	6
Contact hours	¶ Four hours per week
Class/ Workshop	¶ Thursday: 9:00 - 13:00 Online
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INFORMATION ABOUT THE COURSE

An introduction to lumped and distributed catchment runoff models; an introduction on the rationale used for model verification and validation, model development and parameter estimation; Bayesian methods for estimating model parameters; reservoir and channel routing; reservoir operation and design; wetland design and conceptual processes; introduction to hydrologic time series characterization and stochastic modelling in the context of water resources management; Climate change: Bias correction and downscaling models.

HANDBOOK DESCRIPTION

See link to virtual handbook:

https://www.handbook.unsw.edu.au/undergraduate/courses/2020/CVEN9612/

Units of Credit

OBJECTIVES

Objective of the course is to impart advanced knowledge in Water Engineering with a focus on Hydrology and Water Resources Engineering methodologies. The course consists of two halves, both being taught as online courses. The first part focuses on catchment surface models, and the second part focuses on water resources management.

TEACHING STRATEGIES

The teaching strategies that will be used include:

- **Lectures** that will focus on the development and application of the development of rainfall-runoff models, catchment hydrological characteristics and processes and approaches to time series analysis, optimization approaches and other statistical techniques for hydrological investigation.
- **Workshop** classes will concentrate on strategies for solving such problems. You will be encouraged, from time to time, to work alone as well as in small groups to solve problems.
- **Computer-aided exercises** will also be used to assess operational application of analytical techniques and other concepts developed throughout the course.

Suggested approaches to learning in this course include:

calibration/validation, and how to undertake data and modelling analysis using a range of statistical and other analytical approaches in a changed climate.

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

Learning Outcome		**EA Stage 1 Competencies**
1.	*Perform rainfall runoff modelling using conceptual models*	*PE1.1, PE1.5, PE2.2, PE2.3*
2.	*Perform semi-distributed hydrologic modelling.*	*PE1.2, PE2.2, PE2.3*
3.	*Understand differences between conceptual and distributed models*	*PE1.2, PE2.2, PE2.3*
4.	*Understand the basis for model calibration and validation*	*PE1.1, PE2.2, PE2.3, PE3.3*
5.	*Assess reservoir sizing and operation*	*PE1.1, PE2.2, PE2.3, PE3.3*
6.	*Perform simple time series analysis and use this to quantify uncertainty*	*PE1.2, PE2.2, PE2.3*
7.	*Assess implications of climate change on reservoir operation and learn how to correct systematic biases in climate model simulations*	*PE2.2, PE2.3, PE3.3*

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

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

6	***No lectures***			
7	29/10/2020	AS	¶ Introduction, reservoir design and operation ¶ Reservoir simulation methods, definition of storage capacity	
8	05/11/2020	AS	¶ Storage capacity (continued) ¶ Class workshop: reservoir design and storage	
			¶ Introduction to simple time series models ¶ Class workshop: time series models	
9	12/			

- Assignments (55%)
  - #1: Rainfall-Runoff Modelling and Computation (25%)
    Part 1: Runoff routing and model calibration (15%, due on: 2 Oct, marks returned: 8 Oct)
    Part 2: SMART (10%, due on: 29 Oct, marks returned: 12 Nov)
  - #2: Reservoir Modelling Application (30%, due on: 24 Nov, marks returned: 26 Nov)

  * Note that an absolute fail for an assignment automatically occurs when the penalty for a late submission excesses the mark limit (i.e. your mark -

- Final Exam (45%): online, 2-hour duration during the T3 examination period (27 Nov 10 Dec)

RELEVANT RESOURCES

There is no subject textbook but a number of recommended reference books for this course are as follows:

- Handbook of Hydrology (1992), by D.R. Maidment (Editor in Chief); published by McGraw-Hill, Inc.
- Water Resources Engineering (2001), by L. W. Mays; published by John Wiley & Sons Inc.
- Applied Hydrology (1988), by Chow, Maidment and Mays; published by McGraw-Hill Inc.
- Hydrology, An Australian Introduction (2008), by Anthony Ladson; Oxford University Press.

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.

hey were your own. When it is necessary or

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;
- Special Considerations: student.unsw.edu.au/special-consideration;
- General and Program-specific questions: The Nucleus: Student Hub
- Year Managers and Grievance Officer of Teaching and Learning Committee, and
- CEVSOC/SURVSOC/CEPCA

Refer to Academic Advice on the School website available at:

https://www.engineering.unsw.edu.au/civil-engineering/student-resources/policies-procedures-and-forms/academic-advice

Appendix A: Engineers Australia (EA) Competencies

Stage 1 Competencies for Professional Engineers

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing
	PE1.3 In-depth understanding of specialist bodies of knowledge