CVEN90016 Concrete Design and Technology

Credit Points:	12.5
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2015, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 49 hours (Lectures: 32 hours per semester, Workshops, Labs and Tutorials: 17 hours per semester) Total Time Commitment: 200 hours
Prerequisites:	Admission to the 746ST Master of Engineering Structures OR

Subject	Study Period Commencement:	Credit Points:
CVEN90049 Structural Theory and Design 2	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 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. 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
Coordinator:	Assoc Prof Helen Goldsworthy
Contact:	Assoc Prof Helen Goldsworthy **helenmg@unimelb.edu.au (mailto:helenmg@unimelb.edu.au)**
Subject Overview:	**AIMS** This subject introduces the students to advanced modelling techniques for concrete structures, and to the design and analysis of pre-stressed concrete structures with applications to both buildings and bridges. It builds on knowledge from CVEN90049 Structural Theory and Design 2, in particular the section on the fundamental behaviour of reinforced concrete structural elements when subjected to flexure, axial load and shear. Students will be introduced to strut-and-tie modelling which is used in the analysis and design of complex regions in concrete elements where simple flexural behaviour is disrupted, and also to deformation modelling for reinforced concrete elements which highlights the importance of ductility in these elements. This subject will also introduce advanced concrete technology with discussion of high strength concrete, deterioration mechanisms and the design for durable concrete structures. Students who complete this specialist subject are likely to find employment in design consultancy or concrete construction companies and work under the supervision of a senior engineer. **INDICATIVE CONTENT** Partially prestressed concrete beams: Properties of prestressing steel and types of prestressing systems; Sectional behaviour at service load level, equivalent load concept and load balancing; Creep and shrinkage in concrete; Estimation of prestress losses, deflection and amount of cracking; Indeterminate structures; Anchorages; Applications to building and bridge

	construction; Applications to precast concrete structures; Deformation modelling; Strut-and-tie modelling; High strength concrete; Design against physical and chemical attack of concrete structures.
Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILO)** On completion of this subject the student is expected to: 1. Use advanced deformation modelling techniques and tools for modelling concrete structures 2. Use strut and tie design methodology to design non-flexural members such as deep beams 3. Describe the technology related to high strength concrete and demonstrate awareness of the important factors affecting its performance in practical applications 4. Design against physical and chemical attack of concrete structures 5. Describe the behaviour of partially pre-stressed concrete beams, and analyse and design these structures. The implementation of measures to improve environmental sustainability will be discussed in relation to design 6. Describe the use of precast concrete, its advantages and aspects related to its design application.
Assessment:	Two assignments and a mid-semester test, due in approximately weeks 5, 8 and 11 One assignment students will work in a team of 2/4 students, on a prestressed concrete laboratory exercise. Approximately 2000 words, each member committing to approximately 10-13 hours of work, due approximately week 5. Assesses Intended Learning Outcome (ILO) 5 (10%) One 50 minute test (and an associated laboratory class), held approximately week 8. Assesses ILO 4 (10%) One individual assignment, approximately 1000 words, a time commitment of approximately 10-13 hours' work, due approximately week 11. Assesses ILO 1 (10%) 3-hour written, closed book, end of semester, examination. Assesses ILOs 1 to 6 (70%) Hurdle Requirement: A pass in the end of semester examination is required to pass the subject.
Prescribed Texts:	None
Recommended Texts:	Foster, S., Warner, R. and Faulkes, K., 2013 "Prestressed Concrete", 3rd Edition, Pearson
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:	# Ability to apply knowledge of science and engineering fundamentals # Ability to undertake design problem identification, formulation, and solution # Capacity for creativity and innovation # Proficiency in engineering design # Understanding of professional and ethical responsibilities, and commitment to them # Capacity for lifelong learning and professional development.
Notes:	**LEARNING AND TEACHING METHODS** Lectures, with examples, are used to convey basic information and concepts. Lectures are supplemented with tutorial problems, a virtual laboratory class, and several assignments (one of which includes a hands-on concrete technology laboratory class), all of which reinforce the student's understanding of the core material. Concept design workshops are given in conjunction with experienced bridge and building design consultants from industry; they give the students the opportunity to test their acquired skills. **INDICATIVE KEY LEARNING RESOURCES** Recommended texts: Foster, S, Warner, R. and Faulkes, K, 2013 "Prestressed Concrete", 3rd Edition, Pearson Design Standard: Standards Australia, Concrete Structures, AS3600-2009. **CAREERS / INDUSTRY LINKS** Three concept design exercises are given in conjunction with experienced structural design consultants from industry.
Related Course(s):	Master of Engineering Structures Master of Philosophy - Engineering Ph.D.- Engineering

Related Majors/Minors/ Specialisations:	B-ENG Civil Engineering stream Master of Engineering (Civil) Master of Engineering (Structural)