CVEN90051 Civil Hydraulics

Credit Points:	12.5
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2016, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 39 hours (Tutorials/Workshops: 3 hours per week; Laboratory Workshop/ Demonstration: 3 hours per semester) Total Time Commitment: 200 hours
Prerequisites:	One of the following subjects is required:

Subject	Study Period Commencement:	Credit Points:
ENGR30001 Fluid Mechanics & Thermodynamics	Not offered 2016	12.50
ENGR30002 Fluid Mechanics	Semester 1, Semester 2	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 Michael Stewardson
Contact:	Assoc Prof Michael Stewardson **mjstew@unimelb.edu.au (mailto:mjstew@unimelb.edu.au)**
Subject Overview:	**AIMS** Students that successfully completely this subject will have the skills to practice under a chartered engineer to analyse problems and propose designs in the field of civil and environmental hydraulic engineering. Analysis of water flow in natural and constructed channels is studied in the river hydraulics module. This gives students the fundamental tools to learn techniques such as flood prediction, the design of channels for water movement in irrigation, and the prediction of water levels in channels in environmental flow studies. The movement of water and sediment along coasts due to wave action and currents is the focus of the coastal hydraulics module. An understanding of wave processes in coastal and surf zones is an essential starting point for the design of coastal structures such as piers, groins and jetties. With impending sea level rise, this will be a significant area of civil engineering practice for the foreseeable future. In the third module, the focus will be on processes of sediment transport and geomorphological change in rivers and coastal waters. The ability to analyse these processes can lead to graduates working in the area of river engineering, where for example the erosion of sediment from bridge abutments must be controlled. It is also important in ecological modelling where the movement of sediments and entrainment in water can impact on the habitat of stream biota.

	The subject will draw on students' existing knowledge of fluid mechanics, systems modelling, statistics, engineering mathematics and geomorphology gained from undergraduate or other preparatory study. **INDICATIVE CONTENT** 1 River Hydraulics: revision of basic concepts of steady-state open channel flow and extend this with applications in natural river channels, time dependent behaviour and flood hydraulics 2 Coastal Hydraulics: basic wave theory and processes including in the surf zone 3 Sediment Transport and Water Quality: mechanisms and models of particulate and solute transport in rivers and coastal environments.
Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILO)** On completion of this subject the student is expected to: 1 Describe flow regimes and what controls the water level in a river 2 Analyse the flow and backwater profiles of water in natural and constructed channels to predict the channel capacity and flow characteristics such as depth 3 Analyse the flow water through natural and constructed structures such as chokes, weirs, spillways and energy dissipaters 4 Design a channel to carry a particular design flow 5 Describe the characteristics of waves and be able to predict the behaviour of waves in the near-shore environment based on their deep-water characteristics 6 Calculate the breaking characteristics of waves and their effect on coastal water levels and currents 7 Interrogate wave recordings for statistics useful in the design of coastal structures and management options 8 Use tidal constituents to classify the tidal regime at various locations 9 Recommend coastal management options based on an understanding of waves, tides and near-shore currents 10 Describe and analyse the processes of sediment erosion, entrainment, transport and deposition in river channels 11 Predict sediment loads based on channel and sediment characteristics and discriminate between supply and transport limited situations 12 Predict how channel morphology will change as the result of natural or human impact.
Assessment:	Three 30 minute tests (30%) at the end of each four week long module. Intended Learning Outcomes (ILOs) 1 to 3, 6 to 8, and 10 to 12 are addressed in these tests Group and online activities for each module (30%) equivalent to 500 words for each module and student, each module requiring approximately 13-15 hours of work. ILOs 1 to 12 are addressed in these activities One 2 hour examination (40%) end of semester. ILOs 1 to 3, and 5 to 12 are addressed in this examination.
Prescribed Texts:	Readings will be available on-line and as a bound volume available for purchase from the Book Co-op.
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 problem identification, formulation and solution # Ability to utilise a systems approach to complex problems and to design and operational performance # Ability to function effectively as an individual and in teams, as a team leader or manager as well as an effective team member
Notes:	**LEARNING AND TEACHING METHODS** These modules will be taught using a combination of self-guided readings, tutorial/practice classes (3 hours/weeks) and group work. Readings provide the basic theory and applications, tutorial support learning of this material through sample problems and discussion in practice

	classes. Students practice the application of this theory to Civil Hydraulics problems in group projects for each module. There are no traditional lectures in this subject. **INDICATIVE KEY LEARNING RESOURCES** Readings are provided for this subject and made freely available on-line and for purchase as hard copy at the book room. Readings are taken from the following texts and papers: García, M.H., ed. 2008 Sedimentation engineering : processes, measurements, modeling, and practice; Prepared by the ASCE Task Committee to Expand and Update Manual 54 of the Sedimentation Committee of the Environmental and Water Resources Instiworkshop. Reston, Va. :, American Society of Civil Engineers. Bridge, J. S. and Demicco, R. 2008 Earth surface processes, landforms and sediment deposits Cambridge, UK ; New York: Cambridge University Press. Chadwick, A. and Morfett, J. 1998 Hydraulics in civil and environmental engineering. London: E&FN Spon. Chang, H. H., 1992. Fluvial processes in river engineering. Malabar: Krieger publishing company. Dean, R. G. and Dalrymple, R.A., - 2002 Coastal processes with engineering applications Cambridge: Cambridge University Press. Deslauriers, L. E., Schelew,E. and Wieman,C., 2011. Improved Learning in a Large-Enrollment Physics Class. Science 332(6031), 862-864 Dingman, S. L., 2008. Fluvial hydraulics. New York : Oxford University Press. French, R. H., 1994. Open-channel hydraulics. New York : McGraw-Hill. Gordon, N. D., McMahon,T.A. et al.-2nd ed. 2004. Stream hydrology : an introduction for ecologists. Chichester, West Sussex, England: Wiley. Henderson, F. M., -1966. Open channel flow. New York: Macmillan. Hibbeler, R. C., 2011. Mechanics of Materials. Boston: Prenctice Hall. Kamphuis, J. W., 1999. Introduction to coastal engineering and management. Singapore ; London: World Scientific. Kay, M., 2008. Practical hydraulics. London : Routledge. Kondolf, M. and Piégay,H., 2003. Tools in fluvial geomorphology. Hoboken, NJ, USA : J. Wiley. Nielsen, P., 2009. Coastal and estuarine processes. Singapore : World Scientific. Julien, P.J., -2nd ed.2010. Erosion and Sedimentation. Cambridge University Press Pretor-Pinney, G., 2010. The Wavewatcher's Companion. London: Bloomsbury Publishing. Reeve, D. and Fleming,C., 2004. Coastal engineering : processes, theory and design practice. London ; New York : Spon Press. Sorensen, R. M., - 2005. Basic coastal engineering. New York: Springer. Soulsby, R., 1997. Dynamics of marine sands : a manual for practical applications. London : Telford. Vogel, S., 1981. Life in moving fluids : the physical biology of flow. Boston, Mass : W. Grant Press. **CAREERS / INDUSTRY LINKS** Case study problems for each of the three modules have been provided with support from practicing engineers.
Related Course(s):	Master of Architectural Engineering
Related Majors/Minors/ Specialisations:	B-ENG Civil Engineering stream Master of Engineering (Civil with Business) Master of Engineering (Civil) Master of Engineering (Environmental) Master of Engineering (Structural)