

Spring 2005

<b>Course Number</b>	CE 578/678
<b>Title</b>	Water Quality Modeling
<b>Section</b>	001
<b>CRN(s)</b>	
<b>Credits</b>	4
<b>Design Credits</b>	1.5
<b>Prerequisite(s)</b>	EAS 361, CE 371
<b>Days/Time</b>	TR 2-4 pm
<b>Location</b>	SB2 108
<b>Final Exam Day/Time</b>	

### Course Website

<b>Instructor</b>	Scott A. Wells
<b>Office</b>	SB2 RM128
<b>Phone</b>	503-725-4276
<b>E-mail</b>	scott@cecs.pdx.edu
<b>Office Hours</b>	By appointment
<b>Mailbox Location</b>	CEE Office, Science Building 2, Room 128

**Required Text or Other Materials:** Surface Water Quality Modeling, S. Chapra, McGraw-Hill, 1997 + Course Notes

### **Recommended References/Optional Text/Supplemental Readings & Resources:**

Hand out course notes

### **Catalog Course Description:**

Introduction to descriptive modeling approaches for analyzing water quality changes in lakes, reservoirs, rivers, and estuaries. Applications include modeling dissolved oxygen, temperature, nutrients, and algal dynamics.

### **Design/Professional:**

N/A

### **Course Objectives – Students must demonstrate the ability to:**

1. Develop governing equations for water quality models of rivers, lakes, reservoirs, and estuaries
2. Write the source/sink term for water quality variables – dissolved oxygen, temperature, algae, nutrients, pH, periphyton
3. Solve problems calibrating water quality models or determining allowable effluent quality to meet water quality standards

### **Course Requirements:**

This course requires students to solve about 10-12 home problems or problem sets and do a project on computer modeling using the model CE-QUAL-W2. Also, there is a closed book mid-term and an open book final examination. Homework is due 1 week from its date of assignment.

## Course Grading

<b>Assignment</b>	<b>Points Assigned or % of Total Grade</b>
Problem sets	10-30 points each
Midterm examination	100 points
Final examination	100 points
Final project	100 points

**Incompletes:** A grade of "I" is granted by the instructor *only* with prior approval and consent. Criteria are outlined in the PSU Bulletin. **Program requirements:** {for UG courses} The CEE Department requires that junior and senior engineering courses must be completed with a minimum grade of C-, and a student's cumulative PSU GPA must be 2.25 or higher to graduate from the BSCE program.

## **Course Schedule**

No	Date	Topic	Reading Assignment	Homework Assignment	HW Due Date
1		Water quality criteria and standards overview	Lect 1		
2		Reaction kinetics, Environmental fluid mechanics: Guest Lecture: Rob Annear	Lect 2-18	PS 1: 3.4,5.1	
3		Modeling Approaches for Rivers, Lakes, Estuaries	Lect 2-18	PS 2: 8.4,9.4	
4		Dissolved Oxygen Modeling	Lect 19-25		
5		Sources/Sinks of Dissolved Oxygen (DO)	Lect 19-25		
6		DO: Application to Rivers, Estuaries	Lect 19-25,14,15	PS 3: 21.6,22.4	
7		DO: Application to Lakes/Reservoirs	Lect 19-25, 16		
8		Temperature Modeling: Surface Heat Transfer	Lect 30, 31		
9		Temperature Modeling: Surface Heat Transfer	Lect 30, 31		
10		Equilibrium Temperature, Cooling Ponds, Reservoir/Lakes	Lect 30, 31	PS 4: 31.1	
11		Midterm examination			
12		Reservoir/Lake Stratification (continued)			
13		Nutrient Modeling: P	Lect 28, 29	PS 5: 29.3	
14		Nutrient Modeling: P	Lect 28, 29		
15		Nutrient Modeling: N	Lect 28, 23	PS 6: 23.5	
16		Algae Modeling	Lect 24, 33-36		
17		Algae Modeling	Lect 24, 33-36	PS 7: 33.4	
18		pH Modeling	Lect 37-39	PS 8: 39.4	
19		Periphyton/Macrophyte Modeling (Guest lecture: Chris Berger)	Lect 24, 33-36		
20		Review for Final Exam			
21		Final Exam 10:15-12:05 Monday			

### **Computer and E-mail Accounts**

All engineering students should activate their engineering computer account (go to the CadLab in SB2, 169) which will allow them to use engineering computer labs and e-mail. You should activate it *before* the day you need it. If you encounter problems with this account, see the lab attendant, or e-mail: [support@cecs.pdx.edu](mailto:support@cecs.pdx.edu). Please note: the CEE Department regularly sends course announcements, job information, etc. to students' CECS accounts, so if you do not check it regularly, we recommend forwarding your CECS e-mail to whatever e-mail address you use.

