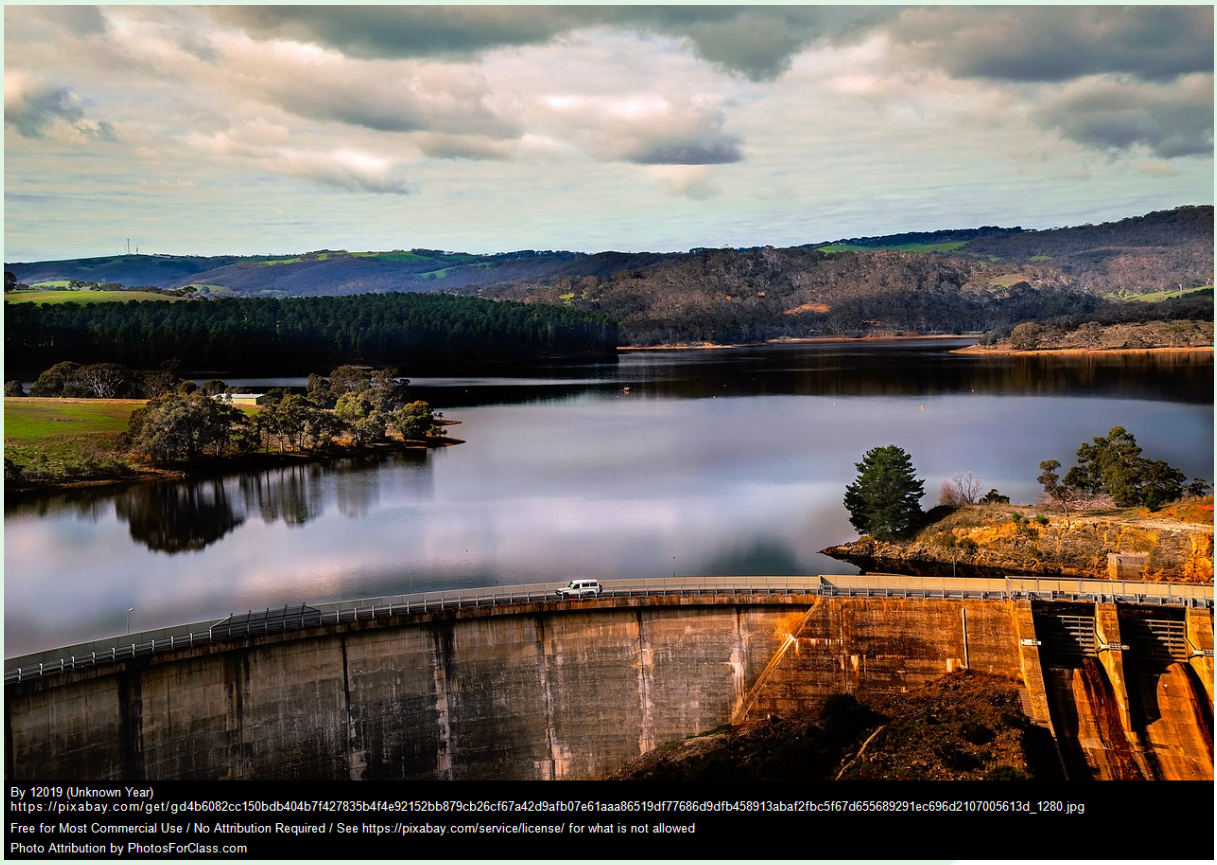
CVEN4507

Advanced Water Engineering

Term 2, 2022



Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Lucy Marshall	lucy.marshall@unsw.edu.au		H22, Room 132	02 9385 7944

Lecturers

Name	Email	Availability	Location	Phone
Stefan Felder	s.felder@unsw.edu.au		H20, Room 303	9385 5898

School Contact Information

Engineering Student Support Services – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

Engineering Industrial Training – Industrial training questions

UNSW Study Abroad – study abroad student enquiries (for inbound students)

UNSW Exchange – student exchange enquiries (for inbound students)

UNSW Future Students – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

Course Details

Units of Credit 6

Summary of the Course

Advanced closed conduit and open channel hydraulic design, designing for peak pump efficiency, sedimentation engineering, reservoir behaviour and design, estimation of large and extreme floods, advanced topics in hydrological design.

Course Aims

- To build up your technical understanding of water engineering
- To understand large-scale water supply and flood engineering assessments.
- To be able to apply acquired theory to develop realistic mathematical models of water engineering systems
- To develop the critical abilities required to apply commercial software packages to large-scale water engineering problems.
- To understand the fundamental concepts of unsteady hydraulic analysis.

