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Information Manual Level One 2009



WELCOME

I extend a special welcome to those students entering university for the first time. It must be very exciting to commence tertiary studies and thereby build the foundations for a successful career as a professional engineer. Although biased, I congratulate you on choosing Chemical Engineering or our exciting new program in Pharmaceutical Engineering. The versatility of Chemical Engineering graduates is well known and this versatility is even further enhanced by the options available for students to undertake double degrees. You will find that the School has well-equipped teaching, research and computing facilities. The School is committed to excellence in all its activities with special emphasis on student care. Although you will be taking many of your Level I courses in other Schools or Teaching Units within the University, when you do have contact with the School of Chemical Engineering you will find all academic, professional and technical staff to be approachable, friendly and willing to provide assistance when required. Please do not hesitate to contact the 2009 Level I Course Advisers, Dr Yung Ngothai (Chemical Engineering) or Dr. Kristen Bremmell (Pharmaceutical Engineering) in the first instance should you require further information or assistance. In my role as Acting Head of School, I am always willing to meet with students, either individually or collectively to discuss any issues you may wish to raise. I try to make myself known to students whenever the opportunity arises so I look forward to meeting with each of you at some time during the year. I offer my best wishes for a successful and enjoyable academic year.

Dr Peter Ashman
Acting Head of School

General Student Information

For further information about the Chemical Engineering School, Engineering North Building, Please contact the appropriate person listed below:

Position	Staff Member	Room No.
Acting Head of School	Dr Peter Ashman	N119
Undergraduate Course Advisor	A/Prof Brian O'Neill (Chem)	N114
	Dr Jingzi Bi (Pharma)	N212
Student Advisor Undergraduate Level 1	Dr Peter Ashman (Chem)	N119
	Dr Jingxiu Bi (Pharma)	N212
Student Advisor Undergraduate Level 2	Dr Zeyad Alwahabi (Chem)	N113b
	Dr Jingxiu Bi (Pharma)	N212
Student Advisor Undergraduate Level 3	Dr Ken Davey (Chem)	N211
	Dr Hu Zhang (Pharma)	
Student Advisor Undergraduate Level 4	Dr David Lewis	N212b
Postgraduate Coordinator	Dr David Lewis	N212b N209
Employment/Industry Liaison	Dr Peter Ashman	
Business Manager	Mrs Dianne Parish	N118
School Office Staff	Mrs Mary Barrow Mrs Elaine Minerds Mrs Sue Earle	N120
Workshop Technical Officers	Mr Jason Peak Mr Jeff Hiorns Mr Michael Jung	Engineering Workshop
Computing Engineer	Mr Sanh Tran	N206a
School Safety Officer	Mr Andrew Wright	N115
School Health and Safety Representative	Mrs Elaine Minerds	N120
First Aid Officers	Mrs Mary Barrow	N120
	Mrs Dianne Parish	N118
Laser Laboratory Coordinator	Dr Zeyad Alwahabi	N212b
Laboratory Coordinator	Mr Andrew Wright	N115
Equal Opportunity	Mrs Mary Barrow	N120
	Mrs Dianne Parish	N118
Sexual Harassment Contact Officer	Mr Andrew Wright	N115
Equity Officer	Mr Andrew Wright	N115



Assessment Procedures, 2009

The following gives the proposed method of assessment and weighting factors for 2009. Minor changes may occur throughout the year. Students will be informed of these.

NOTES:

1. C.B. = Closed book
O.B. = Open book
2. There shall be four classifications of pass at an annual examination in any course for the degree as follows:
Pass with High Distinction, Pass with Distinction, Pass with Credit, Pass.

There shall also be a classification of Conceded Pass. A candidate may present for the degree courses for which a Conceded Pass grade has been awarded within the following limits:

- no course may be presented at the conceded pass level with a unit value greater than 3 units.
- for any single Bachelor of Engineering program no more than 10% of the courses presented may be at the conceded pass level with a limit of 9 units in total.
- for all double/combined programs no more than 10% of the courses presented may be at the conceded pass level with a limit of 12 units in total. All rules pertaining to the presentation of conceded passes within the individual programs must also be complied with.
- articulating students and students with credit transfer may present 10% of their units undertaken at Adelaide at the conceded pass level and this number will be rounded up to a multiple of 3 and will not exceed 9 units in total.

3. Supplementary examinations are held two weeks after the main examination periods:

Mid-year (Semester 1) 20 - 24 July 2009

End of year (Semester 2) 14 - 18 December 2009

Supplementary examinations are available on academic, medical and compassionate grounds. The decision to grant a supplementary examination is the responsibility of the academic staff.

Please note: It is strongly recommended that students sit for their examinations wherever possible because there is no guarantee that a supplementary will be granted.

Academic Grounds

For courses taught by Engineering Schools, supplementary examinations on academic grounds are normally offered to students obtaining a mark of 40-49 (provided they meet all other requirements of the course) and to students in their final year of study who have completed all the requirements for the degree with the exception of up to four units. Precise details on assessment in each course should be provided by Schools at the beginning of lectures.

Students do not apply for academic supplementary examinations. The maximum final grade that can be awarded for a course in which students have an Academic Supplementary is 50 Pass, except where a higher division pass (55 P1) is required to proceed to the next level of the course.

Medical Grounds

Applications must be lodged within five (5) working days of the illness.

It will be to your advantage to see a doctor on the day of the illness, so an accurate assessment of your condition can be made. Retrospective certificates are not accepted.

The category of "unfit to sit an examination" is reserved for major illness that prevents attendance at the examinations. As a general rule, minor ailments, such as colds and mild respiratory infections, are not considered sufficient grounds for being certified unfit to sit an exam.

There is no restriction on the maximum grade awarded for a Medical Supplementary.

Compassionate Grounds

Supplementary examinations may be awarded where special circumstances beyond the student's control significantly affect their preparation for, or performance in, an exam. Applications must be lodged within five (5) working days of the special circumstances. There is no restriction on the maximum grade awarded for a Compassionate Supplementary.

Students who are awarded a supplementary examination on medical or compassionate grounds will not be able to count the better of the primary and supplementary exams. Sitting a supplementary exam will

constitute acceptance of the offer of the supplementary exam and only the supplementary exam result will be recorded (whether it is higher or lower than the first result).

Students granted a Medical or Compassionate Supplementary Examination and also eligible for an Academic Supplementary Examination

For courses taught by Schools in the Faculty of Engineering, Computer & Mathematical Sciences, students granted a medical/compassionate supplementary examination and who are also eligible for an academic supplementary examination should consider their options and before sitting the examination, advise the ECMS Faculty Student Office (ecms_office@adelaide.edu.au) whether they wish to accept the medical/compassionate supplementary examination or whether they wish to take the academic supplementary examination. If no notification is received it will be assumed that the student wishes to take the academic supplementary examination and thus allow the possibility of retaining the primary examination mark.

