BMEN30008 Biosystems Design

Credit Points:	12.50
Level:	3 (Undergraduate)
Dates & Locations:	This subject is not offered in 2014.
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 Biocellular Systems Engineering / Semester 2 / 12.50 AND One of the following subjects **Subject** / **Study Period Commencement:** / **Credit Points:** BMEN30006 Fundamentals of Biosignals / Semester 1 / 12.50 ELEN30012 Signals and Systems / Semester 2 / 12.50 Note: BMEN30007(480-303) Biocellular Systems Engineering 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/
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:

	Risk Management – Australian regulatory guidelines for medical devices (Therapeutic Goods Administration) 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 of 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:	Three individual design reports of up to 20 pages total spread from week 4 to week 10 (30%) An individual poster describing the design project due in week 11 (10%) A group oral presentation of up to 30 minutes duration in week 12 (groups of 3 or 4 students) (10%) A group final report of 30 pages due in week 12 (groups of 3 or 4 students) (50%) Intended Learning Outcomes (IOLs) 1, 2, 3 and 4 are assessed in the design reports, the poster, the oral presentation and the final report.
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/2014/B-ARTS)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2014/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) Science-credited subjects - new generation B-SCI and B-ENG. Selective subjects for B-BMED