CVEN3501 Water Resources Engineering

Semester 1, 2016

Never Stand Still | Faculty of Engineering | School of Civil and Environmental Engineering

COURSE DETAILS

Units of Credit	6		
Contact hours	5 hours per week		
Class	Tuesday,	14:00 – 16:00	CLB 7
	Thursday,	09:00 – 10:00	CLB7
Workshop	Thursday,	10:00 – 12:00	COL LG01, COL LG02, Gold G04, Gold G06, Gold G16, Mat 130, Mat 231, Mat 232, Old Main Building 151

Course Coordinator

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Lecturers

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INFORMATION ABOUT THE COURSE

Water Resources Engineering will provide the basic information describing the hydrological cycle and those components of it that are essential to engineering design and process understanding. The main course taken before Water Resources Engineering (CVEN3501) which supports its content is:

- Principles of Water Engineering (CVEN2501): The object of CVEN2501 is to introduce students to the practice of water engineering. Topics discussed include properties of fluids, manometry, hydrostatics, the principles of mass conservation, energy conservation, the forces and momentum in flowing fluids, flow in pipes, boundary layers, dimensional analysis, physical models, flow in open channels inclusive of specific energy, Manning and Chezy equations, uniform flow, subcritical and supercritical flow, hydraulic jumps, and gradually varied flow profiles.

Courses to be taken after Water Resources Engineering (CVEN3501) which are supported by its content are:

- Water and Wastewater Engineering (CVEN3502): the design and operation of (i) water treatment plants, (ii) wastewater treatment plants, (iii) stormwater systems, (iv) water distribution systems and (v) sewage distribution systems require knowledge of free surface computations, head losses due to friction in pipes, local head losses due to pipe fittings and shear stresses at flow boundaries which maintain pipes and channels which are scoured clean.
- Solid Wastes and Contaminant Transport (CVEN3702): quantifying the rate of pollutant transport and dispersion in pipes, streams, rivers and estuaries requires knowledge of flow regimes (laminar and turbulent) and the velocity profiles in boundary layers.

HANDBOOK DESCRIPTION

See link to virtual handbook:

http://www.handbook.unsw.edu.au/undergraduate/courses/2016/CVEN3501.html

OBJECTIVES

The objectives of this course are to:

- Introduce you to the practice of water resources engineering.
- To instruct you in basic hydrological measurement techniques
- To teach you how to estimate design rainfall and rainfall losses
- To teach you how to quantify flow peaks and volumes required for engineering design
- To develop an awareness of the energy and water fluxes in the environment
- To introduce you to groundwater and the techniques used to estimate groundwater resources.

Generally, the final exam, the mid-semester quiz and the assignments are designed to assess:

- Your understanding of the principles of Water Resources Engineering

The course objectives, content and assessment focuses on encouraging the following attributes in you, with particular application to water resources engineering:

- Capacity for analytical and critical thinking and for creative problem solving. You will be exposed to, and be required to solve, numerous hydrologic problems in the Lectures, the Workshops and the assignments --- "the learning is in the doing". All these problems will cover a variety of scenarios, and where possible, will be drawn from engineering practice.
- Skills for effective communication: Throughout this course, the skills to be developed are in written communication. In your assignments and exams it is important that you clearly communicate your knowledge.
- Ability to engage independent and reflective learning: By revising the material from the lectures and the workshops you will gain improved skills in independent learning.

TEACHING STRATEGIES

Teaching in this course is centred on the Lectures which are technical in content. You will develop your analysis skills in water resources engineering by applying the theory to problems which you undertake in the Workshops

Detailed lecture notes with examples are available on Moodle. The purpose is to free up your time to think and comprehend during the lectures.

Private Study	• Review lecture material and textbook • Do set problems and assignments • Join Moodle discussions of problems • Reflect on class problems and assignments • Download materials from Moodle • Keep up with notices and find out marks via Moodle
Lectures	• Find out what you must learn • Learn more details on the methods and theory that are not covered in the notes • Follow worked examples • Hear announcements on course changes
Workshops	• Be guided by demonstrators • Practice solving set problems • Ask questions
Assessments	• Demonstrate your knowledge and skills • Demonstrate higher understanding and problem solving

EXPECTED LEARNING OUTCOMES

At the end of this course, you will be familiar with the engineering techniques used to analyse and design the basic components of water resources engineering. Upon successful completion of Water Resources Engineering

(CVEN3501) you will be able to:

- Conduct a hydrological assessment of a catchment;
- Quantify the size of design floods;
- Understand energy fluxes and calculate evaporation; and
- Undertake a basic assessment of groundwater resources.

For each hour of contact it is expected that you will put in at least 1.5 hours of private study.

ASSESSMENT

The final grade for this course will normally be based on the sum of the scores from each of the assessment tasks.

There will be no supplementary exam offered for the mid semester quiz. If you apply for and receive special consideration for the mid semester quiz, your final exam will be worth 65% of the assessment for the course.

