CHEN30001 Reactor Engineering

Credit Points:	12.5
Level:	3 (Undergraduate)
Dates & Locations:	2015, Parkville This subject commences in the following study period/s: Semester 1, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 2 x one hour lecture and 1 x two hour lecture per week, 1 x one hour tutorial per week and 2 x three hour laboratory sessions per semester Total Time Commitment: Estimated 170 hours
Prerequisites:	**Undergraduate students:** Students must have completed:

Subject	Study Period Commencement:	Credit Points:
MAST10009 Accelerated Mathematics 2	Semester 2	12.50

OR:

Subject	Study Period Commencement:	Credit Points:
MAST10006 Calculus 2	Semester 1, Semester 2	12.50

And ONE OF:

Subject	Study Period Commencement:	Credit Points:
CHEN20010 Material and Energy Balances	Semester 1, Semester 2	12.50
CHEN20008 Chemical Process Analysis 2	Semester 2	12.50

AND:

Subject	Study Period Commencement:	Credit Points:
CHEM20018 Chemistry: Reactions and Synthesis	Semester 1	12.50

CHEM20018 Reactions and Synthesis may also be taken concurrently

OR

Postgraduate students:

Admission to the MC-ENG Master of Engineering (Chemical), (Chemical with Business) or (Biochemical)

and ONE OF:

Subject	Study Period Commencement:	Credit Points:
CHEN20010 Material and Energy Balances	Semester 1, Semester 2	12.50
CHEN20008 Chemical Process Analysis 2	Semester 2	12.50

AND:

	<table><tr><th>Subject</th><th>Study Period Commencement:</th><th>Credit Points:</th></tr><tr><td>CHEM20018 Chemistry: Reactions and Synthesis</td><td>Semester 1</td><td>12.50</td></tr></table> CHEM20018 Reactions and Synthesis may also be taken concurrently
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	CHEN40003 Reactor Engineering
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
Coordinator:	Prof Greg Qiao
Contact:	Email: **gregghq@unimelb.edu.au (mailto:gregghq@unimelb.edu.au)**
Subject Overview:	**AIMS** This subject introduces students to aspects of reactor system design. Chemical reactors are at the heart of any major chemical process design. Chemical reaction engineering is concerned with the exploitation of chemical reactions on a commercial scale. Chemical reaction engineering aims at studying and optimizing chemical reactions in order to define the best reactor design. Hence, the interactions of flow phenomena, mass transfer, heat transfer, and reaction kinetics are of prime importance in order to relate reactor performance to feed composition and operating conditions. This subject is one of the key parts of the chemical and biochemical engineering curriculum upon which a lot of later year material is built. **INDICATIVE CONTENT** 1 Kinetics of homogeneous reactions 2 Design of single ideal reactors 3 Multiple reactor systems 4 Other design reactors (recycle reactors and temperature effects) 5 Basics of non-ideal flow 6 Models for reactors 7 Mixed flow in model reactors.
Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILOs)** On completion of this subject the student is expected to: 1 Interpret data from both ideal and non-ideal batch, plug flow and mixed flow reactors 2 Model more complex flowing reactor systems using combinations of idealized plug flow and continuously stirred tank ranks 3 Design simple reactor systems 4 Predict simple temperature profiles in reacting systems.
Assessment:	A two-hour written test (15%), held mid-semester (on or around week 6). Intended Learning Outcomes (ILOs) 1 to 4 are addressed in this test Two lab reports (15%); no more than 10 pages per report (not including title page, nomenclature, and appendices). An overall time commitment of 15-20 hours. ILOs 1 to 4 are addressed in the laboratory assignments. One in the first-half of semester and the second in the second-half of semester Three-hour end of semester examination (70%). 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 chemical reactors. The problems set for the exam will be similar to those undertaken in the tutorial class. ILOs 1 to 4 are addressed in the examination. Hurdle requirement: A mark of 40% or more in the end-of-semester examination is required to pass the subject.
Prescribed Texts:	O. Levenspiel, Chemical Reaction Engineering, 3rd Edition, John Wiley & Sons, Inc., New York,1999
Recommended Texts:	Missen, R. W., Mims, C. A., and Saville, B. A., 1999, Introduction to chemical reaction engineering and kinetics, John Wiley & Sons, Inc, New York, Fogler, H.S., 1999, Elements of chemical reaction engineering, 3rd Edition, Prentice Hall PTR, New Jersey,
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/2015/B-ARTS)** # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2015/B-COM)** # **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2015/B-ENVS)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2015/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:	On completion of this subject students should have developed team work skills and enhance the following generic skills: # Ability to undertake problem identification, formulation and solution # Capacity for independent thought # Ability and self-confidence to comprehend complex concepts, to express them lucidly and to confront unfamiliar problem.
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. The two experiments are: 1 Chemical Reactors 2 Dynamics of Reactors **INDICATIVE KEY LEARNING RESOURCES** Missen, R. W., Mims, C. A., and Saville, B. A., 1999, Introduction to chemical reaction engineering and kinetics, John Wiley & Sons, Inc, New York, Fogler, H.S., 1999, Elements of chemical reaction engineering, 3rd Edition, Prentice Hall PTR, New Jersey, **CAREERS / INDUSTRY LINKS** The skills gained in this subject are crucial to the career of a process engineer. They will be important for students wishing to progress to jobs in engineering design offices or in operational roles within a wide range of chemical industries including petrochemicals, polymer and surfactant manufacture.
Related Course(s):	Bachelor of Engineering (Biomedical)Biocellular
Related Majors/Minors/ Specialisations:	B-ENG Chemical Engineering stream B-ENG Chemical and Biomolecular Engineering stream Chemical Systems 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