MCEN90013 Design for Integration

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	This subject is not offered in 2014.
Time Commitment:	Contact Hours: 36 hours lectures, 5 hours tutorials, 12 hours of practical workshops. Total Time Commitment: 200 hours
Prerequisites:	**Subject** / **Study Period Commencement:** / **Credit Points:** MCEN90012 Design for Manufacture / Semester 1 / 12.50
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	None
Core Participation Requirements:	For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Students Experiencing Academic Disadvantage Policy, academic requirements for this subject are articulated in the Subject Description, Subject Objectives, Generic Skills and Assessment Requirements of this entry. The University is dedicated to provide support to those with special requirements. Further details on the disability support scheme can be found at the Disability Liaison Unit website: http://www.services.unimelb.edu.au/disability/
Contact:	**colb@unimelb.edu.au (mailto:colb@unimelb.edu.au)**
Subject Overview:	**AIMS** As a result of satisfactorily participating in this subject, students should be able to undertake design tasks at an intermediate level, considering performance under uncertain system integrity due to fatigue and wear, and have the ability to design or select suitable ameliorating solutions. **INDICATIVE CONTENT** Topics covered in this subject may include: general concepts of function, integrity, value, quality, efficient use of resources in the synthesis of solutions to design problems; specific mechanical elements such as gears and other common means of power transmission, and their design; development of understanding, in the engineering paradigm, of general concepts such as: function, integrity, value, quality, the efficient use of resources in the synthesis of solutions to design problems. Students will also be exposed to - • Design for fatigue: characteristics of fatigue fracture, two-dimensional (2-D) and three-dimensional (3-D) stress conditions • Management of the design process: initial appreciation, information flows and networks, characteristics of manufacturing processes affecting product design • Cumulative damage hypothesis • The Weibull distribution • Design for wear: surface phenomena and tribology; its application to bearings and seals • Quantitative measures of reliability **This subject has been integrated with the Skills Towards Employment Program (STEP) and contains activities that can assist in the completion of the Engineering Practice Hurdle (EPH**).
Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILO)** On completion of this subject the student is expected to have the skills to: Provide in-depth explanation of and apply the concepts and methods of designing for system and component integrity under conditions of fatigue and wear

	1 - Apply information-based techniques for the management of engineering design 2 - List, explain, evaluate and modify the function of the major components of manufacturing systems and how they interact with engineering design and clients 3 - Analyse the efficiency of some basic productive systems 4 - Describe in detail information-based techniques for the management of engineering design
Assessment:	One 2-hour end-of-semester examination (40%). Associated with Intended Learning Outcomes (ILOs) 1 to 5. One team project, not exceeding 2,000 words (excluding computations, tables, graphs, diagrams) per student (60%) due in week 10 of the semester. Associated with ILOs 2 and 4. Interim reports and associated team management meetings will be assessed: Initial Appreciation, Strategic Information Network (SIN) flow chart, Progress and Completion Reports. Associated with ILOs 2 and 4. HURDLE - Students must obtain a mark of at least 40% for all continuing assessment tasks in order to pass the subject.
Prescribed Texts:	Budynas, R.G. and Nisbett, J.K, Shigley's Mechanical Engineering Design, McGraw-Hill, 2011
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:	# The ability to undertake problem identification, formulation, and solution. # The ability to use a system based approach to complex problems and to design and operational performance. # Proficiency in engineering design. # The ability to conduct an engineering project. # The ability to communicate effectively, with the engineering team and with the community at large. # The ability to manage information and documentation. # The 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.
Notes:	**LEARNING AND TEACHING METHODS** The subject will be delivered through a combination of lectures and problem-based-learning workshops that will feature student-centred activities including computer-aided materials. **INDICATIVE CONTENT** Topics covered in this subject may include: general concepts of function, integrity, value, quality, efficient use of resources in the synthesis of solutions to design problems; specific mechanical elements such as gears and other common means of power transmission, and their design; development of understanding, in the engineering paradigm, of general concepts such as: function, integrity, value, quality, the efficient use of resources in the synthesis of solutions to design problems. Students will also be exposed to: # design for fatigue: characteristics of fatigue fracture, two-dimensional (2-D) and three-dimensional (3-D) stress conditions # management of the design process: initial appreciation, information flows and networks, characteristics of manufacturing processes affecting product design # cumulative damage hypothesis # the Weibull distribution # design for wear: surface phenomena and tribology; its application to bearings and seals # quantitative measures of reliability # case studies of failed engineered designs **INDICATIVE KEY LEARNING RESOURCES** # Budynas, R.G. and Nisbett, J.K, *Shigley's Mechanical Engineering Design*, McGraw-Hill, 9 th SI Edition, 2011 # Additional notes on LMS # MatWeb – a searchable database of material properties # Lecture slides

	# Tutorial sheets **CAREERS / INDUSTRY LINKS** When available, industry-based engineering practitioners will provide seminars on issues associated with the current state of the engineering and manufacturing, with particular reference to: # integration of large scale, complex designs for successful manufacture # successful design of technically advanced components and systems
Related Majors/Minors/ Specialisations:	B-ENG Mechanical Engineering stream Master of Engineering (Mechanical with Business) Master of Engineering (Mechanical)