4. Tutorials and class exercises held during the year may count towards the mark in any subject for each component. This value will be specified by the lecturer in charge at the commencement of the course.
5. In subjects consisting of a number of components, a minimum mark of 40 must be obtained. This requirement applies to the following subject: CHEM ENG 3003A/B Chem Eng Projects III; CHEM ENG 4025 Chemical Engineering Projects IV, CHEM ENG 4027 Chemical Engineering Research Project (N), CHEM ENG 4026 Chemical Engineering Research Project (H), CHEM ENG 4002A/B Chemical Engineering Research Elective II and CHEM ENG 4020A/B Chemical Engineering Research Elective. A fail will be recorded if the student does not submit satisfactory project work in **ALL** components as specified by the examiner or supervisor.
6. **Exemptions and Status** - In some cases students may be granted status in whole subjects because of related studies taken previously. Exemptions from part of a subject previously attempted may be granted in some cases. You **must apply** for exemption or status; it does not happen automatically. Applications should be submitted to the **School Office** on the appropriate form **no later than** the end of Week 1 (3 March 2009).
7. **Chemical Engineering Honours:** To be eligible for the award of honours a student **should be** enrolled for the complete Fourth Year with the exception of up to 4 Units (composed of electives and/or CHEM ENG 4018 Ind. Econ. Man). In exceptional circumstances this requirement may be varied by the Head of the School. Honours will be awarded for meritorious performance throughout the course. To obtain the final honours mark a weighted average for each year will be evaluated based upon the subject weights shown in a calendar (eg a 2-point subject will contribute $2/24 = 8.33\%$) and the mark achieved by a student at their **first attempt** (with the exception of subjects where a medical supplementary was awarded). Results from any repeating subjects are **NOT** counted towards honours marks. Weights for the individual years are: Year 2 = 20%, Year 3 = 30%; Year 4 = 50%. Class I Honours requires 75%, Class IIA 70% and Class IIB 65%. Candidates will normally be required to average at least 75% in their final year for the award of Class I Honours.
There is a selection process to choose candidates who will be permitted to undertake the honours stream in the fourth year of the BE. Those selected for honours may enrol in a specially designated level IV honours course. This course varies from program to program and details are given in the enrolment sheets for each program. The normal minimum requirement for selection for the honours stream is a weighted average of 60% over levels 2 and 3 of the BE, where the relative weighting of the levels is 2:3 respectively.
8. Students may apply **in writing** to have supervised access to their **examination scripts** within **three (3) weeks** of the publication of the provisional examination results.
9. Students who believe they have reasonable grounds for expecting a higher mark may request, **in writing** to the Acting Head of School within **three (3) weeks** of the publication of the results, for a piece of work to be reassessed
10. **Review of Academic Progress:** Engineering implements a review of academic progress policy in accordance with University guidelines. This policy states that students who, in any one year of university study, fail 1/3 or more of their year's enrolment will be subject to review. The review in this case involves a formal letter and an interview with a Course Adviser in the School. The outcome could include referral to academic or counselling services and restriction of the student's enrolment, such that the student is not permitted to enrol in an overload in the following year. Further failures will result further restrictions and students failing 1/3 or more of their enrolment in each of three consecutive years will have their progress

reviewed by the Academic Review Committee. The outcome of this review could include a recommendation for preclusion, compulsory deferment for one semester or one year, or a further restricted enrolment.

11. **University Policy on Plagiarism:** Details are available on the CLPD website at:
<http://www.adelaide.edu.au/clpd/plagiarism/students>

Acting Head of School
February 2009

Calculator Policy

1. **No restrictions** will be placed on the **type/brand** of calculator that may be used by students in an examination where the use of calculators is permitted.
 2. Students are expected to own **either a graphing** calculator (similar to those used in Year 12 mathematics) or a calculator with a **solve function** (i.e. can iterate & solve non-linear equations). This is particularly useful in the later years of the course.
 3. There will be **no restrictions** placed on calculator usage in **an open-book** examination or **an open-book** section of an examination.
 4. Students are permitted to use a calculator in **all closed-book** examinations or **all closed-book** sections of an examination unless a **specific direction** is included on the examination cover sheet prohibiting the use of calculators
 5. The use of calculators **may be prohibited in a defined part (or all) of a closed-book examination**. In this case, a separate answer book for this section **must be handed-in** before the portion of the paper in which a calculator may be used is commenced.
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School Policy and Procedures for Handling Student Complaints and Feedback

The following outlines the necessary steps to make a complaint, offer suggestions or comments, or express concerns about any issue deemed relevant to the School:

1. Bring the matter to the attention of the appropriate member of staff (academic, professional or technical) concerned.
2. If the matter is not resolved by following step 1, it should be discussed with the Year Level Advisor.
3. If the matter remains unresolved after following steps 1 and 2, it should be brought to the attention of the Acting Head of School. If the member of staff concerned in step 1 is the Acting Head of School then the appropriate person in step 3 is the Executive Dean.
4. Steps 1 and/or 2 may be by-passed if the student so desires.
5. If the student wishes to make anonymous complaints, suggestions or comments, a locked Suggestions Box is available on the wall outside the School Office (Room N120, North Engineering Building).

**Assessment Procedures Chemical Engineering Subjects (2009)
Level I**

Subject	Part	Paper No.	Type	Duration (hours)	Semester	Weight
Level I						
CHEM ENG 1006 INTRODUCTION TO PHARMACEUTICAL ENGINEERING					1	(3 Units)
	1. Examination	1		3		70%
	2. Assignments					30%
CHEM ENG 1007 PROCESS ENGINEERING I					2	(3 Units)
	1. Examination	1	C.B.	3		70%
	2. Assignments					30%
CHEM ENG 1008 ENGINEERING COMPUTING					1	(3 Units)
	1. Examination	1	C.B.	2		60%
	2. Projects x 4					40%
CHEM ENG 1009 MATERIALS I					2	(3 Units)
	1. Examination					70%
	2. Assignments					30%
CHEM ENG 1010 PROFESSIONAL PRACTICE I					2	(3 Units)
	1. Examination					25%
	2. Assignments					35%
	3. Projects					40%

Assessment procedures for Level I service subjects are available on MyUni.

Practical Experience:

It is a student's responsibility to organise their own work experience and a booklet listing names of companies who have provided practical work experience to students in the past is available at the School Office. Engineers Australia also provides a booklet to their Student members listing a number of Chemical Engineering companies.

