BIEN90002 Biochemical Engineering Design Project

Credit Points:	25
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2015, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus. A self-learning engineering design project, conducted as a team, aided by lectures and consultation sessions.
Time Commitment:	Contact Hours: 1 x two hour lecture + 1 x three hour consultation session per week Total Time Commitment: Estimated 400 hours
Prerequisites:	Students must have completed the following subjects prior to enrolling in this subject:

Subject	Study Period Commencement:	Credit Points:
CHEN30005 Heat and Mass Transport Processes	Semester 1, Semester 2	12.50
CHEN30001 Reactor Engineering	Semester 1	12.50

Prior to 2010 CHEN40003 Reactor Engineering

Subject	Study Period Commencement:	Credit Points:
CHEN90009 Fermentation Processes	Not offered 2015	12.50

Subject	Study Period Commencement:	Credit Points:
CHEN90020 Chemical Engineering Management	Semester 1	12.50

Prior to 2010 CHEN40006 Chemical Engineering Management or CHEN30013 Chemical Engineering Management

Subject	Study Period Commencement:	Credit Points:
CHEN90013 Process Engineering	Semester 1	12.50

Prior to 2010 CHEN40007 Process Engineering

Subject	Study Period Commencement:	Credit Points:
CHEN90012 Process Equipment Design	Semester 1	12.50

Prior to 2010 CHEN40005 Process Equipment Design

Subject	Study Period Commencement:	Credit Points:
CHEN90032 Process Dynamics And Control	Semester 2	12.50

Prior to 2012 CHEN30009 Process Dynamics and Control

Corequisites:	None

Recommended Background Knowledge:	None
Non Allowed Subjects:	Credit will not be given for this subject and the following subjects: CHEN40009 Design Project BIEN40002 Biomolecular Engineering Design Project

Subject	Study Period Commencement:	Credit Points:
CHEN90022 Chemical Engineering Design Project	Semester 2	25

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 Paul Webley
Contact:	Email: **paul.webley@unimelb.edu.au (mailto:paul.webley@unimelb.edu.au)**
Subject Overview:	**AIMS** This unit requires the students to undertake a major design task utilising the knowledge gained throughout the Biochemical engineering course. This comprises the following tasks: design of a process to meet a specified requirement; feasibility study of alternative processes which meet the specification; determination of sequence for investigation of a chemical manufacturing project and preparation of a report; consideration of environmental impacts and sustainability issues; preparation of flowsheets; confirmation of effects of market forecasts; economic evaluation; preparation of estimates for the minimisation of capital and production costs; specification of equipment; selection of construction materials; and specification of instrumentation location, staff and labour requirements and safety precautions. The HYSYS simulation package will be utilised where appropriate. There will also be a series of lectures on various aspects of design. This subject forms the major capstone design project for the Chemical engineering Discipline and closely simulates the design procedures the graduate students will undertake in chemical industry process and design engineers. The pre-requisites ensure that the students bring together all of the undergraduate knowledge and skills imparted in earlier years of the degree program. All aspects of the safe and environmentally responsible design of a chemical process plant are covered in this unit through project based learning. Through a careful sequential approach, the students develop a feasibility study, an initial process scoping and development report, and finally, a detailed design report. Team work is emphasized throughout to mimic the typical team environment the students will encounter in the work place. **INDICATIVE CONTENT** No new topics of a technical nature are introduced into this unit. The unit requires the students to integrate their skills and knowledge from earlier units into a single, design project executed in a team environment. The content therefore includes: # A feasibility study which includes market analysis, plant location and health and safety assessment and preliminary economic evaluation of the proposal # A process development report which includes the assessment of technology options to produce the required product, a mass and energy balance of the proposed process, as evaluation of the environmental impact of the process, a safety analysis, and a detailed process flow diagram of the proposed process # A detailed design report including the detailed process and mechanical design of a unit operation with the process, the full process control and operation as well as process and instrumentation diagram of the process, specification of all minor equipment items in the process, a full HAZOP of a section of the plant, a full economic analysis and sensitivity study of the proposed plant.

	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 (ILO)** On completion of this subject the student is expected to: 1 Complete a chemical engineering feasibility study for a proposed product/process 2 Conduct a process development assessment and mass and energy balances to determine the overall scope and intent of the project 3 Carry out the integrated process and equipment design for an industrial chemical process, which is initially poorly-defined and for which much of the design data is not available 4 Function as part of a team and manage their time effectively 5 Apply all of the hard and soft skills acquired in earlier units in an integrated way to develop a full chemical plant design package.
Assessment:	First Report (15%): Team report submission of a feasibility study of up to 30 pages. Time commitment of approximately 40-50 hours. Peer assessment is required and considered in the marking of these reports. Intended learning outcomes (ILOs) 1 to 5 are addressed in this report. Due approximately one third of the way through the semester (on or around week 4) Second Report (30%): Team report submission of up to 100 pages (not including supporting material such as appendices, diagrams, tables, computations and computer output). Time commitment of approximately 70-80 hours. Peer assessment is required and considered in the marking of these reports. ILOs 1 to 5 are addressed in this report. Due approximately two thirds of the way through the semester (on or around week 8) Final Report (55%): Individual report submission of up to 100 pages (not including supporting material such as appendices, diagrams, tables, computations and computer output). Report includes components generated as a team. Time commitment of approximately 170-180 hours. ILOs 1 to 5 are addressed in this report. Due end of semester. Hurdle requirement: An aggregate mark of 50% or more and a mark of 50% or more in the final report is required 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:	# Ability to undertake problem identification, formulation and solution # Ability to apply principles of chemical engineering to the design and specification of equipment and/or processes which have not previously been encountered # Ability to utilise a systems approach to design and operational performance # Ability to function effectively as an individual and in multi-disciplinary and multi-cultural teams, with the capacity to be a leader or manager as well as an effective team member # Understanding of the principles of sustainable design and development # Capacity for independent critical thought, rational inquiry and self-directed learning # Openness to new ideas and conventional critiques of received wisdom.
Notes:	**LEARNING AND TEACHING METHODS** The subject is developed through team work and through a series of lectures, guest speakers, and weekly consultancy sessions. The deliverables in the project are managed carefully and teams are expected to meet deadlines as required during the unit. The consultancy sessions include meetings with industry engineers to provide real-work input into the students design and decision making process. **INDICATIVE KEY LEARNING RESOURCES** Prior to the start of this unit, a substantial database of technical reports, journal articles, web sites and patents is set up. These are all relevant to the particular chemical/biological process being evaluated. Students have access to this database through the subject LMS site upon the

	start of the project. In addition, lecture notes and weekly consultancy sessions with experienced engineers provide additional resources for their learning. All lecture notes, discussion, progress updates etc are communicated through the project LMS site. **CAREERS / INDUSTRY LINKS** The unit is run in close consultation with industry engineers both with respect to setting up the project as well as weekly consultancy sessions with industry engineers. Guest lecturers from industry are also invited to convey the industry relevance of the project undertaken.
Related Majors/Minors/ Specialisations:	B-ENG Chemical and Biomolecular Engineering stream Master of Engineering (Biochemical)