BMEN30008 Biosystems Design

Credit Points:	12.5
Level:	3 (Undergraduate)
Dates & Locations:	2015, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 12 hours of lectures; 36 hours of workshops Total Time Commitment: 170 hours
Prerequisites:	The prerequisites for this subject are: **Subject** / **Study Period Commencement:** / **Credit Points:** BMEN30007 Biotransport Processes / Semester 2 / 12.50 (prior to 2015 BMEN30007 Biocellular Systems Engineering) **AND** One of the following subjects **Subject** / **Study Period Commencement:** / **Credit Points:** BMEN30006 Circuits and Systems / Semester 1 / 12.50 ELEN30012 Signals and Systems / Semester 2 / 12.50 Note: BMEN30007 Biotransport Processes and ELEN30012 Signals and Systems may be taken concurrently
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	None
Core Participation Requirements:	For the purposes of considering applications for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005) and Students Experiencing Academic Disadvantage Policy, this subject requires all students to actively and safely participate in laboratory activities. Students who feel their disability may impact upon their participation are encouraged to discuss this with the Subject Coordinator and the Disability Liaison Unit. http://www.services.unimelb.edu.au/disability/
Coordinator:	Prof David Grayden
Contact:	Email: **grayden@unimelb.edu.au (mailto:grayden@unimelb.edu.au)**
Subject Overview:	**AIMS** This subject involves undertaking biosystems design group projects from concept to reporting and communicating the design proposal through to possible development, and so will provide an integrated capstone experience for the Bioengineering major. The emphasis of each of the projects is associated with a well-defined project description that may be based on a task required by an academic or external, industry-based client. The topics covered will include design processes, formulation of the problem, conceptual designs, partitioning of design activities, analysis of system components, integration of design, quality and safety assessment, project management, and engineering professional attitudes. The open-ended nature of the design task will result in students having exposure to historical, sociological and environmental factors in invention and innovation, professional ethics,

	regulatory and statutory requirements, legal and ethical responsibilities, and environmental considerations. **INDICATIVE CONTENT** Topics include: Design Control Processes -Design and development planning, Design input, Design control, Design output, Design review, and Design verification Theory of measurement – understanding and applying the limitations of measurement Amplifier circuits –design and construct basic op-amp circuits to the application of high precision instrumentation amps Data acquisition systems – programming and applying industry standard engineering software and hardware tools Sensors – adapting and implementing simple displacement and electrochemical sensors Physiological dynamics – understanding physiological dynamic parameters and applying parameter estimation techniques to acquire physiological signals Non-invasive physiological system – use sensors, amplifiers, data acquisition systems and parameter estimation to design and construct a physiological system
Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILO)** Upon completion of this subject students should be able to: 1 Apply fundamental concepts of engineering design through various stages of the design process, problem formulation and structuring, ideation, decision making and communication; 2 Demonstrate awareness of the integrative nature of engineering design through the experience of balancing a range of factors, including uncertainties relating to safety, regulatory, safety and economic requirements; and have observed the close interrelation between the properties of engineering materials and the design process; 3 Design simple engineering components for desired performance specifications; 4 Write a professional technical report and/or design specifications.
Assessment:	Attendance and participation in weekly workshop classes with three individually written design reports of approximately 1500-2000 words each spread from week 4 to week 10 (10% each) each requiring approximately 8 to 10 hours of work including preparation; One individual poster describing the design project due in week 11, requiring approximately 8 to 10 hours of work (10%); One team-based presentation (10%) with 3 to 4 team members of approximately 15 to 20 minutes duration due in Week 12, requiring 8 to 10 hours of work; One team-based report (50%) with 3 to 4 team members of approximately 10,000 words due in Week 12, each member committing 50-60 hours of work. Intended Learning Outcomes (ILOs) 1 to 4 are assessed in workshop classes, poster assignment, and continuous assessment of submitted project work. (ILOs) 1 to 3 are also assessed in the team-based presentation.
Prescribed Texts:	None
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/2015/B-ARTS)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2015/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 developed their: # Ability to undertake problem identification, formulation and solution # Understanding of social, cultural, global and environmental responsibilities and the need to employ principles of sustainable development # Ability to utilise a systems approach to complex problems and to design and operational performance

	# Proficiency in engineering design # Ability to conduct an engineering project # Understanding of the business environment # Ability to communicate effectively, with the engineering team and with the community at large # Ability to manage information and documentation # Capacity for creativity and innovation # Understanding of professional and ethical responsibilities, and commitment to them # 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.
Notes:	**LEARNING AND TEACHING METHODS** This subject is delivered through lectures and workshop classes for hands-on laboratory activities. **INDICATIVE KEY LEARNING RESOURCES** Students are provided with lecture slides, electronic resources, industry standard engineering software and hardware tools, project specifications, component specifications and reference lists. **CAREERS / INDUSTRY LINKS** Exposure to biomedical instrumentation through guest lectures by representatives of hospitals, industry and/or medical research institutes.
Related Majors/Minors/ Specialisations:	Bioengineering Systems Master of Engineering (Biomedical with Business) Master of Engineering (Biomedical) Science-credited subjects - new generation B-SCI and B-ENG. Selective subjects for B-BMED