

## CE 462 – Open Channel Hydraulics

**Instructor:** Dr. David F. Hill  
**Office:** 231 D Sackett Building  
**Telephone:** 863-7305  
**Office Hours:** TH 10:30a - 12:00a, F 12:30a - 2:00p

**Text:** *Water Resources Engineering*, L. Mays, John Wiley and Sons

**Grading:** Homework - 40%  
Midterm Exams (2) - 25% each  
Final Project - 10%

### 1. Introduction

Open Channel Hydraulics is a class dedicated to the study of free surface flows. From municipal water conveyances to storm water runoff systems to flood prediction, a solid physical understanding of these flows is crucial to the practicing civil engineer.

### 2. Prerequisite Requirements

The prerequisite for this class is CE 360. You will be dropped from this course prior to the last day of the drop / add period (January 25th, 2007) if your PSU record does not reflect that you have passed this requirement. Students should discuss any concerns regarding this requirement with the instructor prior to this date.

For another perspective, the material in Open Channel Flow draws heavily from Fluid Mechanics and Dynamics; we will use the conservation laws of classical mechanics to formulate and analyze a wide variety of interesting flow phenomena. Your familiarity with the material in CE 360 is assumed and will be essential to a satisfactory performance in CE 462.

### 3. Class Management

All communications and distributions of class materials will take place via ANGEL, the PSU course management system. If you have not already done so, you are encouraged to visit [www.angel.psu.edu](http://www.angel.psu.edu) and enroll. There, you will find homework assignments and solutions, announcements, and other materials relating to CE 462.

### 4. Tentative List of Topics

Week	Topic(s)	Reading Assignment
1	Introduction, governing equations	Chapters 1 - 3
2	Specific energy, frictionless flow in channels	§5.2
3	Uniform flow	§5.1
4	Rapidly varied flow	§5.5
5	Introduction to gradually varied flow	§5.3-5.4
6	Gradually varied flow, numerical solution	Supplement, class notes

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7	Unsteady flow and routing	Chapter 9
8	Hydraulic structures I	§5.6, 17.4
9	Culverts and HY8 Analysis	§16.2
10	Boundary layers, stream gaging	Supplement, class notes
11	Sediment motion and transport	Supplement, class notes
12	Sediment transport calculations	Supplement, class notes
13	HEC-RAS, GIS, and HEC-GEORAS	Manuals
14	HEC-RAS, GIS, and HEC-GEORAS	Manuals
15	HEC-RAS, GIS, and HEC-GEORAS	Manuals

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## 5. Homework

Homework assignments will be given on a regular basis. Some important points:

- (a) The primary roles of homework are to help reinforce the concepts learned in class and to help students prepare for the exams.
- (b) Homeworks are due, *at the front of the classroom, at the start of class*. Please drop them off at the front as you arrive. As a rule, late homeworks are not accepted.
- (c) At the end of the semester, your lowest homework score will be dropped. This accommodates a missing score due to illness, family emergencies, etc.
- (d) Your homework assignments should be in the following overall format:
  - List your name, assignment number, and section number on the first page of your assignment.
  - Initial all subsequent pages, in case pages get separated.
  - Use 8.5 x 11 paper and use only one side (please feel free to ‘recycle’ paper).
  - Staple pages together.
  - Use pencil.
  - Use only one side of the paper. Feel free, however, to ‘recycle’ paper; I don’t care what is on the back side.
  - Be NEAT and organized. Homework that is not will be returned ungraded.
- (e) Each problem solution should include and clearly indicate the following:
  - Given: briefly summarize the problem, including given information and relevant sketches.
  - Objective: briefly state what is unknown, i.e. what the problem is seeking.
  - Solution: present a detailed solution of the problem, listing assumptions, including units, and boxing / circling the final answer.
- (f) The structure / grading of each homework problem will be as follows:
  - 3 points - Work of the highest quality. The assumptions and problem are well defined, the problem solving method is clear and logical, the correct conceptual approach is used, the solution fully addresses all parts of the problem posed, and a correct or nearly-correct final answer is obtained. Minor algebraic or computational mistakes will typically still result in full credit.

- 2 points - Work of satisfactory quality. The problem statement is fully posed. The problem solving method incorporates a generally correct conceptual approach but incorporates inappropriate assumptions, skips a step or two, or is otherwise only slightly incomplete or incorrect. A 2 is also the maximum score you can earn if you either do not box your answer or do not include units as part of your answer.
- 1 point - Work of marginal quality. The problem statement is incomplete and / or the problem solving method is not conceptually correct. The work may also be illegible, unorganized, or marginally complete.
- 0 point - Work of unacceptable quality. No substantive effort to solve the problem was made.

(g) While you are encouraged to discuss the problems with other students in your class, the work you turn in *MUST* be your own. There is a fine line between collaboration and academic misconduct; please don't cross it. Assignments that do not appear to be independent work will not be graded.

6. **Exams** There will be two in-class mid-term exams, Friday February 23rd, and Friday April 13th. All exams will be closed-book, with necessary equations and numerical constants provided. While calculators may be used, cell phones, blackberries, and other electronic devices are strictly prohibited. Makeup exams will only be given in the event of a documented illness or a family emergency. Arrangements for an alternate exam need to be made, when possible, prior to the scheduled exam date.

7. **Final Project** The final three weeks of the semester will involve significant computer work (HEC-RAS, GIS, and HEC-GEORAS). You will have several small tutorial-style homework assignments during this period and one involved project, which builds upon these assignments. This final project will be in lieu of a final exam in the class.

#### 8. Grading Scale

- $A \geq 92\%$
- $92\% > A- \geq 90\%$
- $90\% > B+ \geq 88\%$
- $88\% > B \geq 82\%$
- $82\% > B- \geq 80\%$
- $80\% > C+ \geq 78\%$
- $78\% > C \geq 70\%$
- $70\% > D \geq 60\%$
- $60\% > F$

#### 9. Miscellaneous

(a) If you expect me to learn your name during the course of the semester, take the time to introduce yourself to me (during office hours, after class, etc.). Also, placing a clear head-shot photograph of yourself in your Angel profile will help me greatly.

- (b) If you find yourself having difficulty early on in the semester, it is imperative that you come see me early so that we can get you back on track. Please do not wait until the last few weeks of the semester, when it may be too late.
- (c) I will gladly treat you with respect if you will do the same. So, at the start of class, put the newspapers away, turn the cell-phones off and please give me your attention. Failure to do so is distracting not only to me, but to your classmates as well.
- (d) Contrary to popular belief, professors actually LIKE office hours! It gives us a chance to get to know students on a more individual level and to offer more personalized instruction. To maximize the effectiveness of office hours, please arrive with *specific* questions. I do not simply ‘give out’ the solutions to homework problems during office hours. I will help you identify what is being asked and the appropriate tools, but it remains up to you to solve the problem.
- (e) While you are free to email me at any time, do understand that I can not be expected to reply immediately. Moreover, understand that certain topics of inquiry are inappropriate for email. For example, an email asking ‘how do I do homework problem # 3?’ is likely to go unanswered for two reasons. First, as per the previous point, this is not a specific question. Second, even specific questions are hard to answer via email as it is difficult to incorporate equations and figures into email. You will have much greater success getting homework assistance if you come to my office hours.

#### 10. Academic Integrity

Students are expected to review the College of Engineering’s Academic Integrity Website, found at <http://www.engr.psu.edu/CurrentStudents/acadinteg.asp>. This site provides details about what constitutes a violation of academic integrity, the process for dealing with violations, and the penalties for violations.