

Course Number CE 410/510
Title Temperature Modeling of River and Lakes
Section 006
CRN(s) 44528/44529
Credits 4
Prerequisite(s) Senior/graduate standing
Days/Time TR 1200-1350
Location Room 310, EB
Final Exam Day/Time Thursday, March 20, 1015-1205

Course Website <http://www.cee.pdx.edu/w2/tempmodelcourse/TMChome.html>

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Office Hours	Tuesday 11 to 12 or by appointment	Tuesday 11 to 12 or by appointment
Mailbox Location	CEE Office, EB 200 Suite	CEE Office, EB 200 Suite

Required Text or Other Materials:

No Required Text

Reading materials will consist of any class materials and journal articles.

Recommended References/Optional Texts/Supplemental Readings & Resources:

Surface Water Quality Modeling, Steven C. Chapra, 1997

Mixing in Inland and Coastal Water, Fischer et al., 1979

Principles of Surface Water Quality Modeling and Control, Thomann and Mueller, 1987

Environmental Fluid Mechanics, Rubin and Atkinson, 2001

Hydrodynamics and Transport for Water Quality Modeling, Martin and McCutcheon, 1998

Course Description:

This course will introduce students to the basic principles of temperature modeling in surface water systems, emphasizing the importance of heat budget components and the impact on temperature. Topics include: regulatory background, case studies, fate and transport equations for heat, hydrodynamics, source and sink terms, equilibrium temperature concept, river, lake and reservoir case study applications. Prerequisite: senior/graduate standing.

Course Objective:

To introduce descriptive modeling approaches for analyzing temperature changes in lakes, reservoirs, rivers and estuaries.

Course Requirements:

The course will consist of lectures, several homework assignments 2 course projects, a journal article review and a final exam. The course grading will be done as follows:

Course Grading Assignment	Points Assigned or % of Total Grade
Attendance	10%
Homework	20%

Course projects	30%
Journal paper review	10%
Final Exam	30%

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 2.33 or higher to graduate from the BSCE program.

Course Schedule

Week No	Dates	Topic	Reading Assignment	HW* Assignment	HW* Due Date
1	Jan 8 & 10	Background, why is it important, regulatory issues, water quality standards. Guest Speaker, Start Journal Review Assignment			Feb 26
2	Jan 15 & 17	Willamette River TMDL – example, introduce Course Project 1. Laurance Lake Reservoir – example, introduce Course Project 2.	"Willamette River Basin Temperature TMDL Model: Boundary Conditions and Model Setup," EWR-01-04 and "Laurance Lake Temperature Model," EWR-04-04 (see links 1 and 2 below)		Mar 13
3	Jan 22 & 24	Fate and Transport Equations for Heat: 3D Advective-Diffusion Equation			
4	Jan 29 & 31	3D Advective-Diffusion Equation" Simplifications and Numerical Solution		Problem Set 1	Feb 5
5	Feb 5 & 7	Hydrodynamics			
6	Feb 12 & 14	Hydrodynamics and Source and Sink Terms for Heat Transfer		Problem Set 2	Feb 19
7	Feb 19 & 21	Source and Sink Terms for Heat Transfer			
8	Feb 26 & 28	Source and Sink Terms for Heat Transfer and the Equilibrium Temperature Concept		Problem Set 3	Mar 4
9	Mar 4 & 6	River Temperature Applications	Willamette River, Spokane River, Pend Oreille, Bull Run		
10	Mar 11 & 13	Stratified Lake/Reservoir Applications Course Projects Due	Lake Roosevelt, Waldo Lake, Lake Whatcom, South Fork Tolt Reservoir		Projects Due
11	Mar 20 10:15 – 12:05	Final Exam			

*HW: Homework

Reading Links

1. http://www.cee.pdx.edu/w2/download/willamette/DataReport_WillametteRiver.zip
2. http://www.cee.pdx.edu/w2/download/laurance_lake/Report_Laurance_Lake_7.pdf

Computer and E-mail Accounts

- If you haven't done so already, please go to the CadLab located in EB 325 to activate your engineering account. If you need help in using this account, please see the attendant or send an e-mail to support@cecs.pdx.edu
- If you choose not to check your CECS e-mail account regularly (yourname@cecs.pdx.edu) then please forward it to an e-mail account that you do check. Important information and announcements are delivered via this e-mail address.

Code of Conduct

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/>.

Classroom Rules and Behavior Expectations

The classroom is a professional space and professional conduct is expected. Please silence your cell phone and refrain from text messaging during class and exam times. Treat your fellow students and the instructor with respect and please use appropriate language at all times. Additional rules may be added at the instructor's discretion.

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), and you should be familiar with the ASCE Code of Ethics (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.

Campus 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:

- CEE Website: <http://www.cce.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 SMU - 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.

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. 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 increase your technical knowledge. Take a look at these organizations as a starting point:

- American Society of Civil Engineers (ASCE) Oregon Section: www.asceor.org
- Institute of Transportation Engineers (ITE) Oregon Section: 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

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 accessed via the PSU library home page at <http://www.lib.pdx.edu/>. Also available on the library home page are Full Text Electronic Journals and a list of on-line Databases. Databases to try are 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.