A total of **twelve weeks practical experience** (of which a minimum of 6 weeks should be under the supervision of a professional engineer) is required and this should be undertaken during the university vacations and normally be completed before beginning the work of Level IV of the course.

It is desirable that at least half of the total number of weeks specified above be spent in an approved chemical factory or research establishment on plant operation or industrial research or development.

The Faculty may grant either partial or total exemption from these requirements to a candidate who produces satisfactory evidence of practical experience obtained before their first enrolment in the Faculty; and in exceptional cases, the Faculty may grant dispensation from the requirements. Credit will not normally be given for periods of less than three consecutive weeks. A candidate should seek a variety of practical experience appropriate to the candidate's academic level.

Before beginning a period of practical experience, a candidate may ensure that it will be satisfactory to the Faculty by consulting the Acting Head of School.

Upon completion of each period of practical experience (and no later than the following 31 March) each candidate is required to submit to the Faculty Office, on the prescribed form, a statement of practical experience gained, certified by the employer for approval by the Faculty of Engineering.

To help you find work experience, we have produced a booklet which contains names, addresses and phone numbers of companies you may contact for work experience. This is available from the School of Chemical Engineering Office N120.

STUDENT PLACEMENT PROGRAM AGREEMENT

Students who undertake **unpaid** work experience or a community placement program in connection with their course or approved research work will only be covered by the University's insurance program if the work is undertaken with the knowledge and consent of the University. To obtain and document this consent the student must complete a **Student Placement Program Agreement** before any work placement can take place. (This form, totalling 3 pages, may be found starting on the next page.)

The most important thing to remember is that if a student begins **unpaid** work placement without the approval of the Acting Head of School and the completion of the Student Placement Program Agreement, the University of Adelaide insurance program is **not** available to the student.

STUDENT PLACEMENT PROGRAM AGREEMENT

Part A - Student Details

Family Name _____ Given Names _____

Student ID # _____ Student Phone # _____

Degree/Program enrolled _____

Faculty _____ Campus _____

EMERGENCY CONTACT

Name _____ Relationship _____

Phone # Work: _____ Home: _____

Mobile # _____

School Contact

Name _____ Phone # _____

As a student on work placement, I agree

1. To attend the workplace to which I have been assigned at the agreed times and days stated below.
2. To notify both my workplace supervisor (named below) and the School Contact above if I am unable to attend for reasons of ill health or any other reason.
3. To present myself in an appropriately dressed fashion ensuring I am wearing any protective clothing which may be required by the Host Organisation.
4. Obey all lawful directions of the workplace to which I have been assigned.
5. To work to my full capacity, with due regard for my legal responsibilities in the workplace.
6. To comply with all Occupational Health & Safety requirements required by the host organisation.
7. To inform the host workplace supervisor and the School administration office of any accident or injury in which I am injured or in which I have injured another party.
8. In the event of an emergency I will contact the School administration office.

Student's Signature: _____ Date: _____

Part B – Host Organisation

Name: _____ Phone # _____

Street address: _____

Contact Person: _____ Phone # _____

Email Address _____ Fax# _____

Location of placement _____

Supervisor Name _____ Phone # _____

Date of placement: (From) _____ (To) _____

Hours of work: (Start) _____ (Finish) _____

Description of task to be performed _____

Special Conditions (Clothing, safety equipment, parking) _____

Part C – Conditions

We agree to accept the named student on work placement and to plan an appropriate program for their placement.

All reasonable precautions will be taken in the workplace to ensure the occupational health safety and welfare of the student in a non-discriminatory and harassment free working environment. The School administration office will be notified by our organisation in the case of a student's illness, injury or unexplained absence. The student will not receive any form of reward or stipend for work performed during and placement and will not be used to replace paid workers or be used during any form of industrial dispute. The student is not to be required to undertake any task prohibited by the University, Legislation or insurance requirements.

It is understood by all parties that the University, the host organization or the student may without notice cancel the work placement.

The host organization agrees that they have Occupational Health & Safety procedures in place and the student will receive a safety and workplace induction that will prepare them to safely undertake the tasks and duties of the work placement.

Part D – Insurance

The University maintains a Public Liability insurance policy that will indemnify the host organisation for any negligence act, error or omissions by the student during the period of the work placement. A Certificate of Insurances for Public Liability is enclosed with this Placement Agreement Form.

The host organization agrees to indemnify the University and the student for any injury, loss or damage to student or to University property being used by agreement with the host organisation, resulting from any negligent act or omission by its employees, agents or contractors.

The host organisation agrees to provide 'proof of insurance' for the period of the work placement to the School administration office. The student is not to commence the work placement until the proof of insurance has been sighted.

Host Organisation Authorising Officer Name: _____

Signature _____ Date _____

Part E - Authorisation

I grant permission for the above named student to undertake a work placement with the above named host organisation in accordance with the conditions and guidelines above:

Acting Head of School

Signature _____ Date _____

Distribution

1. School administration office
2. Host organisation
3. Student

Adelaide University Undergraduate Scholarships

A list of potential scholarships is available on the web at the following URL:

<http://www.adelaide.edu.au/scholarships/undergrad/>

Chemical Engineering Undergraduate Prizes

Each Year students who achieve a weighted average of over 80% will receive a Dean's Merit Award.

The Sir Robert Chapman Prize

Whereas the University has received the sum of \$600 subscribed by former students of Sir Robert William Chapman, first Professor of Engineering and for fifty years a teacher at the University, for the purpose of founding a prize in his honour and memory, it is hereby provided as follows:

1. There shall be an annual prize to be called "The Sir Robert Chapman Prize".
2. The value of the prize shall be \$100.
3. An annual prize shall be awarded to the student in the Bachelor of Engineering who has most distinguished himself or herself during that year in the Level I Engineering courses in the program. No award shall be made unless the student is of sufficient academic merit.
4. Where two or more candidates are of equal merit, the prize shall be shared equally.
5. If in any year no award is made, the prize for that year shall lapse.
6. These rules may be varied from time to time, but the title and the general purpose of the prize shall not be changed.

Course Notes and Syllabus Requirements for B.E. (Chem.) and Combined Degrees.



The degree course with Honours in BE (Chem.) shall occupy four years of full-time study. Details of BE courses can be found at the following site.

