flipflops, counters and displays; analog/digital interconversions; data busses and microprocessor fundamentals; digital signal processing.

Text: As for Principles of Bioinstrumentation (91422).

Replaced in 1990 by two three semester hour subjects - numbers to be advised.
Hardware for Clinical Data Acquisition and Control
Advanced Bioinstrumentation - 3Hrs.

91432 Laboratory Biocomputing
Six semester hours (2 s/hrs lectures, 4 s/hrs tutorial).
Pre-requisite: Principles of Biocomputing (91408) or equivalent.

A course in real-time laboratory computing using PDP-11 minicomputers. FORTRAN-basic statements, sequential file access, FORMAT facilities, subroutines. Laboratory peripherals: analogue and digital inputs and output; real-time clocks. The MACRO assembler language: basic assembler syntax and instructions; FORTRAN-MACRO interfaces. Operating systems for personal computer data acquisition. Example applications and case studies.

Replaced in 1990 by two three semester hour subjects - numbers to be advised.
Laboratory Computing - 3 Hrs.
Advanced Programming

91433 Biostatistics
Three semester hours (1 s/hr lecture, 2 s/hrs tutorial).
Pre-requisite: Principles of Biocomputing (91408) or equivalent.

Review of parametric and non-parametric statistics applied to the clinical field; population distributions, tests of significance, selection of suitable statistical tests, analysis of variance, correlation and regression analysis, experimental design. Use of major computer packages (SPSS, minitab) for statistics.

Text: Sokal, R.R. and Rohlf, F.J. "Biometry" (Freeman, 2nd ed.) 1981, or
Zor, S.H. "Biostatistical Analysis" (Prentice-Hall, 2nd ed.) 1984.

91434 Radiation Protection
Three semester hours (1 s/hr lecture, 2 s/hrs tutorial/practical).

Principles and techniques of radiological protection including: Basic physics; radiation, its sources and properties; radiation units; detection and measurement principles; health physics instruments; radiation dosimetry (ionising and non-ionising); principles of radiation control; radiation protection standards; shielding fundamentals; principles of radioactive waste disposal; safety design of nuclear laboratories; administrative aspects of radiological protection; legal aspects; accelerators and cyclotrons; transport of radioactive materials.
(See over)
NOTE: Students will be required to attend at least 2 days for excursion at the Australian School of Nuclear Technology, Lucas Heights, during one of the tutorial weeks for practical work on the safe handling of radioactive materials.

91435 Physics in Medicine
Three semester hours (1 s/hr lecture, 2 s/hrs tutorial/practical).

Radiation biology: principle of radiation dosimetry; cellular and molecular radiobiology; dose-response relationships. Radiopharmaceuticals: processing and use of radiopharmaceuticals, biologically specific radioactive compounds, handling of isotopes. Radiochemical techniques: use of tracers in medicine and biology.

NOTE: Students will be required to attend at least 2 days for excursion at the Australian School of Nuclear Technology, Lucas Heights, during one of the tutorial weeks for practical work on the safe handling of radioactive materials.

Renamed in 1990 - number to be advised.
Physics in Medicine 2

91442 Toxicological Testing - Bioassay
Six semester hours 2 s/hr lecture, 4 s/hrs practical).
Pre-requisites: Introduction to Toxicology (91448) and Experimental Design (91449)
Toxicity tests to determine acute and chronic effects of toxic substances on a wide range of organisms e.g. fish, invertebrates, plants. Analysis and interpretation of results.

91443 Environmental Management
Three semester hours (1 s/hr lecture, 2 s/hrs practical).
Pre-requisites: Introduction to Toxicology (91448) and Experimental Design (91449)

Environmental legislation; the NSW Environmental Acts and their associated regulations; comparison of the Federal Acts with those from other States; Significance of socio-economic factors on decision making in environmental matters; Cost benefit analysis and prediction of social impact; Environmental impact assessment; Objectives, contents and procedures for the preparation of environmental impact statements.

National and international environmental legislation. Risk analysis and management strategies to reduce risk from environmental pollution. Use of toxicological data in Environmental Impact Statements.

91444 Analytical Techniques in Toxicology
Six semester hours (2 s/hrs lecture, 4 s/hrs practical/tutorial).
Pre-requisites: Introduction to Toxicology (91448), Experimental Design (91449).
Co-requisites: Biochemical Toxicology (91445).

Techniques and instrumentation used for toxicological testing of environmental and biological samples.

91445 Biochemical Toxicology
Three semester hours (1 s/hr lecture, 2 s/hrs practical).
Pre-requisites: Introduction to Toxicology (91448).
Co-requisites: Analytical Techniques in Toxicology (91444).

