CHEN90012 Process Equipment Design

Credit Points:	12.5
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2016, Parkville This subject commences in the following study period/s: Semester 1, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 3 x 1 hour lectures + 1 x 1 hour tutorial per week Total Time Commitment: Estimated 200 hours
Prerequisites:	ONE OF: **Subject** / **Study Period Commencement:** / **Credit Points:** ENGR10004 Engineering Systems Design 1 — Semester 1, Semester 2 — 12.50 ENGR90021 Engineering Practice and Communication — Semester 1, Semester 2 — 12.50 AND **Subject** / **Study Period Commencement:** / **Credit Points:** CHEN30005 Heat and Mass Transport Processes — Semester 1, Semester 2 — 12.50 ENGR30002 Fluid Mechanics — Semester 1, Semester 2 — 12.5 (Prior to 2013 ENGR30001 Fluid Mechanics and Thermodynamics)
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	None
Core Participation Requirements:	For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Students Experiencing Academic Disadvantage Policy, academic requirements for this subject are articulated in the Subject Description, Subject Objectives, Generic Skills and Assessment Requirements of this entry.The University is dedicated to provide support to those with special requirements. Further details on the disability support scheme can be found at the Disability Liaison Unit website: http://www.services.unimelb.edu.au/disability/
Coordinator:	Prof George Franks
Contact:	Prof George Franks Email: **gvfranks@unimelb.edu.au (mailto:gvfranks@unimelb.edu.au)**
Subject Overview:	**AIMS** Application to the design of chemical equipment. Design of fluid storage and transfer equipment; pressure and non-pressure vessels, pumps and compressors, nozzles, piping, valves. Design of other operational units commonly used in chemical plants; heat exchangers, solid handling devices, fluid processing units. Hydraulic aspects of plate distillation column, packed columns, fluidised beds. Safety and integrity of equipment; safe working stress. Design standards and codes of practice. Flow sheets, plant layout; equipment, piping and site layouts.

	INDICATIVE CONTENT To be able to conduct technical design of process equipment such as: pressure vessels, non-pressure vessels, compressors, heat exchangers, plate distillation columns, packed absorption columns, fluidised beds. To be able to design and layout pipelines. To be able to select valves and pumps. To be familiar with general concepts of process equipment design so that other process equipment, not covered in this subject, can be designed. To be able to design equipment safely. To be able to design equipment in compliance with regulations and standards. To be able to design equipment in an economically efficient manner. To be able to produce equipment specification sheets and equipment drawings. To be able to develop and draw process flow sheets and plant layouts. This subject has been integrated with the Skills Towards Employment Program (STEP) and contains activities that can assist in the completion of the Engineering Practice Hurdle (EPH).
Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILOs)** On completion of this subject the student is expected to: 1 Display an understanding of the principles of process equipment design, the mechanical aspects of the design and operation of process equipment, including safety considerations 2 Students will have completed detailed designs of several unit operations 3 Students should be able to develop process flow sheets and lay out of equipment and pipelines in chemical process plants
Assessment:	One written 3-hour end-of-semester examination (40%) One assignment due in three or more parts during semester, requiring approximately 75-80 hours of work in total (60%). Intended Learning Outcomes (ILOs) 1 to 3 are addressed by the examination and the assignment Hurdle requirement: Students must pass both components of assessment and pass the examination with minimum score of 40% to pass the subject.
Prescribed Texts:	None
Recommended Texts:	None
Breadth Options:	This subject is not available as a breadth subject.
Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees
Generic Skills:	# Capacity for independent thought # Awareness of advanced technologies in the discipline # 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** Lectures, tutorials, worked examples, Problem based learning **INDICATIVE KEY LEARNING RESOURCES** The required text for this subject are the Lecture Notes compiled by Franks. They are available on LMS. Lecture Notes produced by Dr. Teresa Pong prior to 2006, are available on LMS. These notes contain additional information which may be needed for your Design Project in Semester 2. Please down load them and save them for reference. Additional texts used in compiling these notes will need to be consulted from time to time including: Sinnott, R. and Towler, G., 2009 Chemical Engineering Design, 5th Edition, Elsevier, Australian Standards, AS 1210 – Pressure Vessel, UniM ERC f 681.760410218 STAN - hard copy AS 4041 – Pressure Piping, UniM ERC f 681.76041 PRES - hard copy AS 1200 – Pressure Equipment

	AS 1692 – Steel tanks for flammable and combustible liquids AS 4343 – Pressure Equipment, Hazard Levels AS 1940 – Handling and storage of flammable and combustible liquids for e-version, go to supersearch – find data base – SAI global – AS1210, AS1200, AS1692, AS4041 etc – view document Additional TEXTS Also used in compiling these notes Treybal, R.E., , 1980, 'Mass Transfer Operations'. McGraw Hill, New York. Zappe, R.W., , 1991, 'Valve Selection Handbook', Gulf Publishing, Houston. Pell, M., , 1990, 'Gas Fluidization', New York, Elsevier. Howard, J.R., 'Fluidized Bed Technology, Principles and Applications', Adam Hilger, New York, 1989 Couper, J.R., Penney, W. R., Fair, J.R., Walas, S. M., , 2004,Chemical Process Equipment, Selection and Design, 2nd Edition, Elsevier, On line edition available from library through Knovel. Perry's Chemical Engineers Handbook (7th Edition), McGraw-Hill, 2004, On line edition available from library through Knovel. Sinnott, R. K., , 1999, Coulson and Richardson's Chemical Engineering, Volume 6, 3rd edition. Also volumes 2 and 1. **CAREERS / INDUSTRY LINKS** National and company standards are covered. The role of engineers in the profession is discussed.
Related Course(s):	Doctor of Philosophy - Engineering Master of Philosophy - Engineering
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)