<http://www.ecms.adelaide.edu.au/enrol/guides/>

B.E. Chem (Energy and Environment)
B.E. Chem (Process and Product Engineering)
B.E. Chem (Food, Wine and Bio-molecular)
B.E. in Sustainable Energy Engineering (Chemical)
B.E. in Pharmaceutical Engineering

Double and Combined Programmes

It is possible for students to enhance their engineering qualifications by combining studies in Engineering with studies in other faculties. Information can also be found at: <http://www.ecms.adelaide.edu.au/enrol/guides/>

The complete Academic Program Rules governing the award of combined degrees is available online as a pdf file from the University's website. The URL is:

www.adelaide.edu.au/calendar/ug/eng

B.E. (Chem.)/B.Sc
B.E. (Chem)/B.Ma&Comp.Sc. (Computer Science focus)
B.E. (Chem)/B.Ma&Comp.Sc. (Mathematics focus)
B.E. (Chem)/B.A.
Arts Studies Combined with the B.E.(Chem)
B.E. (Chem.)/B.Ec.
B.E.(Chem.)/B.Fin..
B.E. (Chem.)/B.Sc (Biotech)
B.E. (Petroleum.)/B.E. (Chemical)

The Bachelor of Engineering degree in the specialisations listed above may be awarded in the Pass or Honours grade. The award of the Honours grade shall be made for meritorious performance in the course with greatest weight given to performance in the later years. The Honours grade may be awarded in one of the following classifications: First Class, Second Class Division A, Second Class Division B. (There is no Third Class for the Bachelor of Engineering degree). To qualify for the degree a candidate shall regularly attend lectures and do written, laboratory, and other practical work (where such is required), and pass examinations in the subjects prescribed in the Specific Course Rules for one of the specialisations listed above. Before being admitted to the degree a candidate shall also submit satisfactory evidence of completion of a period of practical experience in work approved by the Faculty of Engineering as appropriate to the course which the candidate has followed. Candidates are required to complete satisfactorily subjects to the value of 24 Units at each of Levels I, II, III and IV.

Candidates Transferring after Completing a Science Degree

A candidate who has completed the academic requirements for the degree of B.Sc. should consult the Head of the School of Chemical Engineering before preparing an application to the Faculty of Engineering for appropriate status. Normally, acceptable candidates may proceed to the degree of B.E. (Chem.) by completing a further two-year program as specified by the Acting Head of School.

Prerequisite Subject Requirements

A student may not normally undertake a subject for which the prerequisite subject requirements have not been satisfied. Although the School of Engineering is reluctant to waive the prerequisite requirements of a subject, it is recognised that there can be situations where it is appropriate. Accordingly, if a student has sound academic reasons for a waiver of the requirement, he or she should apply to the School of Engineering through the Head of the School which offers the subject concerned.



SUMMARY OF AIMS, OUTCOMES ASSESSMENT AND SYLLABUS FOR LEVEL I CHEMICAL ENGINEERING SUBJECTS

CHEM ENG 1004: INTRODUCTION TO BIO-PROCESSING

<i>Units:</i>	<i>3.0</i>
<i>Duration:</i>	<i>Semester 1</i>
<i>Lecturer:</i>	<i>Dr Ken Davey</i>
<i>When:</i>	<i>Refer Timetable under Current Students in MyUni</i>

Assumed Knowledge:

SACE Stage 2 Mathematics 1 and 2, Physics

Course Objectives:

Introductory computing and programming in ANSI C: the elements of databases; elementary concepts and tools used in bioinformatics. Simple process engineering concepts are introduced and their application in society, industry and the environment will be illustrated. Basic measurement and conservation principles for mass and energy are applied to solve simple problems, eg in food processing, biotechnology, fuel combustion and energy generation, fluid flow and water treatment.

Graduate Attributes to be Developed:

1. Ability to apply knowledge of basic science and engineering fundamentals.
2. In-depth technical competence in at least one engineering discipline.
3. Ability to utilize a systems approach to design and operational performance.
4. Ability to focus on the integration of process safety considerations with environmental concerns, waste minimization and control system specifications.
5. Confidence to tackle real-world problems and issues central to engineering and to work as individuals and co-operatively in multidisciplinary and multicultural teams.
6. Enthusiasm and interest for undertaking life-long learning and the continual updating of engineering skills.

Course Synopsis: To provide students with the basic principles and knowledge

Text book:

Reference Books

GRADUATE ATTRIBUTES:

- The ability to apply knowledge of basic science and engineering fundamentals.
- In-depth technical competence in at least one engineering discipline.
- Ability to utilise a systems approach to design and operational performance.
- Ability to function effectively as an individual and in multi-disciplinary and
- Ability to communicate effectively, not only with engineers but also with the community at large.
- Confidence to tackle real-world problems and issues central to engineering and to work as individuals and cooperatively in multidisciplinary and multicultural teams.
- Enthusiasm and interest for undertaking life-long learning and the continual updating of their engineering skills.

CHEM ENG 1006: INTRODUCTION TO PHARMACEUTICAL ENGINEERING

<i>Units:</i>	<i>3.0</i>
<i>Duration:</i>	<i>Semester 1</i>
<i>Lecturer:</i>	<i>Dr Jingxiu Bi</i>
<i>When:</i>	<i>Refer Timetable under Current Students in MyUni</i>

Assumed Knowledge:

SACE Stage 2 Mathematics 1 and 2, Physics

Teaching Method: 30 hr lectures, 15 hr tutorials

Assessment:

A combination of tutorial assignments, presentations & critical analysis of literature (30%) and a final examination (70%).

Course Objectives:

1. to introduce students to key elements of engineering practice – sustainability, quality control & risk assessment.
2. to briefly outline the history of the pharmaceutical industry & the role of the pharmaceutical engineer.
3. to introduce students to modern pharma & biopharma fundamentals and techniques.

Graduate Attributes to be Developed:

1. Ability to apply knowledge of basic science and engineering fundamentals.
2. In-depth technical competence in at least one engineering discipline.
3. Ability to utilize a systems approach to design and operational performance.
4. Ability to focus on the integration of process safety considerations with environmental concerns, waste minimization and control system specifications.
5. Confidence to tackle real-world problems and issues central to engineering and to work as individuals and co-operatively in multidisciplinary and multicultural teams.

6. Enthusiasm and interest for undertaking life-long learning and the continual updating of engineering skills.

Course Synopsis: To provide students with the basic principles and knowledge of pharmaceutical engineering.

Content:

The course is divided in units with a typical duration of two weeks

Unit 1:

Introduction:

What do pharmaceutical engineers do? A brief history followed by challenges for the industry in the future – personalized medicine, product design – interaction between chemistry, technology & marketing to meet consumer needs; product flow & the supply chain. Units & Dimensions; Conversion of units; Numerical Calculations & Estimation – simple statistical quality concepts (mean & standard deviation); process data representation & analysis

Unit 2:

Introduction to Molecular Biotechnology & its Influence on Future Products & Treatments:

Central dogma of molecular biology; DNA to proteins, proteins as the workhorses of cells & as drugs, GMOs – gene addition to organisms – bacteria, yeasts, and plant, insect and mammalian cells, gene therapy – promise & problems, cloning – difficulties, transgenic animals,

Drug discovery – introduction to genomics, the sequence – target selection & identification, lead identification, lead optimization, toxicology studies and clinical trials – Phases I to III.