Biochemical mechanisms involved in entry, transformation and removal of toxic substances in plants, animals and selected micro-organisms.

91446 Field Surveillance and Management of Toxic Substances
Six semester hours (2 s/hrs lecture, 4 s/hrs practical/tutorial).

Pre-requisites: Introduction to Toxicology (91448), Experimental Design (91449).
Co-requisites: Environmental Accumulation and Transformation of Toxic Substance

Field monitoring for the effects of toxic substances. Use of biological indices to assess impact of toxic substances. Application of bioassay data to natural ecosystems.

91447 Environmental Accumulation & Transformation of Toxic Substances
Three semester hours (1 s/hr lecture, 2 s/hr practical).
Pre-requisites: Introduction to Toxicology (91448).
Co-requisites: Field Surveillance and Management of Toxic Substances (91446).

Pathways of toxic substances in the environment. Transfer mechanisms between different environment compartment. Bioaccumulation and biotransformation.

91448 Introduction to Toxicology
Three semester hours (1 s/hr lecture, 2 s/hrs practical).
Pre-requisites: Nil.

Strand A
Historical development of toxicology and environmental toxicology. The sources and behaviour of the main classes of toxic substances in the environment, their effects on tissues, organs, organisms and ecosystems. Introduction to community ecology and ecological processes. Environmental toxicology and human and occupational health. National and international standards for toxicological testing.

Strand B
The use of mammalian species in toxicity testing. Examination of the effects of the main classes of natural and artificial poisons on specific organ systems of mammals. Care and maintenance of laboratory animals and special problems associated with their use in toxicity testing. Mutagenesis, carcinogenesis and teratogenesis.

91449 Experimental Design
Three semester hours (1 s/hr lecture, 2 s/hrs practical/tutorial).
Pre-requisites: Assumed knowledge of Biostatistics or equivalent.
Co-requisites: Introduction to Toxicology (91448).

Design and analysis of biological experiments. Basic parametric statistical methods and their applications in toxicology: analysis of variance, the factorial experiment, an experiment with two factors, control of error, compounding. Interrelations of two or more variables: regression, multiple regression, correlation. Non-parametric statistical

tests. Data transformations; probit analysis. The use of computers and statistical packages in the analysis of toxicological data.

91450 Project (Environmental Toxicology)
Nine hours per week for two semesters.

All Masters candidates must undertake a project and prepare a report. The project is designed to introduce them to problem solving situations in applied fields relevant to their interests. Projects may take the form of experimental investigations, design studies, extensive critical reviews or other suitable activities. If possible, projects will be chosen in co-operation with employers so that candidates have some introduction to professional practice. The project will be completed in accordance with the Rules for Masters Degree by Coursework.

91451 Clinical Measurement A
Six semester hours (2 s/hrs lectures, 4 s/hrs tutorials/practicals/ demonstration).
Pre-requisites: Principles of Bioinstrumentation (91422), Principles of Human Biology (91421).

Introduction to advanced principles of neurophysiology, electrophysiology, fluid dynamics and kinetics as applied to the clinical situation: Membrane physiology, electrical propagation in nerves and muscles, neuromuscular control and feedback, sensory systems, fluid dynamics, lung and blood mechanics, physiological transducers.

Replaced in 1990 by two three semester hour subjects - numbers to be advised.
Physiological Measurement
Biosensors and Transducers

91452 Clinical Measurement B
Three semester hours (2 s/hrs lectures, 1 s/hr tutorials/demonstrations).
Pre-requisites: Principles of Bioscience (91420), Principles of Bioinstrumentation (91422).

Introduction to use of radioisotopes, x-rays, ultrasound, magnetic resonance, image processing and formation techniques in organ imaging and related tissue visualisation methods. Clinical application of CT, ultrasound, gamma cameras, PET and MRI reviewed.

Text: Wells, P.N.T. "Scientific Basis of Medical Imaging" (Churchill-L'stone) 1982.

Replaced in 1990 by two three semester hour subjects - numbers to be advised.
Medical Imaging and Signal Processing
Physic in Medicine 1

91461 Physiological Modelling
Three semester hours (1.5 s/hr lecture, 1.5 s/hr tutorial).
Pre-requisite: Principles of Biocomputing (91408).

An introduction to the analysis of dynamic behaviour in biological and physical systems, with emphasis on the development of suitable mathematical models. General development of models; philosophy, variables, states, signal flows and parameters. Computational block models; simulations using THTSIM. Expression-based modelling languages. Example biological models; compartment models, driven models, non-linear models. Integration errors. Validation of dynamic models against data.

