BIEN90004 Biochemical & Pharmaceutical Engineering

Credit Points: 12.50

Level: 9 (Graduate/Postgraduate)

Dates & Locations: This subject is not offered in 2014.

Time Commitment: Contact Hours: 36 hours of lectures and 8 hours of tutorials Total Time Commitment: Estimated 200 hours

Prerequisites:

Students must have completed the following subjects (or equivalent) prior to enrolling in this subject:

Subject	Study Period Commencement:	Credit Points:
MAST10007 Linear Algebra	Summer Term, Semester 1, Semester 2	12.50
CHEM10004 Chemistry 2	Summer Term, Semester 2	12.50

As well as ONE of the following three biology subject combinations, either (i), (ii) or (iii):

(i) ONE of the following subjects:

Subject	Study Period Commencement:	Credit Points:
CHEN90031 Bioprocess Engineering	Semester 1	12.50
BTCH90006 Bioprocess Engineering	Not offered 2014	12.50
CHEN90008 Biology for Engineers	Not offered 2014	12.50

OR (ii) BOTH of the following subjects:

Subject	Study Period Commencement:	Credit Points:
BIOL10004 Biology of Cells and Organisms	Semester 1	12.50
BIOL10005 Genetics & The Evolution of Life	Semester 2	12.50

OR (iii) BOTH of the following subjects:

Subject	Study Period Commencement:	Credit Points:
BIOL10003 Genes and Environment	Semester 2	12.50
BIOL10002 Biomolecules and Cells	Semester 1	12.50

Corequisites: None

Recommended Background Knowledge: None

Non Allowed Subjects:

Subject	Study Period Commencement:	Credit Points:
CHEN90016 Metabolic Engineering	Not offered 2014	12.50

Core Participation Requirements: For the purposes of considering applications for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005) and Student Support and Engagement Policy, academic

	requirements for this subject are articulated in the Subject Overview, Objectives, Assessment and Generic Skills sections of this entry. It is University policy to take all reasonable steps to minimise the impact of disability upon academic study, and reasonable adjustments will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact on meeting the requirements of this subject are encouraged to discuss this matter with a faculty Student Adviser and the Disability Liaison Unit http://www.services.unimelb.edu.au./disability/
Contact:	Email: **sgras@unimelb.edu.au (mailto:sgras@unimelb.edu.au)**
Subject Overview:	**AIMS** This subject aims to build on the principles introduced in CHEN90031 Bioprocess Engineering to provide a more advanced understanding of biochemical production processes with a focus on pharmaceutical production. Students will learn about pharmaceutical and biochemical production processes in Australia and the Asia-Pacific region. **INDICATIVE CONTENT** Pharmaceutical products will include opiates, blood plasma products, vaccines, monoclonal antibodies and other medicines. Unit operations will include the growth of animal, plant and fungal cells, cell disruption and methods for product purification, such as chromatography. Case studies will include the production of recombinant proteins and amino acids and the genetic techniques required to make these products. The sustainable production of other biochemicals will also be discussed, including biofuels and the growth of algae. Students will learn how cellular processes can be used by chemical engineers to improve process efficiencies, clean up our environment and reduce chemical waste. Regulation, Good Manufacturing Practice and Validation processes will be introduced, along with the design of laboratories, pilot plants and manufacturing facilities and associated utilities and services. Students will also be introduced to relevant analytical techniques used to track production and purity and will become familiar with the research literature in this field.
Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILO)** On completion of this subject the student is expected to: 1 Describe typical production processes for common pharmaceuticals 2 Discuss the role of chemical engineering in pharmaceutical development, the regulatory standards that apply to such products and the business drivers for product development 3 Apply systems approaches to describe how changes to a cell can be used to make new biochemical products 4 Describe the processes in research, development and practice that may increase the sustainability of biochemical and other production processes 5 Describe a range of biochemical products and develop create strategies to produce and purify these products 6 Discuss the synergies between biochemistry and chemical engineering
Assessment:	Two assignments not exceeding 2000 words, one due around Week 4 and one due around Week 8 of the semester (20%) One 3 hour written end of semester examination (80%) Hurdle requirement: A mark of 40% or more in the end of semester examination 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:	# In-depth techinical competence in at least one engineering discipline # Ability to function effectively as an individual and in teams # Capacity for independent critical thought, rational enquiry and self-directed learning

	# Ability to communicate effectively, not only with engineers but also with the community at large
Notes:	**LEARNING AND TEACHING METHODS** The subject will be delivered through a combination of lectures, self managed assignments, and self managed work on tutorial questions supported by tutorial classes. **INDICATIVE KEY LEARNING RESOURCES** These will be provided through the subject LMS site. **CAREERS / INDUSTRY LINKS** Biochemical engineers explore the development of large scale processes that use microbial, plant or animal cells. Career opportunities exist in bioprocessing industries such as food, beverage and pharmaceutical production, the petrochemical, minerals and energy industries and in new fields made possible by the advances of biotechnology. Graduates may also work in environmental fields.
Related Majors/Minors/ Specialisations:	B-ENG Chemical Engineering stream B-ENG Chemical and Biomolecular Engineering stream Master of Engineering (Biochemical) Master of Engineering (Chemical)