## **Ethics and Professionalism**

As future professional engineers you should plan to take the FE Exam (see the Oregon State Board of Examiners for Engineering and Land Surveying at [www.osbeels.org](http://www.osbeels.org)), and you should be familiar with the ASCE Code of Ethics ([www.asce.org/inside/codeofethics.cfm](http://www.asce.org/inside/codeofethics.cfm)), which includes the following:

***Engineers shall act in such a manner as to uphold and enhance the honor, integrity and dignity of the engineering profession.***

The PSU Student Conduct Code prohibits all forms of academic cheating, fraud, and dishonesty. Further details can be found in the PSU Bulletin. Allegations of academic dishonesty may be addressed by the instructor, and/or may be referred to the Office of Student Affairs for action. Acts of academic dishonesty may result in a failing grade on the exam or assignment for which the dishonesty occurred, disciplinary probation, suspension or dismissal from the University. The students and the instructor will work together to establish optimal conditions for honorable academic work. Questions about academic honesty may be directed to the Office of Student Affairs (<http://www.ess.pdx.edu/osa/>).

## **Student Groups and Professional Organizations**

Participation in student and professional groups can be a valuable part of your education experience. Membership gives students opportunities to get to know fellow students better, meet and network with professionals, collaborate in solving real engineering problems, learn about internship or job possibilities, socialize and have fun. Your fellow students can be a great source of help and guidance in your academic endeavors. Consider becoming active with a student organization, such as the following:

- American Society of Civil Engineers Student Group (ASCE): <http://www.asce.pdx.edu>
- Institute of Transportation Engineers Student Chapter (ITE): <http://www.its.pdx.edu/ite/>

Most professional organizations have monthly meetings and encourage student participation by providing discounts for lunch and dinner meetings. These meetings provide opportunities to network with potential future employers, learn about scholarships, and increasing your technical knowledge. Take a look at these organizations as a starting point:

- American Society of Civil Engineers (ASCE) Oregon Section: [www.asceor.org](http://www.asceor.org)
- Institute of Transportation Engineers (ITE) Oregon Section: [www.oregonite.org](http://www.oregonite.org)
- Society of Women Engineers (SWE) Columbia River Section - <http://www.swe-columbia-river.org>
- Structural Engineers Association of Oregon (SEAO): [www.seao.org](http://www.seao.org)

## **Resources**

As a PSU student, you have numerous resources at your disposal. Please take advantage of them while you are here. A small sample is listed below:

- CE Website (includes program info, job listings, etc.): <http://www.cee.pdx.edu/>
- Career Center: <http://www.career.pdx.edu/>
- Center for Student Health & Counseling: <http://www.shac.pdx.edu/>
- The Writing Center: <http://www.writingcenter.pdx.edu/>
- PSU Disability Resource Center: 435 Smith Memorial Union

Note: The PSU Disability Resource Center is available to help students with academic accommodations. If you are a student who has need for test-taking, note-taking or other assistance, please visit the DRC and notify the instructor at the beginning of the term.

## **Introduction to Library and Literature Research**

With the advent of the Internet it is very tempting to think that all necessary resources for a term project will be available in full text after typing in a few words at Google.com. This is

not the case. You will often need to go to the library, use real library search tools and access real books and articles contained in refereed/archival journals.

Be sure to make use of the Vikat library catalog. Go to the PSU library home page at <http://www.lib.pdx.edu/>. Also available on the library home page are Full Text Electronic Journals: <http://www.lib.pdx.edu/~bvws/bytitle.html>, and a list of on-line Databases: <http://www.lib.pdx.edu/resources/databases/databases.html>. Try EI Compendex (<http://www.ei.org/ev2/ev2.home>) and Lexis-Nexis. Note that access to these databases is free for PSU students, but you must be using a computer on campus or via a dial-in service. See <http://www.lib.pdx.edu/services/distance/proxyserver.html> for instructions on how to gain off-campus access using a proxy server.

### **Campus Safety**

The University considers student safety paramount. The Campus Public Safety Office is open 24 hours a day to assist with personal safety, crime prevention and security escort services. Call 503-725-4407 for more information. For Campus emergencies call 503-725-4404.