91501 Bioscience 1A
Six semester hours.
Co-requisite: Physical Science 1A (62181).

Characteristics of living things, classification into kingdoms, summary of animal kingdom, and the place of humans within it. Introduction to human biology; evolution of humans, major organ systems. Introduction and function of tissues.

The skeletal and muscular systems. Homeostasis at the organism level.

Cell structure and function in procaryotes and eucaryotes; cell division, abnormal growth and division of cells. Mendelian inheritance, population genetics, and Hardy Weinberg equilibrium, as they relate to human populations.

Introduction to microbiology; the main groups of micro-organisms; the normal flora of humans - intestine, skin, nose, throat.

91502 Bioscience 1B
Six semester hours.
Pre-requisite: Bioscience 1A (91501).
Co-requisite: Physical Science 1B (62182).

Basic anatomy and histology - body regions, cavities, distribution of major organs, basic tissue types.

Basic control systems - nature of nerve impulse, nervous and synaptic transmission; endocrine glands and hormones; neuroendocrine interactions. Changes with growth and aging.

Biological macromolecules; carbohydrates, lipids, proteins, nucleic acids, vitamins. The nature and role of enzymes in the body.

The gastrointestinal system, structure and function. Principles of anabolic and catabolic processes. Reproduction - anatomy and physiology of reproductive system; embryology, foetal development, birth, neonatal changes.

The haemopoetic system - haemopoetic organs and tissues, types of blood cells and their functions, control of blood cell production and turnover.

Sterilisation, disinfection, sanitation, asepsis, antisepsis. Basis of barrier nursing. Sources and mode of transfer and survival of infectious agents. The carrier state. The taking of specimens and their transport to the laboratory.

91503 Bioscience 2A
Six semester hours.
Pre-requisite: Bioscience 1B (91502).

The immune system and its role in normal body function. Failure of cellular and immune control and neoplasias.

Compartments of body fluids: composition, distribution and exchange.

The Cardiovascular system: blood composition and flow; the heart, control of heart rate and stroke volume; factors affecting blood pressure.

The Respiratory system: lungs, mechanism of breathing, gas exchange and transport, oxygen dissociation curves.

The Renal system: the kidney; mechanism of urine formation; control of blood volume; control of blood osmotic pressure, micturation reflexes; diuresis. Factors affecting water and electrolyte balance. Factors affecting acid-base balance.

91504 Bioscience 2B
Three semester hours.
Pre-requisite: Bioscience 2A (91503).

Pathogenicity, virulence, invasiveness of pathogens; opportunistic pathogens, toxicity. Compromised hosts. Basic epidemiology. The development and use of vaccines. Hospital-acquired infections and their control. Microbiological safety procedures. Occupational risks. The microbiology of specific infections.

Microbiology and its relationship to nursing care. Food hygiene; food-borne infections and intoxications; water microbiology, antibiotics and transfer of resistance to antibiotics.

91505 Bioscience 3A
Three semester hours.
Pre-requisite: Bioscience 2B (91504).

Anatomy and function of the central nervous system: structure and function of the brain; effect of xenobiotics on brain function. Effects of aging. Structure of spinal cord, hierarchical control of reflex activity and sensory information.

The somatic nervous system; neuromuscular transmission and the musculoskeletal system. The special senses, vision, hearing, balance, smell, taste. The autonomic nervous system. Neuroendocrine control of behaviour and behavioural disorders.

Multisystem integration and its control. Biochemical rhythmicity in the human body - neuroendocrine aspects.

Factors causing behavioural disturbances, hormonal imbalance, insufficiency or over-production; vitamin and mineral disturbances, inborn errors of metabolism, drugs, alcohol and other xenobiotics.

91506 Bioscience 3B
Three semester hours.
Pre-requisite: Bioscience 3A (91505).

Human ecology: the emergence of humanity from other primates; biosocial evolution of *Homo sapiens;* biological compared with cultural differences among populations and races; diversity of diets, physical activities, environmental parameters and lifestyle among peoples; acceleration of environmental and social change not matched by biological changes; stressors and contaminants in urban, industrialised areas compared with those in agricultural areas, and with natural areas. The changing Australian gene pool and the distribution of inherited disorders. Geographical and socioeconomic determinants of health and disease in Australia.

91507 Bioscience 3C
Three semester hours.
Pre-requisites: Bioscience 3A (91505) and 3B (91506).

Biochemistry of organ systems in relation to cell renewal, detoxification and excretion. Biochemical parameters in diagnosis. Basic nutritional requirements; total parenteral nutrition.

