Instructor: Prof. Andrew J. Guswa, aguswa@smith.edu

Time and Location: 9-9:50 MWF, Lab Th 1-4 pm, Engineering 201
   Th 4:30-5:30 My office
Office Hours:   M 5-7 pm   My office, by appt.
               W 10-12   My office, by appt.

Textbooks

Material
This is the second course in a two-semester sequence designed to introduce students to fundamental theoretical principles and analysis of mechanics of continuous media, including solids and fluids. Concepts and topics to be covered in this course include intensive and extensive thermophysical properties of continua, control-volume and differential expressions for conservation of mass, momentum, and energy, dimensional analysis, and an introduction to viscous and open-channel flows.

Course Objectives
Upon completion of EGR 271, each student should have

- A conceptual understanding of what a fluid is and how it behaves
- An expert ability to set up, analyze, and solve engineering problems
- The analytical prowess to use conservation laws and constitutive relationships to understand and predict the behavior of fluids
- A comprehension of dimensional analysis
- An awareness and understanding of the particular engineering approaches appropriate to certain types of flows, such as pipe flow, external flows, and open-channel flow
- Facility with verbal, visual, and mathematical means of communicating fluid mechanics ideas and concepts

Grading
There will be weekly problem sets, two mid-term exams, a final exam, and laboratories over the course of the semester. These components will count toward your grade as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Homework Assignments (9 of 10) and Participation</td>
<td>20%</td>
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<tr>
<td>Laboratories (6)</td>
<td>15%</td>
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<tr>
<td>Mid-term Exams</td>
<td>10-20% each</td>
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<tr>
<td>Final Exam</td>
<td>25-35%</td>
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The weights assigned to the exams will be selected on an individual basis to maximize each student’s grade; i.e., the lowest exam grade will be count as the lower percentage, and the two highest exam grades will count as the upper percentages. The combination of all three exams will count for 65% of a student’s grade.
Exams
The midterm exams will be administered in the evening on the dates given in the schedule. The final exam will be an open-book take-home during the week of May 6-9. These exams are designed to test your knowledge of and ability to apply the concepts of fluid mechanics. Each exam will cover all material presented up to that point. I take the Smith College Honor Code very seriously, and I expect you to do the same. Honor Code infractions will not be tolerated.

Laboratories
The laboratories are designed to give you added insight to the principles of fluid mechanics, experience with experimental design and data analysis, and exposure to large-scale fluid mechanics projects. There will be two lab sections for this class, each meeting every other Thursday afternoon (for a total of six meetings per section). Associated with each laboratory will be an assignment to be submitted one week after the lab meeting. Lab assignments are due by 1:00 pm, and late assignments will be penalized at the rate of one grade increment per hour (e.g., $B \to B$).

Homework Assignments
The homework assignments are designed to give each student facility with solving fluid mechanics problems and thinking deeply about fluid mechanics concepts. The homework assignments include questions and problems that are very similar to those you will be asked on the exams, so your effort on the homework will have a direct impact on your exam performance. You are welcome to work with your peers on the assignments, but each student is responsible for the work she/he turns in (this means that each student should be able to explain how she/he solved each problem). Solutions for all homework problems will be available in Prof. Guswa’s office and on reserve in the Science Library. The lowest homework score for the semester will be dropped. To be accepted, your responses to each assigned problem must be started on a new sheet of paper, your writing must be neat and clear, and your solutions must be stapled. Assignments are due by 9:01 am on the Fridays indicated on the schedule, and absolutely no late assignments will be accepted.

Each graded problem will be evaluated on a 0-10 scale according to the following guidelines:

- 0 No effort
- 2 Problem statement written out but not attempted
- 6 Incomplete attempt
- 9 Complete attempt, incorrect solution
- 10 Complete attempt, correct solution

A ‘complete attempt’ includes identification of what is known, articulation of for what you are solving, statement of assumptions, properly labeled figures, and a clearly documented progression to a final result. In addition to the above guidelines, each problem will receive a 1 point deduction for each of the following:

- substitution of numerical values into equations before the final solution step
- use of an unreasonable number of significant figures
- lack of appropriate units
Frequently Asked Questions

Is email a good way to get in touch with Prof. Guswa?
After you have looked through the syllabus and schedule, email is a good way to get answers to questions regarding course logistics and clarification of course requirements. Questions related to conceptual understanding can best be addressed in my office hours. I check my email once per weekday (usually in the morning), so you can expect a reply within that timeframe. I will let you know if I plan to be out of email contact for longer periods.