Unit 3:

The Production & Purification Sequences

Bioreactor type & mode of operation – stirred tank, bubble column, air lift reactors, fixed bed reactors, advantages & disadvantages, harmful effects of shear, mode of operation – batch, fed batch, the sterility problem and batch tracking

Downstream process – removal of biomass, formation of inclusion bodies (IBs), secretory systems – bacteria, yeasts, fungi; Proteins & their purification difficulties; typical unit operations – centrifugation, membrane filtration, chromatography, precipitation, crystallization, etc.

Unit 4:

Introduction to Molecular Kinetics of Biological Systems:

Simple kinetic models – zero, first & second order, Saturation kinetics, Michaelis-Menten kinetics, The formation of complexes, inhibition routes, uses of enzymes as drugs, influence of inhibition on reaction rates, extracting kinetic parameters.

Unit 5:

Solid State Pharmaceuticals

Introduction to powder dosage forms, milling, tableting, granulation and drying, crystalline solids and packaging.

Unit 6:

Drug Delivery:

Historical perspective, drug administration & effectiveness, rudimentary elements of pharmacokinetics – compartments, plasma level-time curve, simple one compartment models, routes of drug administration -oral, rectal, sublingual & buccal parental, aerosols, transdermal; physicochemical considerations

Unit 7:

Social Responsibility:

Engineer and Society, Ethics, Risk & Reliability, GMP framework, Legislative framework – FDA & TGA (Therapeutic Goods Administration); OGTR - Office of Gene Technology Regulator – The Gene Technology Act, Role of IBC, classes of dealings, environmental management, bioaccumulation – simple fugacity models.

Text book:

Lecture notes will be provided on My Uni. A suitable text book does not exist for this course.

Reference book:

D. Beer and D McMurrey. “A Guide to Writing as an Engineer,” (1997). John Wiley & Sons.

Carstensen J.T., Rhodes, C.T., Drug, Dev. Ind. Pharm, 10, 1017, 1984;

GRADUATE ATTRIBUTES:

- The ability to apply knowledge of basic science and engineering fundamentals.
- In-depth technical competence in at least one engineering discipline.
- Ability to utilise a systems approach to design and operational performance.
- Ability to function effectively as an individual and in multi-disciplinary and
- Ability to communicate effectively, not only with engineers but also with the community at large.
- Confidence to tackle real-world problems and issues central to engineering and to work as individuals and cooperatively in multidisciplinary and multicultural teams.
- Enthusiasm and interest for undertaking life-long learning and the continual updating of their engineering skills.

CHEM ENG 1007: PROCESS ENGINEERING I

<i>Units:</i>	<i>3.0</i>
<i>Duration:</i>	<i>Semester 2</i>
<i>Lecturer:</i>	<i>Professor Mark J. Biggs</i>
<i>When:</i>	<i>Refer Timetable under Current Students in MyUni</i>

Assumed Knowledge:

SACE Stage 2 Mathematics 1 and 2, Physics

Teaching Method:

31 hr lectures, 11 hr tutorials, 3 hr practicals.

Assessment:

Tutorials, practicals & tests during semester (30%) and final 3 hr closed-book examination (70%).

Course Objectives:

1. Understand and use concepts, conventions and calculations important in process engineering.
2. Draw and interpret pictures and diagrams depicting processes.
3. Present and describe important processing engineering unit operations and equipment.
4. Understand and work with units and dimensions – including units' conversions between SI and the American Engineering units' systems.
5. Understand and apply the basic principles of material, energy and momentum balances.
6. Understand the fundamental concepts associated with rate processes, including mass and heat transfer, and their application to design and operation of process engineering equipment.
7. Appreciate the importance of fluid flow in process engineering systems and learn application of the mechanical energy balance for pipe design and pump selection.
8. Understand basic principles of reaction equilibria and kinetics.
9. Solve problems in a systematic and professional manner using conventional notation and terminology, including making assumptions when necessary and the importance of significant figures.

Course Synopsis:

To provide students with the basic principles and knowledge which define chemical or process engineering and to demonstrate these through basic calculations and problem solving. Students are introduced to topics and theory related to the core tasks that process engineers undertake. The four main areas of chemical engineering are introduced: conservation principles, fluid mechanics, transfer processes and reaction engineering.

Content:

1. Introduction to chemical and process engineering: what is chemical and process engineering; what is a process; the role that chemical and process engineering plays in industry and society.
2. Examples of important chemical and process engineering equipment and unit operations.
3. Process variables: flow rate; volume fraction; mass fraction; mole fraction; average molecular weight; concentration; density; specific gravity; specific volume; ideal gas law; temperature; gauge pressure; absolute pressure.
4. Units and dimensions: addition, subtraction, multiplication and division of units; conversion between sets of units (cgs, SI, British, American Engineering) using dimensional equations; use of the gravitational conversion factor; the importance of dimensional consistency in engineering equations; the importance of dimensionless numbers in chemical engineering; accuracy and the importance of understanding and correctly using significant figures.
5. Flow-sheeting: block diagrams; flow diagrams; pictorial diagrams; presentation of stream flow-rates.

6. Material balances (without chemical reaction): importance and application of material balances in process engineering; open and closed, batch and continuous systems; underlying principles used in solving material balance problems; identifying system boundary; general steps involved in solving material balance problems; examples of solving material balance problems with and without recycle.
7. Chemical equations and stoichiometry: writing and balancing reaction equations; calculating stoichiometric quantities of reactants and products given chemical equations; excess reactant, limiting reactant, conversion, degree of completion and yield in a reaction; identify the limiting and excess reactants and calculating the percent excess reactant(s), the percent conversion, the percent completion and yield for a chemical reaction; calculating the amount of products for incomplete reactions.
8. Energy conservation: characteristic energy forms; transfer of energy, total energy balance for closed and open systems; specific heat; conversion of water to steam in a boiler; combustion; mechanical energy; and electrical energy.
9. Introduction to mass transfer : overview of mass transfer; diffusion and the factors that affect diffusion rate; boundary layers and the importance of diffusion in the movement of molecules through boundary layers; some processes that involve mass transfer.
10. Introduction to heat transfer: overview of heat transfer; heat conduction; thermal conductivity of single and composite flat and cylindrical walls; convection; heat transfer coefficients; pipe flow; combined conduction and convection; heat exchangers; cocurrent and countercurrent flow; LMTD.
11. Introduction to rheology and fluid mechanics: importance of fluid mechanics in chemical engineering; physical properties of fluids; viscosity and its importance in determining power requirements, mixing efficiency and mass transfer rates; Newtonian and non-Newtonian fluids; laminar and turbulent flow; Reynolds number for different flow systems and its importance in chemical engineering; the relationship between Reynolds number and turbulence; application of the mechanical energy balance for pipe design; pump selection.
12. Introduction to reaction engineering: batch, continuous and fed-batch (semi-continuous) reactors; efficiencies of various reactors; describe factors that affect the reaction rate; define what are catalysts and describe their effects on reactions; compare and contrast batch and continuous reactors in terms of their potential productivities and costs; classify continuous reactors in terms of plug flow, stirred tank and fluidized bed reactors; describe stirred tank reactors and compare them with plug flow reactors.
13. Practicals: A number of practical demonstrations will be used in the classroom to illustrate various chemical engineering principles.