Pharmocolometric principles, toxicity and drug metabolism; drug interactions. Biological mechanisms of drug addiction, and long-term toxicity.

Physical principles relating to both invasive and non-invasive measurement of clinical parameters, for instance haemodynamics, pressures, rates, cardiac efficiency. Principles of instrumentation, recording and displaying of vital signs, interpretation of signals and measurements.

91508 Bioscience 3D
Three semester hours.
Pre-requisite: Bioscience 3C (91507).

The measurement of biochemical and biophysical parameters of function of metal organ systems under normal conditions. The pathophysiology of vital organ systems, in particular cardiovascular, respiratory, renal and neurological.

Problems of drug interactions in patients with multi-systems failure. Mechanisms of detoxification and clearance of drugs. Use of biotechnological instrumentation in

physiological monitoring, for example, electrocardiographs, electroencephalograph and blood gas analysis.

91777 Masters Applied Science - Thesis (Biol. & Biomed) (F/T)

91778 Masters Applied Science - Thesis (Biol. & Biomed) (External))

91787 Masters Applied Science - Thesis (Biol. & Biomed) (P/T)

91788 Ph D - Applied Science - Thesis (Biol. & Biomed)

91997 Professional Experience (Biol/Biom) (F/T)
See 91999 for description.

91999 Professional Experience (Biol/Biom) (P/T)
All part-time students employed full-time in an area relevant to their course should enrol in this subject in every semester for which they are employed. This will be shown on your academic record to indicate your employment while studying. Full-time students intending to work for six or twelve months in place of their studies should also enrol in this subject.
Note: Professional Experience subjects do not incur a HECS liability

UTS STUDENT SUPPORT SERVICES

STUDENT SERVICES UNIT

The Student Services Unit is located at the Broadway Campus on Level 3A, Union Area of the Tower Building. The Unit offers services in the areas of student counselling, student health, and welfare.

Student Counselling

Students should feel free to contact a student counsellor whenever they have a problem. Interviews are strictly confidential and can concern anything from career assistance to social, personal or family problems. Our counsellors, Pam and Steve Young and Damien Colby Finch, are particularly well equipped to deal with stress and anxieties associated with examination fears, insomnia, public speaking and social relationships as well as general tension and worry. Call in at anytime or make an appointment by phoning 218-9145.

Health Service

A free Health Service is available to all students. The service is headed by Dr. Lesley Peter and includes health counselling, vaccinations, contraception advice, pathology collection, pregnancy tests, diet counselling etc. Students are asked to make an appointment whenever possible by phoning the Sister on 218-9554. For students at the Gore Hill campus, a Student Health Centre is operated at the Royal North Shore Hospital. Students are asked to make an appointment by phoning 438-8542.

Student Welfare

Geraldine Ray is the Welfare Officer whose responsibility is to co-ordinate accommodation, finance & loans, general welfare (including TEAS or AUSTUDY). Geraldine is particularly interested in country students or those students who generally are having a "hard time". Contact her by telephone on 218-9262.

LIBRARY SERVICES

Information services are provided by the University Library. Branches are located on three campuses as follows:

MAIN LIBRARY
Markets Campus - Corner of Quay Street and Ultimo Road, Haymarket
Telephone : 2189795 or 2189415

BRANCH LIBRARIES
North Shore Campus - 4th floor, Dunbar Building
Telephone: 4366242

Balmain Campus - Corner of Mansfield and Batty Street, Rozelle
Telephone: 6920266 (BH) or 6920390 (AH)

Students may borrow from the libraries on presentation of an ID card. Each library holds books, journals and a wide variety of audio-visual material.
Hours of opening and other information on library services are displayed at each library.

STUDENTS' ASSOCIATION

The Students' Association is the representative organisation of all students at the University. Our major purpose is to lobby and advocate on behalf of students to improve the conditions and standard of education for all UTS students.

The Students' association provides a number of other services including resource centres. These provide many indispensable study resources such as second-hand books, photocopying, computer and typing facilities and book binding. We publish the student newspaper *Newswit*, support the activities of affiliated clubs and supply international student identity cards.

Professional education, research, communications, financial and administrative staff are employed to assist in the activities of the Students' Association.

A Women's Officer is employed part-time to represent the interests of women on campus and in the wider community and to co-ordinate a range of social and educational activities.

An International Students' Officer is employed part-time to represent the interests of overseas students and assist with any particular problems they may have.

Student Council is the chief decision making body of the Students' Association. It consists of 23 students elected annually, with at least one student from each faculty.