Course Learning Outcomes

After successfully completing this course, you should be able to:

Learning Outcome	EA Stage 1 Competencies
1. Be familiar with hydrologic model development, parameterization, calibration and validation techniques	PE1.1, PE1.2, PE2.2
2. Understand the principles of reservoir design and operation.	PE1.1, PE1.5, PE2.3
3. Understand the techniques for Climate Change downscaling and bias correction. Become familiar with climate projections and advice for engineering decision making.	PE1.4, PE1.5, PE1.6
4. Understand the principles of uncertainty, including Monte Carlo approaches, parameter uncertainty, stochastic generation, climate change uncertainty, and its importance in decision making.	PE1.5, PE2.1
5. Be exposed to a range of applications which illustrate the realities associated with data, catchment information, along with interactions of the techniques covered here with other disciplines	PE2.3, PE3.3, PE3.4
6. Gain an advanced understanding of basic water engineering concepts	PE1.1
7. Apply the fundamental knowledge to hydraulic engineering applications including channel transitions and sedimentation processes	PE1.3, PE1.6, PE2.1
8. Become familiar with design principles in water engineering	PE2.4, PE3.1, PE3.4

Learning Outcome	EA Stage 1 Competencies
9. Attend a compulsory Field Trip that exposes students to a range of engineering hydrology and hydraulics problems in relation to the topics covered.	PE3.1, PE3.2, PE3.4, PE3.5, PE3.6

Teaching Strategies

This subject consists of a mixture of lectures, workshops and hands-on computer sessions.

Lectures will cover advanced engineering hydrological and hydraulic analyses and their application to water engineering. Commercial software packages used in industry will be described and discussed. This information will form the foundations for your assignment which will require development of a working, practical engineering numerical model. Application of the theories to formulate guidelines in the analysis of practical engineering problems will be emphasized.

The workshops provide you with the opportunity to discuss the lecture material with your tutors and to solve the set workshop problems. In order to understand the subject matter well, it is essential to attend the workshop classes and solve the workshop problems by yourself.

For each hour of contact it is expected that a student will put in at least 1.5 hours of private study. You are recommended to review the lecture and workshop material weekly.

The teaching/learning activities are summarized in the following table:

Lectures

- Cover material to be learned for assessment tasks
- Follow worked examples
- Hear announcements on course changes

Workshops

- Practice solving set problems
- Be guided by tutors
- Ask questions

Computer Sessions

- Hand on exercises using commercial software
- Familiarise with pre- and post-processors
- Reflect and discuss on practical issues in numerical simulation

Private Study

- Review lecture material and textbook
- Preparation for the workshop and do set problems
- Reflect on class problems
- Study relevant references

Assessments (hand-in, assignments, examinations)

- Demonstrate your knowledge and skills
- Demonstrate higher understanding and problem solving

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Quiz	5%	10/06/2022 11:59 PM	1
2. Assignment 1	20%	08/07/2022 02:00 PM	1, 2, 5, 6, 8
3. Assignment 2	25%	02/08/2022 02:00 PM	6, 7, 8
4. Final Exam	50%	Not Applicable	1, 2, 3, 4, 5, 6, 7, 8

Assessment 1: Quiz

Start date: 10/06/2022 12:00 AM
Assessment length: 1 hour
Due date: 10/06/2022 11:59 PM

The quiz will be a multiple choice quiz and students will be assessed on their knowledge of basic modelling concepts and interpretation of model results.

Assessment 2: Assignment 1

Due date: 08/07/2022 02:00 PM

Students are expected to demonstrate their understanding of hydrologic modelling and reservoir design by performing calculations, running suitable models and explaining basic concepts. The marking of the assignment will be based upon the standard of the report, discussion and justification of modelling strategy and the accuracy of the simulations and calculations.

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

Assessment 3: Assignment 2

Due date: 02/08/2022 02:00 PM

Students are expected to demonstrate their understanding of the design of basic hydraulic structures and sediment transport processes by performing calculations, drawings and explaining basic concepts. The marking of the assignment will be based upon completeness, neatness and logical working. Please explain your working and indicate your calculation steps. Marks will be deducted if you only provide a final value as answer. If you used a computer program for your working, you must provide details about your working step as well as the formulas and code created.

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

Assessment 4: Final Exam

Assessment length: 2 hours

Students are expected to demonstrate their understanding of hydrological modelling, reservoir design

and climate change and the design of basic hydraulic structures and sediment transport processes by performing calculations, drawings and explaining basic concepts.

