

421-290 Engineering Materials

Credit Points:	12.50
Level:	2 (Undergraduate)
Dates & Locations:	2009, This subject commences in the following study period/s: Semester 2, - Taught on campus. Lecture, tutorial/practice, project/laboratory
Time Commitment:	Contact Hours: 50 Total Time Commitment: 120 hours
Prerequisites:	It is recommended that students undertake studies in 880-102 Engineering Systems Design 2 or 880-103 Constructing Environments.
Corequisites:	None
Recommended Background Knowledge:	None
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:	Assoc Prof Nelson Lam
Contact:	Assoc.Professor Nelson Lam Dept. of Civil and Environmental Engineering Tel: +61 3 83447554 Email: ntkl@unimelb.edu.au Assisted by: Lihai Zhang Dept. of Civil and Environmental Engineering Tel: +61 3 83446767 Email: lih Zhang@unimelb.edu.au
Subject Overview:	<p>The subject on constructional materials for structural engineering applications is divided into three components:</p> <ol style="list-style-type: none"> 1 Materials Science 2 Constructional Materials 3 Mechanics of Materials. In the material science component, basic concepts on inter-atomic bonding, microstructure of solids and generic material properties related to density, deformation, yield, ductility, fracture, toughness, susceptibility to corrosion and fatigue are introduced. In the constructional materials component, the engineering applications of structural and light-gauge steel, concrete, masonry, timber, glass, fibre-glass and composites will be covered. In the mechanics component, the basic concepts of stress-strain compatibility, composite actions, strength and ductility, arching actions and two-dimensional stress analysis and its measurement are covered.
Objectives:	<p>At the conclusion of this subject students should be able to:</p> <ul style="list-style-type: none"> # Describe atomic and crystalline structures, molecular composition and its influence on the physical properties of materials. # Describe and interpret the phenomena of strength, deformation, ductility, failure mechanisms, fast fracture and fatigue as applied generically to all materials and be able to identify the key engineering implications with these phenomena.

	<ul style="list-style-type: none"> # Describe the key features in the manufacturing/production, quality control, engineering applications, performance and safety issues associated with the commonly used engineering materials including steel, concrete, masonry, timber, polymers and composites, and be able to identify their engineering implications. # Apply the concepts of stress-strain compatibility for analyzing composite actions; identify realistic failure mechanisms in structures and make effective use of strength and ductility in engineering applications. # Identify key considerations including those of costs, practicality, sustainability and the environment, health and safety in making engineering decisions on the choice and engineering application of materials
Assessment:	One 1hr test prior to mid-semester (10%). Two project assignment reports of 1000 words each (30%) due in mid and late semester. One 2hr end of semester exam (60%).
Prescribed Texts:	W.D. Callister, Jr Materials Science and Engineering an Introduction Wiley and Sons Inc. D.R. Askeland, The Science and Engineering of Materials, Chapman & Hall. M.F. Ashby & D.R.H. Jones, Engineering Materials 1 & 2.
Recommended Texts:	No specific recommendations
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>On completion of this subject students should have the following skills:</p> <ul style="list-style-type: none"> # critical thinking and judgment # ability to apply knowledge of basic science and engineering fundamentals # ability to communicate effectively, not only with engineers but also with the community at large # ability to undertake problem identification, formulation and solution # ability to use a systems approach to design and operational performance # ability to function effectively as an individual and in multi-disciplinary and multi-cultural teams, with the capacity to be a leader or manager as well as an effective team member # understanding of the social, cultural, global and environmental responsibilities of the professional engineer, and the need for sustainable development # understanding of the principles of sustainable design and development # openness to new ideas and unconventional critiques of received wisdom
Notes:	<p>This subject replaces: CVEN10006 (421-122) Materials 2</p> <p>This subject is available for science credit to students enrolled in the BSc (new degree only)</p>
Related Course(s):	Bachelor of Engineering
Related Majors/Minors/ Specialisations:	Civil (Engineering) Systems Physical (Environmental Engineering) Systems