Student Council meets several times each semester and all students are able to attend these meetings and participate in the decision making process.

You do not however have to wait for Student Council meetings in order to have an influence on policy or decisions. If anything concerns you contact any member of Student Council, or the President, so we can hear your opinion.

Student Councillors are students like yourself who are willing to spare some of their time to improve the quality of student life.

The Association's main office is located in Level 3, Tower Building, Broadway (telephone 218 9064) with branches at the Markets campus in Room B110 (telephone 218 9060) and the School of Design, Balmain (telephone 218 9870).

COMPUTER CENTRE

The Computer Centre provides extensive interactive and batch facilities to serve the computing requirements of both academic and administrative users.

The main installation is located at Broadway on Level 9 of the Tower Building, but facilities are also available in Building 4, the Engineering Building and Gore Hill.

The principal equipment installed is a large Amdahl system and IBM compatible workstations.

Facilities are located at the following sites:

Student Terminal Rooms	Tower Building, Level 9	218-9442
	Engineering Bldg, Level 5	-
	Building 4, Level 4	218-9499
	Gore Hill, Level 5	436-6246

Further information is provided in the Computer Centre Handbook. All intending users of the Amdahl must first register.

THE UNION

The Union aims to be the social, cultural and sporting heart of the UTS. To this end it provides food services, lounges, a shop, indoor games, sporting facilities and a second hand bookshop. In addition, the Union supports sporting and recreational clubs, organises entertainment and offers a wide range of creative leisure classes. The Union also operates a newsagency and runs a car park.

Location of Facilities

Broadway
- Sports Centre, Building 4. This area is the heart of the Union, a gymnasium and sauna, squash courts, sports office, outdoor basketball, sports clinic, travel agency.
- Level 3, has food service, bar, billiards room, games room, lounge and meeting rooms, function rooms, the Union Shop, the Second-hand Bookshop and Resources Centre and the Union booking and reception desk.
- Tower Building, Level 6 - the Function Centre.

Gore Hill
- First floor. Licensed bar, general lounge, quiet lounge, canteen, TV and branch of Union shop.

Union Shops

The Union shops have everything to meet your course requirements - calculators, stationery, technical drawing equipment and typewriters. They also stock Institute T-shirts, sweat shirts and some sporting equipment. The Second-hand Bookshop and Resources Centre offers services which include typing, typewriter hire, photocopying, binding, duplicating and sale of second-hand books.

Activities and Creative Leisure Programs

The Activities Officer, Rod Gillett, organises lunchtime and evening concerts, dances, barbecues and various outings. He also organises the creative leisure classes such as Food and Beverage Service, Car Maintenance, Yoga and Self Defence, barbecues, dances and film shows.

If you have any ideas for social activities you are invited to contact the Activities Officer on 212-9686.

Sports and Recreation
The Union supports the following sporting and recreation clubs:

Basketball	IPOSE (photography)	Rugby League
Volleyball	Karate	Soccer
Cricket	Kung Fu	Speleos (caving)
Diving	Fencing	Runners
Motorcycling	Montage Film Society	Ski-ing
Amateur Radio Society	Squash	Fitness Programs

Steve Griffiths and Ben Tjen are the Union Sports Officers, and are located in the Sports Centre on Lower Ground Level of Building 4 at Broadway.

Catering
The Union provides a functions catering service and can assist with functions ranging from small club or faculty get-togethers through to wedding receptions or other large gatherings.

General Enquiries and Other Bookings
The Union Receptionist is located in the Union Centre, Level 3 of the Tower Building. She welcomes all enquiries and handles the bookings for creative leisure classes, snooker, sauna and hire of Union areas etc.

The Union's 'phone number at Broadway is 212-1444 and its postal address is P.O. Box 123, Broadway, 2007; the Gore Hill campus is 439-8763.

CAREERS AND APPOINTMENTS SERVICE

The University Union has established a Careers and Appointments Service which is designed to assist students in all aspects of their career development from career choice to graduate employment.

The Service offers:

- A directory of employers seeking full-time, part-time and casual staff.
- A register of students seeking employment linked to a mailing and telephone contact service.
- A library containing information on organisations which employ student graduates.
- A campus interview program. Increasingly employers conduct their major recruitment campaigns using the campus interview procedure. All major tertiary institutions have a well developed interview program the purpose of which is to bring together a large number of employers in a central location thus providing students with the widest possible choice. All students who wish to participate in campus interviews should register with the CAS as soon as possible after enrolment.
- Interview Skills Workshops are held on a regular basis which give students first hand experience of facing the rigors of the job interview.