Text and reference books:

R.M. Felder & R. W. Rousseau, *Elementary Principles of Chemical Processes, 3rd Edition*, 2005 Edition with Integrated Media and Study Tools, Wiley (2005).

D. M. Himmelblau & J. B. Riggs, *Basic Principles and Calculations in Chemical Engineering, 7th Edition*, Prentice-Hall (2004).

R. M. Murphy, *Introduction to Chemical Processes: Principles, Analysis, Synthesis*, McGraw-Hill (2007).

G.V. Reklaitis, *Introduction to Material and Energy Balances*, Wiley (1983).

K.A. Solen & J.N. Harb, *Introduction to Chemical process Fundamentals and Design* (4th edition), McGraw Hill (2005).

Graduate attributes:

- The ability to apply knowledge of basic science and engineering fundamentals.
 - Ability to communicate effectively, not only with engineers but also with the community at large.
 - In-depth technical competence in at least one engineering discipline.
 - Ability to utilise a systems approach to design and operational performance.
 - Ability to function effectively as an individual and in multi-disciplinary and multicultural teams; with the capacity to be a leader or manager as well as an effective team manager.
 - Confidence to tackle real-world problems and issues central to engineering and to work as individuals and cooperatively in multidisciplinary and multicultural teams.
 - Enthusiasm and interest for undertaking life-long learning and the continual updating of their engineering skills.
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CHEM ENG 1008: ENGINEERING COMPUTING

<i>Units:</i>	<i>3.0</i>
<i>Duration:</i>	<i>Semester 1</i>
<i>Lecturer:</i>	<i>Dr Zeyad Alwahabi</i>
<i>When:</i>	<i>Refer Timetable under Current Students in MyUni</i>

Aims

At the end of the course the students should have gained a basic understanding of:

- 1- Introduction to Engineering modelling techniques.
- 2- Advanced Spreadsheet for Engineering Calculations.
- 3- Introduction to the ANSI "C" computing language with Engineering applications.
- 4- Introduction to Engineering computing Using MATLAB.

Assessment

Project 1 (10%) + Project 2 (10%) + Project 3 (10%) + Project 4 (10%)

Final Exam (2 hr closed book) 60%

Content

1. Introduction to Engineering modeling techniques.

Modeling of experimental data by least squared fitting.

2- Advanced Spreadsheet for Engineering Calculations

- Application of matrix calculation using Microsoft Excel
- Non-linear-least-squared -fitting.
- Statistical analysis of data, creating histograms

3- Introduction to the ANSI "C" computing language with Engineering applications.

- Introduction.

- Variables, expressions and assignments.
- Introduction to initialisation, data input, data output, and the pre-processor.
- Introduction to flow control, data input and ASCII character streams.
- Lexical elements, operators and the "C" system.
- Assignment.
- Flow of control (continued), blocks and compound statements.
- General flow and loop control.
- Flow control (continued).
- Functions and structured programming.
- The fundamental data types (sizes and ranges), arithmetic conversions and pointers.
 - Functions and call-by-reference, scope rules and storage classes.
 - Arrays and pointers.
 - Two dimensional arrays.
 - Character processing, strings and pointers.
 - Standard library string functions.

4- Introduction to Engineering computing Using MATLAB.

- Standard library string functions.
- Introduction.
- Variables, expressions and assignments.
- Functions.
- Handling Graphing in Matlab.

Text book

Kelley, A. and Pohl, I., *'C' by Dissection: The Essentials of 'C' Programming*, Benjamin/Cummings: 4rd Edition.

W. J. Palm III, *Introduction to Matlab 7 for Engineers*, McGrawHill, 2005.

Recommended reading

GRADUATE ATTRIBUTES:

- The ability to apply knowledge of basic science and engineering fundamentals.
- In-depth technical competence in at least one engineering discipline.
- Ability to utilise a systems approach to design and operational performance.

CHEM ENG 1009: MATERIALS I

<i>Units:</i>	3
<i>Duration:</i>	Semester 2
<i>Lecturers:</i>	Mr Ian Brown (Week 1 – 6) Professor Keith King (Week 7 – 12)
<i>When:</i>	Refer Timetable under Current Students in MyUni

Pre-requisites / Assumed Knowledge: SACE Stage 2 Mathematics 1 and 2, Physics

Teaching Method: 34 hours lectures and 11 hours tutorials

Assessment: Written exam 70%, tests, quizzes and tutorials 30%

Course Objectives: At the end of the course the students should have gained a basic understanding of:

- the relationship between the structures and the properties of materials.
- the test methods used for determining the mechanical properties of materials.
- the effect of chemical composition and processing on the properties of materials.
- the process of materials selection.

Graduate Attributes to be Developed:

- ability to apply knowledge of basic science and engineering fundamentals;
- in-depth technical competence in at least one engineering discipline;
- ability to undertake problem identification, formulation and solution;
- understanding of the principles of sustainable design and development; and
- expectation of the need to undertake lifelong learning, and the capacity to do so.

Assessment of Graduate Attributes:

All attributes except the last will be assessed through assignments and examination. The last attribute is expected to be developed as a result of the formal program of study and the realisation by students that to be a competent and effective member of the engineering profession, it is necessary to continually update knowledge and skills through various professional activities such as attendance at conferences and short courses as well as reading and contributing to professional journals.

Course Synopsis:

To provide students with a basic understanding of the underlying science and the engineering performance of materials used in engineering applications. Topics covered include: atomic structure, imperfections in solids, diffusion in solids, mechanical properties of metals, dislocations and strengthening mechanisms, failure mechanisms, phase diagrams and phase transformations in metals, structures and properties of ceramics/polymers/composites, applications and processing of ceramics/polymers/composites.

