

600-607 Bioprocess Engineering

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2009, This subject commences in the following study period/s: Semester 1, - Taught on campus.
Time Commitment:	Contact Hours: 52 contact hours comprising 3 one-hour lectures per week, 2 two-hour practical sessions, and 1 one-hour tutorial per week. Total Time Commitment: Not available
Prerequisites:	None
Corequisites:	None
Recommended Background Knowledge:	411-203 Fluid Mechanics or equivalent 650-141 Biology of cells and Organisms or equivalent 640-311 Physics or equivalent 610-171 Fundamentals of Chemistry or equivalent
Non Allowed Subjects:	None
Core Participation Requirements:	<p><p>For the purposes of considering request 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, Learning Outcomes, Assessment and Generic Skills sections of this entry.</p> <p>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 Student Equity and Disability Support: http://services.unimelb.edu.au/disability</p> </p>
Coordinator:	Prof David E Dunstan
Subject Overview:	As a background to fully understand bioprocess engineering an overview of the structure and function of biological macromolecules including biochemical pathways, genetics and cellular control processes, cell structure and function, microorganism oxygen requirements, microbial diversity and a survey of microbial groups will be given. The methods for characterisation of these, cultivation and enumeration of microorganisms will be described in detail with surveys of applications in biochemical and environmental engineering. Enzymic processes, kinetics, batch growth and product formation, sterilization, fermentation, mixing and separation techniques and design and the application of models to batch cultures will be clearly explained.
Objectives:	<p>The objectives of this subject are to provide students with:</p> <ul style="list-style-type: none"> • An understanding of what constitutes a biochemical engineering process and how chemical engineers use microorganisms and enzymes to produce a wide range of food, chemical and pharmaceutical products. • An understanding of how the same techniques are applied by environmental chemical engineers to purify liquid wastes (such as sewage, food and chemical plant wastes) prior to their discharge to the environment. • An understanding of basic biochemistry and microbiology to enable them to tackle biochemical engineering design problems in subsequent courses. • An enhanced ability to communicate intelligently with specialist microbiologists, biochemists and geneticists. • Practical skills in the observation, handling and culture of microorganisms, and have learned how to present in a written report experimental results from a microbiological investigation.

	<ul style="list-style-type: none"> • The ability to use the biological knowledge gained to better understand the living world and the interaction of living organisms with the environment. • An understanding of the kinetics of enzyme and microbial processes and the factors affecting the design and operation of fermentation equipment. • A deepened understanding of the factors affecting biological systems, which will expand their abilities to apply science and mathematics to the solution of quantitative problems in practical situations.
Assessment:	Two practical work assignments each not exceeding a total of 1000 words one due early in the semester (15%) and one due mid semester (15%) with a total of 30% contributing to the final assessment mark. One three-hour examination at the end of semester 1 contributing 70% to the assessment.
Prescribed Texts:	None
Recommended Texts:	<p>Madigan, M.T. and Martinko, J.M, 2006. Brock Biology of Microorganisms. Eleventh Edition. Pearson Prentice Hall, Upper Saddle River, N.J. (There are multiple copies of this and previous editions of this book available on 7 day loan in the Engineering Library)</p> <p>Prescott, L.M. Harley, J.P. and Klein, D.A. 2002 Microbiology Fifth edition. McGraw-Hill, Boston (especially relevant for Mrs Cain's section)(There are multiple copies of this and the sixth edition of this book available on short-term loan from several branches of the University Library)</p> <p>Schaechter, M., Ingraham, J.L. and Neidhardt, F.C., 2006. Microbe, ASM Press, Washington, DC (especially relevant for Dr Tribe's section) (Several copies are available on short-term loan, see University Catalogue for details).</p> <p>Prescott, L.M. Microbes in Motion 3. CD-ROM, McGraw-Hill 2002 ISBN 0-07-248522-1 (available on overnight loan in the Engineering library).</p> <p>Bailey J.E. and Ollis, D.F. Biochemical Engineering Fundamentals, 1986, 2nd edition, McGraw-Hill NY</p> <p>Schuler, M.L. and Kargi F. Bioprocess Engineering – Basic Concepts, 2002 2nd edition, Prentice hall PTD, Upper Saddle River NY. (Multiple copies of this book are available on 7 day loan (Engineering library)</p> <p>Other modern biochemical engineering texts are also worth consulting.</p>
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:	<p>Upon completion of this subject, students should gain the following generic skills:</p> <p>Capacity for independent thought</p> <p>Ability to analyse and solve open-ended problems</p> <p>The ability to comprehend complex concepts and communicate lucidly this understanding</p> <p>Awareness of advanced technologies in the discipline</p> <p>Ability to work in a team (practical work component)</p>
Notes:	<p>Students undertaking this subject will be expected to regularly access an internet-enabled computer.</p> <p>This subject is co-taught with the undergraduate subject 411-393 Bioprocess Engineering .</p>
Related Majors/Minors/Specialisations:	R05 PB Master of Science (Biotechnology)