

# SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING

THE UNIVERSITY OF  
NEW SOUTH WALES

Session 1 2013



**CVEN4703**                      **Advanced Water Quality Principles**

## COURSE DETAILS

<b>Units of Credit</b>	6
<b>Contact hours</b>	4 hours per week
<b>Class/Tutorial</b>	Tue 9:00 am –1:00 pm (Electrical Eng 418, wks 1-4; TBA, wks 6-7, Material Science G10, wks 10-12)
<b>Course Coordinator and Lecturer</b>	Dr. A. Ninh Pham Email: <a href="mailto:anninh.pham@unsw.edu.au">anninh.pham@unsw.edu.au</a> Office: Room 108, Vallentine Annexe Phone: 9385-5102 Consultation by appointment only
<b>Lecturer</b>	Dr. Martin Andersen Email: <a href="mailto:m.andersen@wrl.unsw.edu.au">m.andersen@wrl.unsw.edu.au</a> Office: WRL Manly Vale/ Kensington Office 412 Phone: 8071-9800 Consultation by appointment only

## INFORMATION ABOUT THE COURSE

Prerequisites: CVEN3502

Arrangement: The first part of the course is common with the first half of CVEN9884: Environmental Engineering Science 1 while the second part of the course extends the principles developed in the first part to the understanding and solution of particular water quality problems.

## HANDBOOK DESCRIPTION

See link to virtual handbook -

[www.handbook.unsw.edu.au/undergraduate/courses/2013/CVEN4703.html](http://www.handbook.unsw.edu.au/undergraduate/courses/2013/CVEN4703.html)

## OBJECTIVES

To familiarise the student with the fundamental principles of water chemistry and to apply these principles to the understanding of, and development of solutions to, water quality problems typical of those encountered by Environmental Engineers and Public Health and Waste Management specialists.

In the first part of the course, the student will develop a sound knowledge of the principles underlying the application of chemical principles to complex aqueous systems. Assessment for this part of the course will be focussed on structured problems designed to assist in acquisition and consolidation of the fundamental principles taught. In the second part of the course, students will be asked to apply the knowledge gained in the

first part of the course to a range of common water quality problems with assessment used which will assist the student in locating and interpreting relevant literature with emphasis given to identification of current status of knowledge and apparent knowledge gaps.

#### TEACHING STRATEGIES

<b>Private Study</b>	<ul style="list-style-type: none"> <li>• Read suggested sections of textbook and review lecture material</li> <li>• Join UNSW Blackboard for discussions of problems</li> <li>• Download materials from UNSW Blackboard</li> <li>• Keep up with notices and find out marks via UNSW Blackboard</li> <li>• Do set problems and assignments and reflect on class problems and tutorials when doing assignments and prepare for the exam</li> </ul>
<b>Lectures and Tutorials</b>	<ul style="list-style-type: none"> <li>• Come prepared (read course material)</li> <li>• Identify beforehand where you may have problems with parts of the course material</li> <li>• Follow worked examples</li> <li>• Get involved in tutorials</li> </ul>
<b>Assessments (assignments and examinations)</b>	<ul style="list-style-type: none"> <li>• Demonstrate your knowledge and skills</li> <li>• Demonstrate higher understanding and problem solving</li> </ul>

#### EXPECTED LEARNING OUTCOMES

After Part 1 of the course, it is expected that students will understand the chemical processes that operate within aquatic systems and will have developed an understanding of the computational tools that can be used to determine the nature of chemical species present in aquatic systems. After Part 2 of the course, students will understand how these processes influence water quality in natural and engineered systems and will have some appreciation of the challenges that exist with regard to maintaining acceptable water quality and the knowledge gaps that remain with regard to understanding and mitigating particular water quality problems.

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

#### ASSESSMENT

Part 1 of this course will be assessed by two assignments (summing to a value of 25%) and a final exam (valued at 25%). Part 2 will be assessed through one literature review (valued at 25%) and a final exam (valued at 25%).

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

##### Part 1

Assignment 1 (15%)	issued on: 12 <sup>th</sup> March	due on: 26 <sup>th</sup> March
Assignment 2 (10%)	issued on: 26 <sup>th</sup> March	due on: 23 <sup>rd</sup> April
Final exam (25%)	during exam period	

##### Part 2

Literature review (25%)	submission at designated times through semester
Final exam (25%)	during exam period

Late work will be penalised at the rate of 10% per day after the due time and date have expired.

## COURSE PROGRAM

SESSION 1 2013

(04 Mar – 01Jul)

Week	Date	Topic	Lecturer
1	05 <sup>th</sup> Mar	Fundamentals of Aquatic Chemistry	Andersen
2	12 <sup>th</sup> Mar	Tools for Solving Problems in Aquatic Chemistry + Computer Lab Exercise	Andersen
3	19 <sup>th</sup> Mar	pH and Alkalinity and Gas Exchange	Andersen
4	26 <sup>th</sup> Mar	Reduction-Oxidation (Redox) Chemistry	Andersen
<i>Semester Recess (29/03 - 07/04)</i>			
5	9 <sup>th</sup> Apr	No Class	
6	16 <sup>th</sup> Apr	Water quality problem 1 (arsenic in subsurface derived drinking waters)	Pham
7	23 <sup>rd</sup> Apr	Water quality problem 2 (blue green algae in marine & freshwaters)	Pham
8	30 <sup>th</sup> Apr	Complexes in Aqueous Solutions + Computer Lab Exercise	Andersen
9	07 <sup>th</sup> May	Solid Precipitation and Dissolution + Surface Chemistry	Andersen
10	14 <sup>th</sup> May	Water quality problem 3 (acid sulfate soils and associated water quality implications)	Pham
11	21 <sup>st</sup> May	Water quality problem 4 (organic toxicants in benthic sediments)	Pham
12	28 <sup>th</sup> May	Water quality problem 5 (radionuclides in subsurface waters)	Pham

## RELEVANT RESOURCES

### Part 1

#### *Textbook/notes*

1. Morel, F.M.M. and Hering, J.G. Principles and Applications of Aquatic Chemistry, Wiley Interscience, New York, 1993. ISBN 0-471-54896-0.
2. CVEN4703 Aquatic Chemistry Course Notes

#### *Reading guide to the textbook by Morel & Hering:*

Chapter 1: Sections 1 to 5 (p. 1-31).

Chapter 2: All of the chapter up to section 5.7 (p. 40-87) and ignore sidebar 2.2

Chapter 3: Sections 1 and 2 (p. 98-138) read cursorily!!!

Chapter 4: Sections 1, 2, 3, 4, 5 (p. 157-195), 7 (203-210) and 9 (to section 9.5) (p. 218-227).

Chapter 5: All of Chapter 5 apart from Example 5 (p. 236-314).

Chapter 6: Sections 2, 3, 4 (to section 4.3) (p. 345-375) and 5 (p. 395-404).

Chapter 7: Sections 1, 2, 3, 4 (p. 421-477) and 6 (p. 491-502).

Chapter 8: Sections 2 (p. 513-519), 3 (p. 519-521) and 6 (p. 563-567).

## Part 2

Copies of Powerpoint Presentations and selected research papers will be distributed weekly.

### DATES TO NOTE

Refer to MyUNSW for Important Dates available at:

<https://my.unsw.edu.au/student/resources/KeyDates.html>

### 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:

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

### COMMON SCHOOL INFORMATION

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 Common School Information on the School website available at:

[http://www.civeng.unsw.edu.au/currentstudents/general/profiles/common\\_ug.html](http://www.civeng.unsw.edu.au/currentstudents/general/profiles/common_ug.html)