



# **CVEN4504**

## Advanced Water and Wastewater Treatment

Term Three // 2020

## Course Overview

### Staff Contact Details

#### Convenors

| Name           | Email               | Availability   | Location                                    | Phone     |
|----------------|---------------------|----------------|---|-----------|
| T. David Waite | d.waite@unsw.edu.au | By appointment | Room 114<br>(H22 –<br>Vallentine<br>Annexe) | 9385 5060 |

#### Lecturers

| Name         | Email                   | Availability   | Location                                    | Phone     |
|--------------|-------------------------|----------------|---|-----------|
| An Ninh Pham | anninh.pham@unsw.edu.au | By appointment | Room 108<br>(H22 –<br>Vallentine<br>Annexe) | 9385 5102 |

### School Contact Information

Student Services can be contacted via [unsw.to/webforms](https://www.unsw.edu.au/webforms).

## Course Details

**Credit Points 6**

### Summary of the Course

The course discusses both the fundamental concepts and practical aspects involved in the design of various conventional and advanced treatment unit processes to meet specified water quality standards with emphasis on removal of non-traditional and emerging contaminants.

### Course Aims

To provide a comprehensive understanding of the fundamental concepts and design principles in both conventional and advanced water treatment unit processes.

### Course Learning Outcomes

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

| Learning Outcome   | EA Stage 1 Competencies                         |
|--|---|
| 1. Identify important water quality parameters and various constituents that affect water quality.   | PE1.1, PE1.3, PE1.5, PE3.4                      |
| 2. Analyse the principles of chemical reactions and concepts involved in design of important treatment units in a conventional treatment plant including coagulation, flocculation, clarification, mixed-media filtration and disinfection.                                  | PE1.1, PE1.2, PE1.5, PE2.1, PE2.2, PE2.3        |
| 3. Apply the various advanced treatment methods including advanced oxidation and reductive processes, membrane-based treatment processes, electrodialysis and capacitive deionization, and adsorption and ion exchange processes to produce water of high-quality standards. | PE1.1, PE1.3, PE1.5, PE2.1, PE2.2, PE3.3        |
| 4. Develop interpersonal and process management skills in team-work environments and the ability to evaluate and disseminate knowledge and technologies from published literature effectively in a written report and as a seminar presentation.                             | PE1.1, PE1.3, PE1.4, PE3.2, PE3.4, PE3.5, PE3.6 |

### Teaching Strategies

The learning and teaching strategies that will be used in this course are traditional lecture teaching combined with workshop and independent study. The approaches to learning and teaching are:

|                      |  |
|----------------------|--|
| <b>Private Study</b> | <ul style="list-style-type: none"><li>• Review lecture material, textbooks &amp; additional readings</li><li>• Do set problems and assignments</li><li>• Join Moodle discussions of problems</li></ul> |
|----------------------|--|

|                    |  |
|--------------------|--|
|                    | <ul style="list-style-type: none"> <li>• Reflect on class problems and assignments</li> <li>• Download materials from Moodle</li> <li>• Keep up with notices and find out marks via Moodle</li> </ul>                  |
| <b>Lectures</b>    | <ul style="list-style-type: none"> <li>• Find out what you must learn</li> <li>• See methods that are not in the textbook</li> <li>• Follow worked examples</li> <li>• Hear announcements on course changes</li> </ul> |
| <b>Workshops</b>   | <ul style="list-style-type: none"> <li>• Be guided by Demonstrators</li> <li>• Practice solving set problems</li> <li>• Ask questions</li> </ul>   |
| <b>Assessments</b> | <ul style="list-style-type: none"> <li>• Demonstrate your knowledge and skills</li> <li>• Demonstrate higher understanding and problem solving</li> </ul>  |

## Additional Course Information

Prerequisites: CVEN3502

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

## Assessment

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

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:

<http://www.lc.unsw.edu.au/onlib/plag.html>

## Assessment Tasks

| Assessment task                    | Weight | Due Date       | Student Learning Outcomes Assessed |
|------------------------------------|--------|----------------|------------------------------------|
| Quizzes                            | 25%    | Not Applicable | 1, 2, 3                            |
| Literature review and presentation | 25%    | Not Applicable | 1, 2, 3, 4                         |
| Final exam                         | 50%    | Not Applicable | 1, 2, 3                            |

## Assessment Details

### Assessment 1: Quizzes

**Start date:** Not Applicable

#### Details:

All quizzes are individual online assessments that have short-answer, multiple choice, true-false and/or calculation questions. All quizzes will be available one week prior to the corresponding due dates and students can attempt the quizzes in their own time **once**.

**Quiz 1 (5%)** is designed to provide an early feedback on student performance prior to the census date which assesses core materials presented in weeks 1 to 2.

**Quiz 2 (7.5%)** and **Quiz 3 (7.5%)** assess core materials presented in weeks 3 to 10.

**Quiz 4 (5%)** comprises of weekly quizzes which assesses contents of research papers presenting by groups.

#### Additional details:

Additional information for each assessment will be available on Moodle.

Please inform the course coordinator in advance or immediately after a problem if you are not able to take the quiz in the allotted week or regarding any computing problems.

**Turnitin setting:** This is not a Turnitin assignment

## **Assessment 2: Literature review and presentation**

**Start date:** Not Applicable

### **Details:**

This is a team-work assessment which consists of three parts. Students can either select their own team members (3 students per group) or be allocated to an existing team.

Part 1 (10%) is a presentation of a core research paper that is assigned to the group. The presentation should be no more than 20 min, plus a 10 min discussion time after.

Part 2 (10%) is a written literature review on the research topic. The review should be no more than 10 page long (excluding references) and submitted to Turnitin.

Part 3 (5%) is a seminar engagement. Students are required to attend all the presentations, participate in the seminar discussion and marking the presentations.

### **Additional details:**

Additional information for each assessment will be available on Moodle.

**Submission notes:** Literature review is due in the same day with the presentation

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

## **Assessment 3: Final exam**

**Start date:** Not Applicable

**Length:** 2 hrs

### **Details:**

Final exam (50%) is a 2 hr open-book online exam which examines all the core lecture material presented from week 1 to week 10.

This exam will have short-answer, multiple choice, true-false and/or calculation questions and be arranged during the exam period.

### **Additional details:**

Additional information of the final exam will be available on Moodle.

**Turnitin setting:** This is not a Turnitin assignment

## **Resources**

### **Prescribed Resources**

Weekly lecture slides drawn from a variety of texts

Additional readings provided on Moodle

Selected research papers

### **Recommended Resources**

Water Treatment: Principles and Design, 3rd Edition, MWH, Wiley, 2012.

Water Quality Engineering: Physical/Chemical Treatment Processes, Benjamin & Lawler, Wiley 2013.

### **Course Evaluation and Development**

Students will be emailed by the University during the term to complete a myExperience survey regarding their experience in the course. Feedback will be provided to the coordinator to further develop the course for future terms.

## 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

### Supplementary Examinations:

Supplementary Examinations for Term 3 2020 will be held on Monday 11th September – Friday 15th January (inclusive) should you be required to sit one. You are required to be available during these dates. Please do not to make any personal or travel arrangements during this period.

### ACADEMIC ADVICE

For information about:

- Notes on assessments and plagiarism;
- Special Considerations: [student.unsw.edu.au/special-consideration](https://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>

### Image Credit

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### CRICOS

CRICOS Provider Code: 00098G

### 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   | ✓ |