CHEN20007 Chemical Process Analysis 1

Credit Points:	12.50
Level:	2 (Undergraduate)
Dates & Locations:	This subject is not offered in 2014.
Time Commitment:	Contact Hours: 3 x one hour lectures + 1 x two hour tutorial per week + 2 x three hours of laboratory work per semester Total Time Commitment: Estimated 170 hours
Prerequisites:	Students must either: 1. Have completed the following subjects prior to enrolling in this subject: One of: **Subject** / **Study Period Commencement:** / **Credit Points:** MAST10006 Calculus 2 / Semester 1, Semester 2 / 12.50 MAST10009 Accelerated Mathematics 2 / Semester 2 / 12.50 AND one of: **Subject** / **Study Period Commencement:** / **Credit Points:** CHEM10003 Chemistry 1 / Semester 1, Semester 2 / 12.50 CHEM10006 Chemistry for Biomedicine / Semester 1 / 12.50 OR 2. Be enrolled in one of the following courses: # MC-ENG Master of Engineering (Chemical) # MC-ENG Master of Engineering (Biochemical) # MC-ENG Master of Engineering (Chemical with Business)
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	None
Core Participation Requirements:	For the purposes of considering applications for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005) and Students Experiencing Academic Disadvantage Policy, this subject requires all students to actively and safely participate in laboratory activities. Students who feel their disability may impact upon their participation are encouraged to discuss this with the Subject Co-ordinator and the Disability Liaison Unit http://www.services.unimelb.edu.au/disability/
Contact:	Email: **dcshal@unimelb.edu.au (mailto:dcshal@unimelb.edu.au)**
Subject Overview:	**AIMS** This subject is an introduction to chemical engineering flowsheet calculations, including materials balances, unit systems, and the prediction of real gas behaviour. The concept of conversion of mass is developed as the basis for determining mass flows in chemical processing systems. Students will be introduced to flowsheeting packages and chemical engineering simulation software. The subject will include exercises in process optimisation and the solution of ill-defined process problems.

	This subject together with CHEM20008 Chemical Process Analysis 2 provides the basis for all the chemical engineering subjects that follow. The calculations introduced in these subjects are the most common type of calculations performed by professional chemical engineers working in all sectors of industry. The teaching of process safety is critical to any undergraduate chemical engineering program. Students need to understand their responsibilities to themselves, their work colleagues and the wider community. They need to be aware of safe practices and also the consequences that may arise when those safe practices are not followed. This subject introduces students to concepts of process safety and the consequences when safety management systems fail. **INDICATIVE CONTENT** Topics covered include material balances around single process units and groups of units, involving simple systems and recycle streams, and non-reacting and reacting systems. Total, component, and elemental balances are covered. Other topics include systems of units and unit conversion, gases, liquids and vapours, P-V-T diagrams of pure substances, ideal and real gas behaviour, use of compressibility factor and generalized compressibility factor charts, equations of state, vapour pressure estimation and humidity.
Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILO)** On completion of this subject the student is expected to: 1 Apply knowledge of basic science and engineering fundamentals to solve material balances. 2 Define and scope engineering problems and formulate suitable strategies for problem solution. 3 Use appropriate software tools to solve material balances. 4 Model real gas behaviour. 5 Have developed an appreciation for the importance of safety in the process industries. 6 Be able to continue study in the area of energy balances with a solid foundation.
Assessment:	Four assignments spread throughout the semester, each of no more than 750 words (10% each). Two of these assignments are associated with the laboratory experiments. One written two hour end-of semester examination (60%). Hurdle requirement: A pass in the end of semester examination is required to pass the subject. Intended Learning Outcomes (ILOs) 1 to 4 and 6 are addressed in the examination and three of the four assignments. ILO 5 is addressed in one of the assignments. The examination paper will consist of problems designed to test whether the student has acquired the ability to apply fundamental principles to the solutions of problems involving material balances and real gas behaviour. The problems set for the exam will be similar to those undertaken in the tutorial classes.
Prescribed Texts:	None
Breadth Options:	This subject potentially can be taken as a breadth subject component for the following courses: # **Bachelor of Arts (https://handbook.unimelb.edu.au/view/2014/B-ARTS)** # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2014/B-COM)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2014/B-MUS)** You should visit **learn more about breadth subjects (http://breadth.unimelb.edu.au/breadth/info/index.html)** and read the breadth requirements for your degree, and should discuss your choice with your student adviser, before deciding on your subjects.
Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees
Generic Skills:	# Ability to apply knowledge of basic science and engineering fundamentals # Ability to undertake problem identification, formulation and solution # Ability to utilise a systems approach to design and operational performance
Notes:	**LEARNING AND TEACHING METHODS** The subject will be delivered through a combination of lectures and tutorials. Students will also complete two experiments which will reinforce the material covered in lectures. **INDICATIVE KEY LEARNING RESOURCES**

	Students will have access to lecture notes and lecture slides. The subject LMS site also contains worked solutions for all the tutorial assignments. Shallcross D.C., Physical Property Data Book for Engineers and Scientists, 2004, IChemE Felder, R.M., Rousseau, R.W., Elementary Principles of Chemical Processes, 2005, Wiley. **CAREERS / INDUSTRY LINKS** The Coogee Energy Methanol plant located in Laverton is used as a case study in the subject.
Related Majors/Minors/ Specialisations:	B-ENG Chemical Engineering stream B-ENG Chemical and Biomolecular Engineering stream Master of Engineering (Biochemical) Master of Engineering (Chemical with Business) Master of Engineering (Chemical) Science-credited subjects - new generation B-SCI and B-ENG. Selective subjects for B-BMED
Related Breadth Track(s):	Chemical Engineering