. Careers Counselling for those students who may wish to review or clarify their original career choice.

. Casual Employment Service which keeps a register of all casual employment suitable for students.

In order to keep up to date with latest vacancies it is wise to consult the Notice Board in your faculty, the Notice Boards at the CAS office and the CAS newsletter which is produced once a fortnight.

Because the Service relies heavily on computer usage it is difficult and expensive to decentralise. However, it should only be necessary to visit the Service once and from that point it is possible to communicate with all registered students through a mailing system.

The Service operates on a full-time basis all year round and is open from 8.30 a.m. to 6.00 p.m. every weekday. Careers and Appointments carries a team of professionally trained staff and is provided free of charge by the Institute Union as a service to students.

The Service is located on Level 5, Building 1; telephone 281-2866 or 281-2867.
Staff:

Helen Christoforou - Reception
Sue Colman - Recruitment Coordination
Chris Perkins - Manager

CO-OP BOOKSHOP

A branch of the Co-Op Bookshop is available at the Gore Hill Campus, situated behind the UTS in the grounds of the North Sydney College of TAFE Phone (02) 906 3183.

Clinical and Applied Mycology	91373
Clinical Bacteriology and Parasitology	91372
Clinical Biochemistry - Advanced Aspects A	91423
Clinical Biochemistry - Advanced Aspects B	91424
Clinical Biochemistry 1	91342
Clinical Biochemistry 2 -	91343
Clinical Laboratory Management	91417
Clinical Measurement A	91451
Clinical Measurement B	91452
Clinical Microbiology - Virology and Serology	91337
Concepts in Biology (F/T) (1 Sem)	91388
Concepts in Biology (P/T) (2 Sem)	91378
Diagnostic Cytology 1	91356
Diagnostic Cytology 2	91357
Environmental Accumulation & Transformation of Toxic Substances	91447
Environmental Chemistry	62462
Environmental Law	77024
Environmental Management	91443
Environmental Measurement	91376
Experimental Design	91449
Field Surveillance and Management of Toxic Substances	91446
Geology 1 (1 Sem)	62311
Geology 1 (2 Sem)	62312
Haematology	91358
Hardware for Clinical Data Acquisition and Control - 3 Hrs.	91463
Health, Technology and Society	51014
Horticultural Experimentation	91201
Horticultural Management 1	91229
Horticultural Management 2	91220
Horticultural Procedures 1 (1 Sem)	91216
Horticultural Procedures 1 (2 Sem)	91226
Horticultural Procedures 2 (1 Sem)	91217
Horticultural Procedures 2 (2 Sem)	91227
Horticultural Research Project	91215
Human Biology	91317
Industrial Relations	51519
Industrial Sociology	51501
Introduction to Toxicology	91448
Introductory Biometrics	33105
Introductory Immunology	91351
Introductory Molecular Biology	91334
Laboratory Biocomputing	91432
Laboratory Computing - 3 Hrs.	91464
Masters Applied Science - Thesis (Biol. & Biomed) (External))	91778
Masters Applied Science - Thesis (Biol. & Biomed) (F/T)	91777
Masters Applied Science - Thesis (Biol. & Biomed) (P/T)	91787
Mathematics 1 (Life Sciences)	33101
Measurements of Homeostasis and its Malfunction	91343
Medical Imaging and Signal Processing - 3 Hrs.	91462
Microbial Technology 1	91368

Microbial Technology 2	91369
Microbiology 1 - Introductory Microbiology	91314
Microbiology 2 - Microbial Physiology & Basic Applied Microbiology	91330
Microbiology 3 - Public Health Microbiology	91331
Organisational Psychology	21101
Pathobiology 1	91354
Pathobiology 2	91355
Pest Control and Toxicology	91366
Ph D - Applied Science - Thesis (Biol. & Biomed)	91788
Physic in Medicine 1 - 3 Hrs.	91403
Physics (Life Sciences) (F/T) (1 Sem)	63111
Physics (Life Sciences) (P/T) (2 Sem)	63112
Physics in Medicine 2 - 3 Hrs.	91404
Physics in Medicine	91435
Physiological Measurement - 3 Hrs.	91439
Physiological Modelling	91461
Plant Breeding and Genetics	91205
Plant Ecophysiology	91362
Plant Production	91206
Plant Protection	91208
Plants in the Landscape	91207
Principles of Biocomputing	91408
Principles of Bioinstrumentation	91422
Principles of Bioscience	91420
Principles of Human Biology	91421
Professional Experience (Biol/Biom) (F/T)	91997
Professional Experience (Biol/Biom) (P/T)	91999
Professional Experience (Urban Horticulture) (F/T) (2 Sem)	91297
Professional Experience (Urban Horticulture) (P/T) (4 Sem)	91299
Project (Clinical Biochemistry)	91418
Project (Clinical Measurement) (1 Sem)	91406
Project (Clinical Measurement) (2 Sem)	91407
Project (Environmental Toxicology)	91450
Project (Honours) (2 Sem)	91394
Project (Honours) (3 Sem)	91384
Project and Industrial Experience - Clinical Measurement	91407
Project and Industrial Experience - Clinical Measurement	91407
Quantitative Ecology	91360
Radiation Protection	91434
Radioactive Isotopes	91348
Reading Assignment	91393
Research Methodology	91392
Soils and Growth Media	91204
Special Horticultural Topics	91235
Statistics (Life Sciences)	33103
Technical and Professional Communication	51369
Technology and Society	51339
Terrestrial Ecology	91365
Tissue Culture	91374
Toxicological Testing - Bioassay	91442