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Schedule

View class timetable

Timetable

Date	Type	Content
O-Week: 23 May - 27 May		
Week 1: 30 May - 3 June	Lecture	Catchment hydrology and modelling
Week 2: 6 June - 10 June	Lecture	Catchment modelling continued
	Assessment	Quiz
Week 3: 13 June - 17 June	Lecture	Reservoir design
Week 4: 20 June - 24 June	Lecture	Climate change analysis
Week 5: 27 June - 1 July	Lecture	Uncertainty Analysis and Hydraulic structures
Week 6: 4 July - 8 July	Fieldwork	Catch up week, and field trip
	Assessment	Assignment 1
Week 7: 11 July - 15 July	Lecture	Hydraulic structures
Week 8: 18 July - 22 July	Lecture	Hydraulic structures
Week 9: 25 July - 29 July	Lecture	Sediment transport
Week 10: 1 August - 5 August	Lecture	Sediment transport
	Assessment	Assignment 2
Study Week: 8 August - 11 August		

Resources

Recommended Resources

There is no textbook for this course but a number of recommended reference books for this course are indicated below - there will be further recommended reading indicated within the lecture notes and course delivery

- 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
- White, F.M. (2011). Fluid Mechanics, 7th edition, McGraw-Hill, ISBN 978 07 1286 459.
- Chanson, H. (2004). “The Hydraulics of open channel flow: an introduction”, Butterworth-Heinemann, Oxford, UK, 2nd edition (ISBN 0 7506 5978 5).
- Akan, A.O. (2006). Open Channel Hydraulics, Butterworth-Heinemann, ISBN 978 0 7506 6857 6.
- Van Rijn, L.C. (1993). Principles of Sediment Transport in Rivers, Estuaries and Coastal Seas,

  AQUA Publications, Amsterdam, ISBN 90 800356 2 9
- Henderson, F.M. (1966). Open Channel Flow, Macmillan, New York.
- Bos, M.G. (1989). “Discharge measurement structures” – ILRI Publication 20, 3rd edition, Wageningen, The Netherlands, ISBN 9070754150

Submission of Assessment Tasks

Please refer to the Moodle page of the course for further guidance on assessment submission.

UNSW has a standard late submission penalty of:

- 5% per day, for all assessments where a penalty applies, capped at five days (120 hours), after which a student cannot submit an assessment, and no permitted variation.

Academic Honesty and 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 Information

Final Examinations:

Final exams in T2 2022 will be held online between 12th - 25th August 2022 inclusive, and supplementary exams between 5th - 9th September 2022 inclusive. You are required to be available on these dates. Please do not to make any personal or travel arrangements during this period.

ACADEMIC ADVICE

- Key Staff to Contact for Academic Advice (log in with your zID and password): https://intranet.civeng.unsw.edu.au/key-staff-to-contact-during-your-studies-at-unsw
- Key UNSW Dates - eg. Census Date, exam dates, last day to drop a course without academic/financial liability etc.
- CVEN Student Intranet (log in with your zID and password): https://intranet.civeng.unsw.edu.au/student-intranet
- Student Life at CVEN, including Student Societies: https://www.unsw.edu.au/engineering/civil-and-environmental-engineering/student-life
- Special Consideration: https://student.unsw.edu.au/special-consideration
- General and Program-Specific Questions: The Nucleus: Student Hub
- Book an Academic Advising session: https://app.acuityscheduling.com/schedule.php?owner=19024765

Disclaimer

This course outline sets out description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle should be consulted for the up to date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline (as updated in Moodle), the description in the Course Outline/Moodle applies.

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CRICOS

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Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.

Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	✓
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	✓
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	✓
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	✓
PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline	✓
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline	✓
Engineering application ability	
PE2.1 Application of established engineering methods to complex engineering problem solving	✓
PE2.2 Fluent application of engineering techniques, tools and resources	✓
PE2.3 Application of systematic engineering synthesis and design processes	✓
PE2.4 Application of systematic approaches to the conduct and management of engineering projects	✓
Professional and personal attributes	
PE3.1 Ethical conduct and professional accountability	✓
PE3.2 Effective oral and written communication in professional and lay domains	✓
PE3.3 Creative, innovative and pro-active demeanour	✓
PE3.4 Professional use and management of information	✓
PE3.5 Orderly management of self, and professional conduct	✓
PE3.6 Effective team membership and team leadership	✓