Content:

SYLLABUS PART A (50%) (Mr Ian. Brown)

STRUCTURES AND PROPERTIES OF METALS

- Introduction: Classification of materials by structure, by properties, effect of structure and processing on properties.
- Atomic Bonding: Periodic table, electronegativity, ionic, covalent, metallic and secondary bonding, relationship between properties and bonding.
- Atomic Structure: Energy and packing, crystal structures, structure-property relationships.
- Imperfections in Solids: Types of imperfections, effect of defects on properties.
- Diffusion in Solids: Types of diffusion, processing using diffusion, Fick's first and second laws, structure and diffusion.
- Mechanical Properties: Principles of elastic and plastic deformation, states of stress and strain, test methods for determining mechanical properties.
- Dislocations and Strengthening: Movement of dislocations, strategies for strengthening – grain size, work hardening, solid solution and precipitation hardening.
- Fracture: Ductile versus brittle failure modes, introduction to fracture mechanics, effect of temperature, strain rate and cyclic stress on failure.

- Phase diagram and phase transformations in metals

SYLLABUS PART B (50%) (Dr Yung Ngothai)

STRUCTURES, PROPERTIES, APPLICATIONS AND PROCESSING OF CERAMICS

- Crystal structures: Ceramic crystal structures, Density computations, silicate ceramics, carbon;
- Point defects: Point defects in ceramics, impurities in ceramics;
- Mechanical properties: Flexural strength, elastic behaviour, hardness;
- Deformation mechanisms for ceramic materials: Crystalline ceramics, noncrystalline ceramics;
- Failure: Brittle fracture of ceramics, creep in ceramic materials;
- Types and applications of ceramics: glasses, glass-ceramics, clay products, Refractories, Abrasives and Cements;
- Fabrication and processing of ceramics: Glasses, glass-ceramics, clay products;

STRUCTURES, PROPERTIES, APPLICATIONS AND PROCESSING OF POLYMERS

- Polymer structures: Hydrocarbon molecules, polymer molecules, molecular weight, molecular shape, molecular structure, thermoplastic and thermosetting polymers, copolymer, polymer crystallinity, polymer crystals, diffusion in polymeric materials;
- Point defects: Point defects in polymers;
- Mechanical properties: Stress-strain behaviour, Macroscopic deformation, Tear strength and Hardness of polymers;
- Mechanisms of deformation and for strengthening of polymers: Deformation of semicrystalline polymers, Factors that influence the mechanical properties of semicrystalline polymers, Deformation of elastomers;
- Failure: Fracture of polymers, Fatigue in polymeric materials, Creep in polymeric materials;
- Polymer types: Plastics, elastomers, fibres, advanced polymeric materials;
- Polymer synthesis and processing: Polymerization, polymer additives, forming techniques for plastics; fabrication of elastomers, fabrication of fibres and films

COMPOSITES

- Particles-reinforced composites: Large-particle composites, Dispersion-strengthened composites;
- Fibre-reinforced composites: Influence of fibre length, Influence of fibre orientation and concentration, the fibre phase, the matrix phase, polymer-matrix composites, metal-matrix composites, ceramic-matrix composites, carbon-carbon composites, hybrid composites, processing of fibre-reinforced composites;
- Structural composites: Laminar composites, sandwich Panels

Text book: Callister, W.D., *Materials Science and Engineering an Introduction*, 7th Edition, Wiley-Plus.

In addition, students may obtain copies of the course materials (such as overhead notes, tutorial answers) from the University of Adelaide's INTRANET home page at <http://www.adelaide.edu.au/myuni/>

Recommended Reading: None

GRADUATE ATTRIBUTES:

- The ability to apply knowledge of basic science and engineering fundamentals.
 - In-depth technical competence in at least one engineering discipline.
 - Confidence to tackle real-world problems and issues central to engineering and to work as individuals and cooperatively in multidisciplinary and multicultural teams.
 - Ability to utilise a systems approach to design and operational performance.
 - Enthusiasm and interest for undertaking life-long learning and the continual updating of their engineering skills.
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CHEM ENG 1010: PROFESSIONAL PRACTICE I

<i>Units:</i>	<i>3</i>
<i>Duration:</i>	<i>Semester 1</i>
<i>Lecturer:</i>	<i>Dr Peter Ashman</i>
<i>When:</i>	<i>Refer Timetable under Current Students in MyUni</i>

Aims

Since its formation in the late-1800s, the discipline of chemical engineering has grown and evolved from its early roots in the production of bulk chemicals, through the petrochemical age, until today where chemical engineers are at the forefront of industries such as biotechnology, pharmaceutical, advanced materials, nanotechnology, food and beverage and many more. The discipline has a long history and an exciting future. This course is an introduction to new students of chemical engineering and related programs to their new discipline and to their new learning environment. This introduction is made through a mix of lectures, group-based activities, site visits and presentations by practising chemical engineers.

Outcomes

At the end of the course, students should be able to:

- have knowledge of the discipline of chemical engineering and an understanding of the role of chemical engineers in society;
- be aware of the different challenges associated with studying at tertiary level as compared to secondary education;
- understand that students have different learning styles and know their own particular learning style;
- be able to articulate their expectations as a student and to understand the expectations of them;
- be introduced to and have practice in working in small teams;
- have a basic understanding of some key concepts in chemical engineering, including those of design, separation, scale-up, safety and sustainability;
- be aware of key industries within the discipline of chemical engineering, of major companies within these industries and of important issues facing these industries and the discipline;
- understand the need for lifelong learning for continuous professional development;
- be able to locate appropriate sources of information from the published literature;
- be able to critically read and interpret information relevant to their own research;
- be able to write appropriate texts which communicate their analysis of issues;
- be able to present their understanding and analysis of issues in a formal seminar presentation;
- be able to participate constructively in class discussions, including informal presentations

Assessment:

Final Exam:	25%
Design Project: (EWB Challenge)	40%
Group assessments:	10%
Individual communication tasks:	25%

Final Exam:

The final exam contributes 25% to your overall mark for this course. The exam will be held during the mid-year exam period (21 Jun-5 Jul). Exam timetables are available on the University website later during Semester 1. The exam will **one hour** in duration and will be a “**closed-book**” exam. The exam will cover all of the course material, including the material covered during seminars and site visits. Further information about the exam will be provided in class (and summarized on MyUni) during Week 12

GRADUATE ATTRIBUTES:

- The ability to apply knowledge of basic science and engineering fundamentals.
- Confidence to tackle real-world problems and issues central to engineering and to work as individuals and cooperatively in multidisciplinary and multicultural teams.
- Enthusiasm and interest for undertaking life-long learning and the continual updating of their engineering skills.