21101 Organisational Psychology
33101 Mathematics 1 (Life Sciences)
33103 Statistics (Life Sciences)
33105 Introductory Biometrics
51014 Health, Technology and Society
51339 Technology and Society
51369 Technical and Professional Communication
51501 Industrial Sociology
51519 Industrial Relations
62311 Geology 1 (1 Sem)
62312 Geology 1 (2 Sem)
62416 Chemistry 1 (Life Sciences) (F/T) (1 Sem)
62417 Chemistry 1 (Life Sciences) (P/T) (2 Sem)
62426 Chemistry 2 (Life Sciences)
62443 Chemical Analysis 2
62462 Environmental Chemistry
63111 Physics (Life Sciences) (F/T) (1 Sem)
63112 Physics (Life Sciences) (P/T) (2 Sem)
77024 Environmental Law
91201 Horticultural Experimentation
91204 Soils and Growth Media
91205 Plant Breeding and Genetics
91206 Plant Production
91207 Plants in the Landscape
91208 Plant Protection
91215 Horticultural Research Project
91216 Horticultural Procedures 1 (1 Sem)
91217 Horticultural Procedures 2 (1 Sem)
91218 Australian Plants
91220 Horticultural Management 2
91222 Advanced Horticultural Research Project (1 Sem)
91223 Advanced Horticultural Project (2 Sem)
91226 Horticultural Procedures 1 (2 Sem)
91227 Horticultural Procedures 2 (2 Sem)
91229 Horticultural Management 1
91235 Special Horticultural Topics
91297 Professional Experience (Urban Horticulture) (F/T) (2 Sem)
91299 Professional Experience (Urban Horticulture) (P/T) (4 Sem)
91301 Biology 1 (P/T) (2 Sem)
91311 Biology 1 (F/T) (1 Sem)
91312 Biology 2
91313 Biochemistry 1 - Introductory Biochemistry
91314 Microbiology 1 - Introductory Microbiology
91315 Biomonitoring
91316 Bioinstrumentation
91317 Human Biology
91320 Biochemistry 2 - Biochemical Pathways
91321 Biochemistry 3

91322 Biochemistry 4
91326 Analytical Biochemistry
91330 Microbiology 2 - Microbial Physiology & Basic Applied Microbiology
91331 Microbiology 3 - Public Health Microbiology
91334 Introductory Molecular Biology
91335 Advanced Molecular Biology
91337 Clinical Microbiology - Virology and Serology
91341 Blood Bank
91342 Clinical Biochemistry 1 - Principles of Clinical Chemistry
91343 Clinical Biochemistry 2 - Measurements of Homeostasis and its Malfunction
91348 Radioactive Isotopes 1
91351 Introductory Immunology
91354 Pathobiology 1
91355 Pathobiology 2
91356 Diagnostic Cytology 1
91357 Diagnostic Cytology 2
91358 Haematology
91359 Advanced Immunology
91360 Quantitative Ecology
91362 Plant Ecophysiology
91363 Animal Ecophysiology
91364 Aquatic Ecology
91365 Terrestrial Ecology
91366 Pest Control and Toxicology
91367 Applied Ecology
91368 Microbial Technology 1
91369 Microbial Technology 2
91372 Clinical Bacteriology and Parasitology
91373 Clinical and Applied Mycology
91374 Tissue Culture
91376 Environmental Measurement
91378 Concepts in Biology (P/T) (2 Sem)
91384 Project (Honours) (3 Sem)
91388 Concepts in Biology (F/T) (1 Sem)
91392 Research Methodology
91393 Reading Assignment
91394 Project (Honours) (2 Sem)
91395 Biocomputing
91396 Advanced Biocomputing
91403 Physic in Medicine 1 - 3 Hrs.
91404 Physics in Medicine 2 - 3 Hrs.
91405 Bioelectronics - 3 Hrs.
91406 Project (Clinical Measurement) (1 Sem)
91407 Project and Industrial Experience - Clinical Measurement
91408 Principles of Biocomputing
91412 Biomedical Sciences 1
91413 Biomedical Sciences 2
91414 Analytical Biochemistry Project 1
91415 Analytical Biochemistry Project 2
91417 Clinical Laboratory Management