What are the prerequisites?
You are expected to have taken Continuum Mechanics I before beginning Continuum Mechanics II. In special cases, this requirement might be waived after a discussion with Prof. Guswa. You are encouraged, but not required, to take EGR 272 concurrently with EGR 271.

What does a grade represent?
Each student in EGR 271 is evaluated on her achievement of the course objectives. The particular vehicles for evaluating her performance are listed above.

Why is there a participation component to the grade?
In class, the preparedness and participation of each student has a direct impact on the learning of her peers. Consequently, each student is expected to ask questions and actively participate in classroom discussions to enhance the learning of all students.

What is the policy on arriving late or missing class?
Each student is responsible for her own learning in this class. As such, the choice is up to her as to the best way to manage her time. I will not judge whether this class should be a higher or lower priority than something else, whether it is recovering from illness, going to the movies, sleeping, spending time with family, etc. I require, however, that a student’s actions not interfere with the learning of others. Also, each student is fully responsible for material, assignments, and notices discussed in class, whether or not she is present.

When are the readings due?
In some classes, instructors assign a particular due date for the course readings. In this class, I have paired the reading assignments with the lecture topics, and I leave it up to you as to when you would like to complete the reading. Some of you may benefit from doing the reading before lecture, while others may prefer to read the material after hearing the lecture. The choice of timing is yours. You will be held accountable for all required readings.

What is the best way to make use of Prof. Guswa’s office hours?
Some of the material presented in EGR 271 can be quite challenging, and I encourage you to take advantage of my office hours. I have open office hours on Thursdays from 4:30 until 5:30. In addition, you may make an appointment to see me on Monday and Wednesday between 10 am and noon. To use this time most effectively, I strongly recommend that you arrive with specific questions. If you have gone over the material ahead of time, we can usually clear up your areas of confusion during office hours. Please note that I will not use office hours to repeat material from a class you may have missed.

How does the Smith Honor Code apply to this course?
I take the Smith College Honor Code very seriously, and I expect you to do the same. In EGR 271, you are encouraged to work with your classmates on the weekly problem sets. These assignments are designed to give you practice with the kinds of questions to which I will expect you to be able to respond on the exams. In many cases, the learning associated with doing these practice problems is enhanced by working in groups. Given that the questions on the exams are similar to those on the assignments, it is in your own best interest to ensure that you have a deep understanding of the homework problems. For the lab write-ups, you are expected to work with your lab partner to complete the assignment. You may converse with other lab groups to clarify the lessons, but you are to submit work that is your own. Any copying or paraphrasing of text, figures, etc. from other lab groups or reports from previous years will constitute a violation of the Honor Code. Any discussion of the exams with anyone other than Prof. Guswa is prohibited while the exam is being administered.
What skills must a student bring to this course?

- Algebra (you should be at a level such that it is like tying your shoe)
- Linear Interpolation
- Unit Conversion
- Differential Calculus (this includes both an ability to differentiate and an ability to convert a word problem into a differential equation)
- Integral Calculus (this includes both an ability to integrate and an ability to convert a word problem into an integral equation)
- Ability to interpret and create graphical representations of quantitative data

What advice do students from last year have for students this year?

“don’t rely on fill-in-the-blank equations to get by”
“review calculus”
“have a strong math background”
“get lots of sleep and review your calculus”
“Make sure you go to office hours when you don’t understand the material. Prof. Guswa is extremely helpful, encouraging, and really seems to be concerned about our education. Start the problem sets early, especially if you are taking another engineering course at the same time.”
“take PHY 210 before this class”
“take PHY 210 first; it helps to understand concepts such as the del operator, etc”
“keep up with your reading and understand all homework assignments; it will be tremendously helpful. Plus, go to office hours.”
“Don’t give up — the course can be rather confusing, but just keep going. Try your best on the homework; the better you understand those, the easier the tests will be.”
“know your calculus”
“Make sure you allot enough time; review and be prepared for exams; don’t forget your calculus.”
“Don’t slack off — I wish I were up to date with the readings throughout the semester. Don’t wait until the night before it is due to start the homework. Brush up on moment and force balances.”
“start the homework problems the weekend before they are due”