Instructions to Undergraduate Students Working in Undergraduate Laboratories

General

The University of Adelaide recognises its obligation to take all reasonable precautions to safeguard the health, safety and welfare of its employees and students while they are at work. The University of Adelaide also believes that students leaving this University must take with them an attitude that accepts good health and safety practice as normal. To this end, [University Laboratory Conduct Procedures](#) have been developed and where practical must be adhered to by all that work in School laboratories. It is strongly recommended that new students and research workers familiarise themselves with the University Laboratory conduct procedures and view the film entitled "Safety in Laboratories" available from the Occupational Health & Safety Unit.

Persons who fail to comply with these procedures may be prohibited from working in laboratories.

The University procedures should be read in conjunction with the Australian Standard 2243, "Safety in Laboratories", Parts 1 to 10 inclusive. Australian Standards can be accessed via a link through the Barr Smith Library.

The School acknowledges the University Laboratory Conduct Procedures and recognises the specific requirements of chemical engineering laboratories. With this in mind the School has formulated specific laboratory regulations which reflect the particular nature of its laboratories. Laboratory users are reminded that these School procedures are in addition to the Universities requirements.

Engineering North Emergency Procedures

R.A.C.E

* Remove

* Alert

* Contain

* Evacuate

Immediately upon discovering a fire or other emergency

1. Remove Others.

Do not put yourself or others at risk.

2. Alert Others

Sound the Alarm.

Break glass type alarm points are situated in the corridors.

Telephone for Help. RING 35444

Explain location and extent of fire or emergency.

AFTER HOURS An emergency telephone is located on the ground floor of the north engineering building near the main southern entrance. (Marked X on the evacuation map.)

3. Contain the Emergency

Fight the fire ONLY if safe to do so. Do not put yourself or others at risk.

4. Evacuate

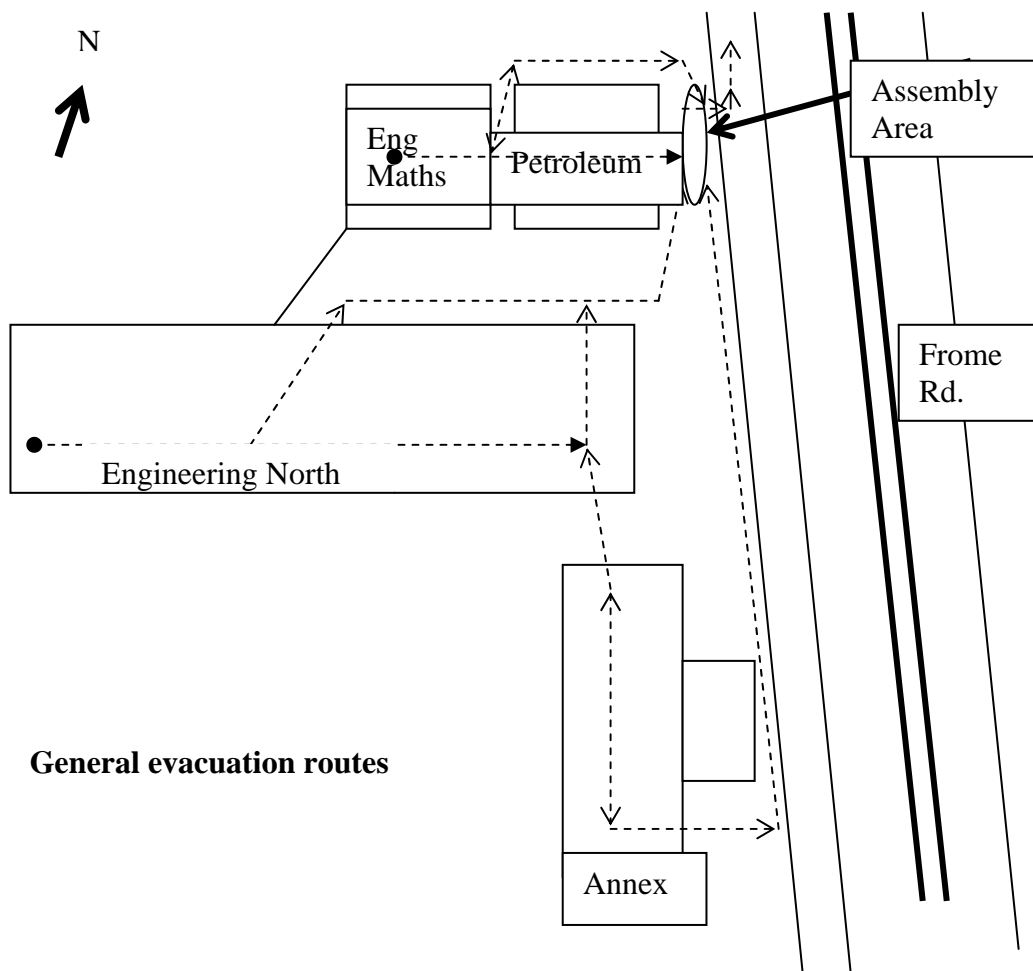
The evacuation alarm will sound firstly as a “**Beep-Beep**” sound. This is the alert phase. You should prepare to evacuate by making your area safe. This means switching of equipment and collecting your personal belongings. The alert phase will then change to the evacuate phase which is a “**Woop- Whoop**” sound. This will be accompanied by a verbal instruction.

This means ALL occupants MUST EVACUATE.

Proceed via the safest route to the assembly area. Take your personal effects, keys, bags, etc. with you as you may not be able to re enter the building. Follow Exit Signs or the directions of wardens in red hats. DO NOT RE-ENTER THE BUILDING until permitted to do so by authorised persons.

Assembly Area

All occupants ***must*** assemble on the School of Petroleum Engineering gardens with overflow onto Frome Road footpath under instructions from wardens



General evacuation routes

BOMB THREAT PROCEDURE
(Endorsed by University Council April 1995)

NOTIFY security on 35444 and the supervisor of the area.

FOLLOW the instructions of the wardens in red hats.

SCHOOL EQUITY POLICY

The School of Chemical Engineering has an Equity, Diversity and Sexual Harassment Policy. The policy is a statement of the School's commitment to providing a workplace for all staff, students and visitors that is free from harassment and bullying, deals with all people in a fair and equitable way and respects the diversity of peoples who engage with the School. The School has a Equity Officer who is trained in equity, diversity and anti-harassment matters and who may be consulted at any time to confidentially assist in matters of concern.

The School equity officer is Andrew Wright, Room N115