91418 Project (Clinical Biochemistry)
91419 Case Studies in Clinical Biochemistry
91420 Principles of Bioscience
91421 Principles of Human Biology
91422 Principles of Bioinstrumentation
91423 Clinical Biochemistry - Advanced Aspects A
91424 Clinical Biochemistry - Advanced Aspects B
91430 Advanced Bioinstrumentation
91432 Laboratory Biocomputing
91433 Biostatistics
91434 Radiation Protection
91435 Physics in Medicine
91436 Advanced Mathematics in the Life Sciences - 3 Hrs.
91437 Advanced Bioinstrumentation - 3Hrs.
91438 Biosensors and Transducers - 3 Hrs.
91439 Physiological Measurement - 3 Hrs.
91442 Toxicological Testing - Bioassay
91443 Environmental Management
91444 Analytical Techniques in Toxicology
91445 Biochemical Toxicology
91446 Field Surveillance and Management of Toxic Substances
91447 Environmental Accumulation & Transformation of Toxic Substances
91448 Introduction to Toxicology
91449 Experimental Design
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91465 Advanced Programming - 3 Hrs.
91501 Bioscience 1A
91502 Bioscience 1B
91503 Bioscience 2A
91504 Bioscience 2B
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91999 Professional Experience (Biol/Biom) (P/T)

BIOLOGICAL AND BIOMEDICAL SCIENCES COURSE CODES

Bachelor Applied Science	Biomedical Science	KB02
Bachelor Applied Science	Urban Horticulture	KB03
Bachelor Applied Science	Environmental Biology	KB05
Bachelor Applied Science	Biotechnology	KB06
Bachelor Applied Science	Honours	KB04
Masters Applied Science	Thesis	KB51
Masters Applied Science	Environmental Toxicology	KB52
Masters Applied Science	Clinical Measurement	KB53
Masters Applied Science	Clinical Biochemistry	KB55
Doctoral Program Ph D		KB56

COURSES OFFERED PRIOR TO 1990 - NOT CURRENTLY AVAILABLE

Bachelor Applied Science	Applied Biology	KB01
Graduate Diploma in Clinical Biochemistry		KB54

THE ACADEMIC YEAR 1990

Day	Week	Date	
		Last day of Previous Academic year (Friday which falls between December 15-21 inclusive)	
FRI		15 Dec 89	
		First Day of Long Vacation (Monday which falls between December 18-24 inclusive)	
MON		18 Dec 89	
		University Closes	
FRI		22 Dec 89	
		Academic Year Commences (six weeks after commencement of Long Vacation)	
MON	1	29 Jan 90	2 WEEKS
		Autumn Semester/Re-enrolling Classes Commence (Two Weeks after Academic Year)	
MON	1	12 Feb 90	
		New Students Commence	
MON	2	19 Feb 90	
		Tutorial Week Commences	
MON	6	19 Mar 90	
		Easter Friday	
FRI		13 Apr 90	20 WEEKS
		Easter Monday	
MON		16 Apr 90	
		Tutorial Week Commences	
MON	12	30 Apr 90	
		Formal Examination Period	
MON to FRI	18 to 20	11 Jun 90 to 29 Jun 90	
		INTER SEMESTER RECESS	
MON FRI		2 Jul 90 20 Jul 90	3 WEEKS
		Spring Semester/Re-enrolling Classes Commence	
MON	1	23 Jul 90	
		New Students Commence	
MON	2	30 Jul 90	
		Tutorial Week Commences	
MON	6	27 Aug 90	
		Tutorial Week Commences	
MON	12	8 Oct 90	20 WEEKS
		Formal Examination Period	
MON to FRI	18 to 20	19 Nov 90 to 7 Dec 90	
		Last Day of Academic Year	
FRI		21 Dec 90	1 WEEK
		University closes	
MON		24 Dec 90	
		Next Academic Year Commences	
MON		4 Feb 91	
		Autumn Semester Commences	
MON		18 Feb 91	

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