It is recommended that students who perform poorly in the online quizzes, mid semester quiz and workshops discuss progress with the lecturer during the semester.

The lecturer reserves the right to adjust the final scores by scaling if agreed by the Head of School.

Details of each assessment component, the marks assigned to it, and the dates of submission are set out below.

ASSIGNMENTS

1.	Assignment 1:	Water cycle and evaporation	Value = 10%	issued on: 15th March	due on: 15th April
2.	Assignment 2:	Engineering hydrology	Value = 10%	issued on: 26th April	due on: 20th May
3.	Assignment 3:	Groundwater	Value = 10%	issued on: 17th May	due on: 3rd June

Assignments that are submitted after the due date will be penalised at the rate of 10% per day.

QUIZZES AND EXAMS

1.	Online Quizzes (available on Moodle)	Value = 5%	issued on: Week 2, 4, 6, 8 and 10
2.	Mid Semester Quiz (Material from Weeks 1 – 6)	Value = 25%	Date: Tuesday 19th April, 14:00 – 16:00
3.	Final Exam (Material mainly from Weeks 7 – 12)	Value = 40%	Formal exam period

Both the mid semester quiz and final examination will be closed book. You will be allowed to take one A4 page into the quiz or exam with any material allowed on the page.

The 5 online quizzes will each contribute 1% of your mark for the subject (i.e. total 5%). These quizzes will give you the opportunity to review your progress in the course as you go. You will be given 5 questions for each online quiz taken from a database of questions. You will be able to have 2 attempts at each quiz with your higher mark taken. Each quiz will be open for 1 week.

COURSE PROGRAM

The course schedule tabulated below shows the main topics and approximately how long will be spent on each topic in lectures. Please note that the lecture durations and sequence of topics is a guide only; there may be some variations. However, details on the associated assessment tasks should not be affected; if they are you will be informed.

SEMESTER 1, 2016

Week	Commencing	Lecturer	Topic	Assessments
1	29 February	AS	Introduction; Water and Energy Cycles	
2	7 March	AS	Climate change, meteorological variables and evaporation	Online quiz 1
3	14 March	AS	Rainfall and streamflow measurements, modelling principles	Assignment 1 issued
4	21 March	AS	Rainfall estimation, catchment delineation and water balance	Online quiz 2
Break	28 March		No lectures or workshops	
5	4 April	AS	Losses, rainfall-runoff modelling basics	
6	11 April	AS	Flood frequency analysis	Online quiz 3 Assignment 1 due
7	18 April	AS	Design storm rainfall, flood estimation basics	Mid Semester Quiz on Weeks 1 - 6
8	25 April	AS	Rational method for flood estimation	Online quiz 4 Assignment 2 issued
9	2 May	LM	Unit Hydrograph for flood estimation	
10	9 May	GR	Introduction to groundwater resources	Online quiz 5
11	16 May	GR	Darcy's Law; Hydraulic head and equations of groundwater flow; storage coefficients and the impact of abstracting water	Assignment 2 due Assignment 3 issued
12	23 May	GR	Field investigation techniques; drilling and pumping test evaluation	
13	30 May	AS/GR	Review lecture and workshops	Assignment 3 due

RELEVANT RESOURCES

There is no textbook for this course. Electronic copies of the notes are available from Moodle.

Recommended reading:

Flood Hydrology

- Pilgrim, D.H (Editor) (1998). Australian Rainfall & Runoff – A Guide to Flood Estimation. Institution of Engineers, Australia, Barton, ACT. ISBN: 1858256878 (Vol 1) and ISBN: 0858254352 (Vol 2)
- Ladson, A. (2008). Hydrology - An Australian Introduction. Oxford University Press, South Melbourne, ISBN: 978019555358
- Maidment, D.R (1993). Handbook of Hydrology. McGraw-Hill. ISBN: 9780070397323

Groundwater

- Fetter, C.W. (2001) Applied Hydrogeology. Prentice Hall, ISBN: 0131226878

DATES TO NOTE

Refer to MyUNSW for Important Dates available at:

https://student.unsw.edu.au/dates

PLAGIARISM

Beware! An assignment that includes plagiarised material will receive a 0% Fail, and students who plagiarise may fail the course. Students who plagiarise are also liable to disciplinary action, including exclusion from enrolment.

Plagiarism is the use of another person's work or ideas as if they were your own. When it is necessary or desirable to use other people's material you should adequately acknowledge whose words or ideas they are and where you found them (giving the complete reference details, including page number(s)). The Learning Centre provides further information on what constitutes Plagiarism at:

https://student.unsw.edu.au/plagiarism

ACADEMIC ADVICE

For information about:

- Notes on assessments and plagiarism,
- School policy on Supplementary exams,
- Special Considerations,
- Solutions to Problems,
- Year Managers and Grievance Officer of Teaching and Learning Committee, and
- CEVSOC.

Refer to Academic Advice on the School website available at:

http://www.engineering.unsw.edu.au/civil-engineering/resources/academic-advice