

CE340 - Hydraulics

Purdue University, School of Civil Engineering

Fall Semester 2016

"Best. Course. Ever. Period."

-Anon

General course information

INSTRUCTOR: PROF. CARY TROY – I am an associate professor in the Hydraulics and Hydrology group of Civil Engineering. My research interests lie in environmental fluid mechanics – the movement of water in lakes, rivers and oceans - especially water waves and density-stratified flows. Most of my current projects are related to the fluid mechanics of Lake Michigan. My hobbies include my 2 kids and wife (okay, they're more than a "hobby" to me), playing soccer at T-REC, coaching kids' soccer, scuba diving, running, piano, biking, gardening, kayaking, watching any television show about living a primitive life in Alaska, and fantasizing about building a LEED-certified Tiny House.

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office hours: TBD or by appt.

TEACHING ASSISTANT: [Let me introduce David Cannon](#) (cannond@purdue.edu)
[Dave was on the Jimmy Kimmel Show](#). Enough said.

CLASS PERIODS:

1. PRIMARY LECTURE (CE340-001): Mon, Wed 1:30-2:20pm, FRNY G140
2. ONLINE LECTURE (or reading) + QUIZ Thurs (prior to Fri. class)
3. WORK SESSION (CE340-002 or CE340-003): Fri, 1:30-2:20 or 2:30-3:20, STEW 314

EVENING EXAMS:

EXAM I: Monday, September 19, 8:00 PM – 9:00 PM, WTHR 200

EXAM II: Monday, October 24, 2016 8:00 PM – 9:00 PM, WTHR 200

EXAM III: Tuesday, November 29, 2016 8:00 PM – 9:00 PM

FINAL EXAM: As scheduled by the university (available late September)

Conflict exams will not be given without a university letter or doctor's note specifying an official conflict/absence. If you are sick, you will need a doctor's verification letter stating that you are too sick to take the exam (not simply a letter stating that you visited the health center).

CANCELLED CLASSES:

Three classes will be cancelled to accommodate the evening exams:

1. Friday, October 7 (the Friday immediately before Fall Break)
2. Monday, November 21 (Monday of Thanksgiving week)
3. To be determined

TEXT: Fundamentals of Fluid Mechanics, 7th Ed., by Munson, Okiishi, Huebsch, and Rothmayer. Course readings, quizzes, and homework problems will refer to this edition of the text, but the content is very similar to previous editions, especially the 6th edition. Thus, **you can likely get by with an earlier (cheaper) version of this same text.**

COURSE WEBSITE: Blackboard Learn

COURSE OBJECTIVES:

Hydrostatics and fluid properties: determine fundamental fluid properties for different engineering liquids, gases, and flows of these fluids; calculate pressures in manometers and hydrostatic fluids; evaluate resultant forces and moments on submerged surfaces.

Kinematics and inviscid flow: Classify fluid flows; calculate pressure and velocity variations within flowing inviscid fluid flows using Bernoulli's equation.

Frictional flow in pipes and conduit flow: Relate shear stress and rate of strain in viscous fluids; calculate pressures, flow rates, and energy/head loss for standard pipe and conduit networks; estimate major and minor losses in pipe networks; select and evaluate pumps for use in pipe networks.

Open channel flow: Classify open channel flows; relate uniform flow rates and depths; apply the concept of specific energy to determine flow depths in open channels; estimate flow rates for weirs; analyze hydraulic jumps.

Control volume analysis: Determine mass and volume flow rates via application of the conservation of mass; apply the conservation of linear momentum principle to solve fluid mechanics problems.

Dimensional analysis: Define and apply standard dimensionless numbers in fluid mechanics.

Immersed bodies: Calculate drag and lift forces on submerged objects.

COURSE POLICIES AND ASSESSMENT

OVERALL COURSE STRUCTURE

1. Regular Lectures

Lectures are meant to be participatory, colorful, mind-altering experiences (not boring monologs). I will do my best to make them interesting but even if it is the most boring lecture in the world, I expect your full attention and participation (an occasional high-five and fist pump will also be appreciated). Please keep your texting to an absolute minimum, and don't let me see it – if you want to text or play Poke-mon, please do! Just not during my class.

Most engineers learn by doing. As such, I utilize “active learning” exercises in class. I expect you to participate in these exercises by discussing concepts with your classmates or working on problems as directed. You can't just learn by sitting there, or rather, you'll learn much more if you are actively engaged. At the end of an activity, I will call on people randomly to discuss their results, so be ready to discuss your work.

2. Online Lectures or Readings

Prior to the Friday work sessions in STEW 314, I will either assign textbook readings or post a short (<20 min) online video on a topic relevant to the week's homework and the Friday work session. A short Blackboard quiz will be associated with this online lecture or reading. You should allocate approximately one hour for this entire activity (lecture or reading + quiz). The Blackboard quiz will be due at 1:00 pm on Friday, just before the first work session of the day. These quizzes add up to 5% of your grade, per the below breakdown.

