BMEN30007 Biocellular Systems Engineering

Credit Points:	12.50
Level:	3 (Undergraduate)
Dates & Locations:	2010, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 36 hours of lectures; 12 hours of tutorials; 12 hours of workshops Total Time Commitment: 120 hours
Prerequisites:	

Subject	Study Period Commencement:	Credit Points:
BIOL10004 Biology of Cells and Organisms	Semester 1	12.50

OR

Subject	Study Period Commencement:	Credit Points:
BIOL10002 Biomolecules and Cells	Semester 1	12.50

OR equivalent,

OR:

Subject	Study Period Commencement:	Credit Points:
CHEM10003 Chemistry 1	Semester 1, Semester 2	12.50

OR

Subject	Study Period Commencement:	Credit Points:
CHEM10006 Chemistry for Biomedicine	Semester 1	12.50

OR equivalent.

Corequisites:	None.
Recommended Background Knowledge:	None
Non Allowed Subjects:	This subject replaces

Subject	Study Period Commencement:	Credit Points:
421-285 Bioengineering Systems Modelling 1	Not offered 2010	

Core Participation Requirements:	Ability to participate actively and safely in the laboratory
Coordinator:	Assoc Prof Andrea O'Connor
Contact:	Melbourne School of Engineering Building 173, Grattan Street The University of Melbourne

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Subject Overview:	This subject introduces biomedical systems engineering, complementing and reinforcing material learned in related Biology subjects. Students will be introduced to the process of developing engineering and computational models and simple conceptual designs in the context of biological systems. Students will examine biological systems at the cellular and tissue level. Systems of ordinary differential equations will be employed to describe various cellular processes, including gene circuits and metablolic pathways. Fundamental transport processes, relevant to biological systems and employed in clinical applications, such as dialysis, will be described and applied in variety of contexts. Students will be required to complete a concept design.
Objectives:	Upon completion, students should be able to: # Recognise and characterise a variety of problems as a system of ordinary differential equations, and solve these equations in a variety of contexts; # Formulate problems in chemical systems, identifying fundamental transport processes and the equations that describe these systems; # Analyse the transport systems and find basic solutions to these problems, including analysis of the one-dimensional transient diffusion equation using the finite difference method; # Formulate problems in electrochemical systems engineering, identifying fundamental potentials influencing the behaviour of chemicals in biological systems; # Perform simple laboratory experiments that deepen and amplify theoretical concepts; # Apply the design process and engaged in the conceptual design stage of the design process;
Assessment:	Two written assignments of 2500 words each due between week 7 and week 12 (30%)One examination of three hours duration at the end of the semester (70%)
Prescribed Texts:	To be advised
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/2010/B-ARTS)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2010/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 devleoped their # Ability to apply knowledge of science and engineering fundamentals. # Ability to undertake problem identification, formulation and solution. # Ability to utilise a systems approach to complex problems and to design and operational performance. # Proficiency in engineering design.

	# Ability to communicate effectively, with the engineering team and with community at large. # Capacity for creativity and innovation. # Ability to function effectively as an individual and in multidisciplinary and multicultural teams, as a team leader or manager as well as an effective team member. # Capacity for lifelong learning and professional development.
Related Course(s):	Bachelor of Science
Related Majors/Minors/ Specialisations:	Bioengineering Systems Bioengineering Systems Master of Engineering (Biomedical)