CVEN30010 Systems Modelling and 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: 52 hours per semester (Lectures: 32 hours, Workshops: 16 hours, Laboratory sessions: 4 hours). Total Time Commitment: 170 hours
Prerequisites:	Admission to the MC-ENG Master of Engineering (Civil) OR Admission to the MC-ENG Master of Engineering (Environmental) OR Both of the following subjects:

Subject	Study Period Commencement:	Credit Points:
ENEN20002 Earth Processes for Engineering	Semester 2	12.50
ENGR30002 Fluid Mechanics	Semester 1, Semester 2	12.50

Please note: Students who completed ENGR30001 Fluid Mechanics & Thermodynamics are NOT required to complete ENGR30002 Fluid Mechanics

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:	Prof Stephan Matthai
Contact:	Prof. Stephan K. Matthai **stephan.matthai@unimelb.edu.au (mailto:stephan.matthai@unimelb.edu.au)**
Subject Overview:	**AIMS** This subject contains capstone design projects with an emphasis on geotechnical and hydraulic engineering but may include requirements for an understanding of other fields. Students will be given briefings on special topics in geotechnical and hydraulic engineering but there will be emphasis put on self-learning. Emphasis will be placed on understanding the principles governing the flow of water through soil and its consequent impact on failure of soil structures such as occurs in landslides. The flow of water in channels, for example like those used for

	irrigation water supply will also feature. Computer models to investigate these areas and laboratory experiments to experience the phenomena in a practical way will also be conducted. The two separate design projects in geotechnical and hydraulic engineering will require students to apply the knowledge gained in the first few weeks of the subject to realistic design problems typical of what would be expected with employment in industry. Students will be required to complete reports presenting the outcomes of their designs so that the relevant data, design philosophies and construction details can be appropriately documented. This subject builds on knowledge gained in subjects such as Fluid Mechanics and Earth Processes for Engineering and assumes a familiarity with concepts of sustainability and engineering systems. The subject builds knowledge to be used in professional masters degree subjects like Geotechnical Engineering and Civil Hydraulics. **INDICATIVE CONTENT** Stresses in soils, permeability and seepage, flow nets, the effect of seepage on stability, slope stability principles, landslides, methods of analysis, design and remediation, the use of computer models to solve seepage and slope stability problems, various aspects of open channel flow including subcritical and supercritical flows, their response to changes in channel geometry, time-dependent behaviour and flow measurements.
Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILO)** On completion of this subject the student is expected to: 1. Interpret a design problem, develop criteria (technical, economic and environmental) to evaluate solutions, and develop conceptual solutions to the problem 2. Use software to assist in designing hydraulic and geotechnical structures 3. Critically evaluate the output of design software 4. Demonstrate competency in communicating technical issues in engineering laboratory and design reports 5. Begin to analyse the influence of engineering materials on design performance.
Assessment:	Two design reports (1500 words), due at or close to the end of semester (40%), each assignment requiring approximately 20-25 hours of work. Assesses Intended Learning Outcomes (ILOs) 1 – 5 Two laboratory reports (1000 words), due around mid-semester (10%), each report requiring approximately 5 hours of work. Assesses ILOs 4 and 5 One 2-hour written examination, end of semester (50%). Assesses ILOs 1, 3, 4 and 5. Hurdle requirement: Students must pass both assignment and examination components to pass the subject.
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 Commerce (https://handbook.unimelb.edu.au/view/2015/B-COM)** # **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2015/B-ENVS)** # **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:	# Ability to apply knowledge of basic science and engineering fundamentals # Ability to undertake problem identification, formulation and solution # Proficiency in engineering design # Ability to utilise a systems approach to complex problems, and to design and assess performance # Ability to communicate effectively # Ability to manage information and documentation # Ability to conduct an engineering project # Ability to function effectively as an individual and in teams # Capacity for creativity and innovation.

Notes:	**LEARNING AND TEACHING METHODS** Over approximately the first half of the semester, separate lectures in both geotechnical engineering and hydraulic engineering will be presented giving the basic technical knowledge required to undertake the design projects. Worked examples will be provided at various times to illustrate the application of that knowledge. Students will also undertake two laboratory sessions during this period so that they can get some hands-on experience with seepage in soils and open channel flow. Over the last few weeks of the semester, students will be provided with a geotechnical engineering design project and a hydraulics engineering design project. These will be computer based projects and will be undertaken with software typically used in industry for these types of project. Tutorial assistance will be provided to students during the computer laboratory sessions. **INDICATIVE KEY LEARNING RESOURCES** A range of references will be provided to allow students to back up the basic information provided in lectures. This material will include specifically prepared notes on selected topics, PowerPoint presentations, worked design examples, manuals for the software used in the design projects and online tutorials for this software. **CAREERS / INDUSTRY LINKS** The main link with this subject is that students will be able to develop many of the essential modelling and design skills typically required for careers in engineering design, not only in generic terms but also specifically in terms of geotechnical and hydraulic engineering. The software used in the projects undertaken is widely used in industry.
Related Majors/Minors/ Specialisations:	B-ENG Civil Engineering stream Civil (Engineering) Systems major Civil Systems Engineering Systems Environmental Engineering Systems major Environments Discipline subjects Master of Engineering (Civil with Business) Master of Engineering (Civil) Master of Engineering (Environmental) Master of Engineering (Structural) Science-credited subjects - new generation B-SCI and B-ENG.