3. Friday work session (aka “Power Hour”)

On Fridays, we work on problems in STEW 314. No, we won't be solving relationship or financial problems, so save those for another time; instead, we'll be working in small groups on homework and homework-related problems, while the TA's and I roam the room and answer questions. It's epic, trust us. Show up. Remember: the best way to ace this class is to really understand the homework; and the best way to really understand the homework is to work through the problems and ask us questions when you get stuck.

WEEKLY CALENDAR FOR SUCCESS

Monday	Tuesday	Wednesday	Thursday	Friday	Weekend
Lecture (1:30)	Homework due by 5pm in Hydraulics/Hydro logy CE340 BOX	Lecture (1:30)	Online video or textbook reading and quiz (due 1pm Friday)	Work session (1:30, Hicks)	-Finish homework.

GRADING

Exam 1	20%	IN OTHERWORDS, DO WELL ON THE EXAMS...
Exam 2	20%	
Exam 3	20%	
Final Exam	20%	
Homework	14%	...WHICH WILL HAPPEN IF YOU UNDERSTAND THE HW AND QUIZZES.
Quizzes	5%	
Attendance	1%	... and attend class.

EXAMS (80% total)

Evening exams (3 x 20%): 3 evening exams will be given. These will typically include some multiple choice (typically conceptual) questions, and 2-3 traditional calculator-type problems, very similar to the HW problems. I do not believe that exams should be tricky, and aim to be as transparent as possible about what I want to you learn.

Final Exam (20%): The final exam will be comprehensive, multiple-choice, and in the style of the fluid mechanics portion of the FE Exam. This exam hits the highlights of the course, and if you generally know what you are doing, you should score well on this exam. It is generally not curved.

HOMEWORK (14%)

Homeworks will be assigned approximately once per week (not more), and will **usually be due on Tuesdays at 5pm inside the Hydraulics and Hydrology office area (or in class on Monday)**. Quantitative solutions should be clearly written out on engineering paper, unless specified differently. Please include your lab section next to your name; use "Section XX" if you are not in the CE343 lab.

Typically 4-5 calculator problems will be assigned. 1-3 of the problems will be graded on the below scale; the remaining problems will be given 1-2 points depending on whether it appears that you diligently worked on the problem.

- 5 – Correct answer, with work clearly shown
- 4 – Most correct, with 1-2 small mistakes
- 3 – Some correct elements
- 2 – A reasonable effort
- 1 – Turned in something

Late policy: Late homework is not accepted without an official university excuse.

ATTENDANCE - Please bring your i-Clickers to the Friday class in STEW 314.

Grades

Grading will be done on a +/- system, with the following scale. In general, curving will be done on individual assessments (homeworks, exams) so that the student has an accurate perception of his/her standing in the course.

A+	96.67 – 100	B+	86.67 – 90.00	C+	76.67 – 80	D+	66.67 – 70.00
A	93.33 – 96.67	B	83.33 – 86.67	C	73.33 – 76.67	D	63.33 – 66.67
A-	90.00 – 93.33	B-	80.00 – 83.33	C-	70.00 – 73.33	D-	60.00 – 63.33

Civil Engineering students: Please note that since CE340 is a CE Core Course, you are required to obtain a C- or higher in this course. See the CE website for specific details on this policy.

Other

Email: Please email questions to the TA (David) first, and email me if you are unable to resolve your issue with the TAs. In general you can expect a response from me within 12-24hours. Please use the subject “CE340” so that your email is routed correctly.

Academic honesty/integrity: We expect that all students will follow the Purdue University standards regulating academic honesty and personal integrity. This includes treating classmates, teaching assistants, and the instructor with respect, as well as recognizing the line between working together and copying work (either from each other or from a solutions manual). **Any plagiarized homework solutions will receive zero credit,** and will be referred to the university for formal disciplinary action if necessary.

Copy homework solutions at your peril. Do the math: if you copy your homework, you won't learn the material, and you'll fail the exams. It's almost as easy to do your homework as it is to copy the solution, so why not just do it yourself?

Campus emergencies:

- **If you are alerted via the campus alert system during class, immediately let me know.**
- **If we hear a fire alarm,** we will immediately suspend class, **evacuate the building,** and proceed outdoors, and away from the building. **Do not use the elevator.**
- **If we are notified of a Shelter in Place requirement for a tornado warning,** we will suspend class and shelter in the lowest level of this building away from windows and doors.
- **If we are notified of a Shelter in Place requirement for a hazardous materials release, or a civil disturbance, including a shooting or other use of weapons,** we will suspend class and shelter in our classroom, shutting any open doors or windows, locking or securing the doors, and turning off the lights.
- In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances.