

PRINCIPLES OF FLUID MECHANICS
CEE 327
FALL 2026

Class: Tuesday and Thursday, 11:00 am – 12:20 pm, 369 Link Hall
Recitation/lab sections: Tuesday, 12:30 – 1:50 pm, 246 Link Hall
Tuesday, 3:30 – 4:50 pm, 237 Sims Hall
Thursday, 12:30 – 1:50 pm, 246 Link Hall
(Lab activities will take place in 0019 Link Hall)

CATALOG DESCRIPTION

Dimensional analysis. Hydrostatics. Equations of motion. Bernoulli's equation. Euler's momentum theorem. One-dimensional analysis. Velocity potential. Stream function. Laminar viscous flow. Potential flow applications.

INSTRUCTOR INFORMATION

Dr. John Trimmer
151D Link Hall
jttrimme@syr.edu

About me:¹ I am a teaching faculty member in Civil and Environmental Engineering, which means that teaching is my focus here. It's also the thing I enjoy most about my job, along with simply getting to know students like you. I grew up in Pennsylvania, but I've moved around quite a bit. In particular, I've spent several years living and working on water and sanitation issues in sub-Saharan Africa, first as a Peace Corps Volunteer in Uganda, and later in Kenya working with the Aquaya Institute, a non-profit research institute focused on safe water and sanitation access. I also play the cello in a local orchestra, I enjoy hiking and reading (especially fantasy and science fiction), and I have a cat (Julia). It's a pleasure to meet you!

Drop-in hours:² Monday, 11:00 am – 12:00 pm
Tuesday, 2:00 pm – 3:00 pm
Wednesday, 3:00 pm – 4:00 pm
Thursday, 4:00 pm – 5:00 pm

This time is for you: I care about you as a person and about your success, in this class and more broadly. You can use this time to introduce yourself and get to know me a bit better, ask specific questions about course material and assignments, or chat about anything that's on your mind. I've set aside the times listed above specifically for this purpose, but please feel free to stop by anytime if my door is open, send me an email, and/or ask to set up a virtual or in-person meeting in a different location, if you'd prefer!

TEACHING ASSISTANT INFORMATION

TBD
Office hours: By appointment

¹ I added this paragraph to introduce myself to students, to help them see me as a person with a life beyond the classroom, and also as someone who cares about student learning and success.

² I renamed "office hours" to "drop-in hours", and I've added to the paragraph below to better explain the purpose of this time and make them feel more welcoming to students. I've also tried to include different times on each day of the week, to hopefully better accommodate students' schedules.

RECOMMENDED TEXTBOOK³

Engineering Fluid Mechanics, 12th Edition

Donald F. Elger, Barbara A. LeBret, Clayton T. Crowe, John A. Roberson

ISBN: 978-1119723509

We will also use relevant sections from the Fundamentals of Engineering (FE) Exam Handbook, to help you prepare to complete that important step in your professional journey. Digital copies of these and other important materials will be provided on Blackboard.

PREREQUISITES

ECS 221, MAT 296

LEARNING OBJECTIVES⁴

This course explores how fluids behave under various conditions. Together, we will learn about these concepts and apply them to analyze and design engineered and natural systems, focusing especially on water resources infrastructure.

After taking this course, you will be able to do the following (and you can find the associated ABET student outcomes at the end of the syllabus):

1. Explain real-world fluid behavior using key properties and characteristics such as viscosity, compressibility, surface tension, and vapor pressure (ABET student outcome 1).
2. Analyze basic infrastructure and measurement devices related to water resources and other fluids under conditions of hydrostatic equilibrium, using hydrostatic pressure distributions and forces (ABET student outcomes 1 & 2).
3. Analyze and design basic infrastructure related to water resources and other fluids in motion under pressurized (pipe flow) and non-pressurized (open channel flow) conditions, by applying conservation of mass, momentum, and energy (ABET student outcomes 1 & 2).
4. Apply fluid mechanics concepts to experimental and real-world examples of water resources infrastructure and communicate findings through collaborative written reports and verbal presentations (ABET student outcomes 3, 5, 6, & 7).
5. Identify and discuss ethical, social, environmental, or economic issues associated with the design and implementation of certain types of water resources infrastructure (ABET student outcomes 3 & 4).

COMPONENTS OF THE COURSE

This course will include a variety of activities, assignments, and other items that are designed to facilitate, support, and enhance your learning. My goal is to provide opportunities for you to engage with the material in a number of different ways. It's possible that you might enjoy certain activities more than others, but please remember that other students might have preferences that are different from yours. Generally, I would suggest doing your best to actively participate in whatever we're doing and take time to reflect on

³ I have switched the textbook from "required" to "recommended", since purchasing it may represent a financial barrier to some students. As stated below, I plan to provide additional open-access materials, in particular focused on the FE Exam, which is an important step for students to become Professional Engineers.

⁴ I have made considerable revisions to the learning objectives below to better follow the CALMS (clear, attainable, learning-focused, measurable, specific) framework. I have also added the brief opening paragraph to welcome students into the learning process.

what we're learning. In my experience, if you do these things, it's more likely that the concepts will stick with you after this course, so that you can use and build on them in the future.

Calculation of Course Grade: A weighted average grade will be calculated from various components of the course, as follows:

Participation & Engagement	5%	A	93-100%	C+	77-79.9%
Homework & Discussions	20%	A-	90-92.9%	C	73-76.9%
Concept Checks	5%	B+	87-89.9%	C-	70-72.9%
Lab Activities & Reports	20%	B	83-86.9%	D	60-69.9%
Group Projects	15%	B-	80-82.9%	F	Below 60%
Three Individual Exams	30% (10% each)				
Reflection Journal	5%				

You can find more details on each of these components below. In this class, my goal is for us to work together in community to understand and apply fluid mechanics concepts. I will often encourage you to work with and help one another, which can aid everyone's learning process. So, your grade will not depend on how you perform relative to others in the class. In other words, it's possible for everyone to succeed together! I care about your learning, and I want everyone to do well. Please always feel free to let me know if you're having trouble with anything.⁵

Participation & Engagement⁶

In this class, I will ask you to participate and engage with the material in several ways. Taking time to practice skills, try things out (and make mistakes!), discuss concepts, and reflect on what we're doing will help you to learn effectively. So, a portion of your grade will depend on this engagement. Here are some strategies and options for you to demonstrate a high level of engagement:

- Listening actively, asking questions, and offering opinions during class;
- Working proactively with your classmates during in-class practice and other activities, such as practice calculations, conceptual brainstorming and discussion, and design challenges;
- Working proactively with your classmates during recitation and lab activities;
- Listening actively and asking questions during end-of-semester presentations, and providing feedback during practice presentations in your recitation;
- Coming to drop-in hours or sending me a message (via email, Blackboard, etc.) to ask questions and discuss class material, homework, projects, etc.;
- Responding to others' ideas in Blackboard discussions.

Homework & Discussions

Practicing the skills we will learn in this class begins with in-class problem solving and other activities, and continues with homework.⁷ These assignments provide additional repetition as you develop your skills, and they will also occasionally give you a chance to tackle more complex problems in a relatively low-stakes setting. You are welcome and encouraged to work together to solve homework problems, and to see me or the TA if you have questions or would like some guidance. However, you should submit your own assignment, which should reflect your own understanding of the material. Unless otherwise noted,

⁵ I have revised this paragraph to emphasize community and my hope for shared success.

⁶ I have revised this section to emphasize the importance of practice and engagement in the learning process, and I have expanded the list of strategies and options for demonstrating engagement.

⁷ I've updated the first few sentences about homework to emphasize the role of homework assignments as (scaffolded) additional practice that builds on in-class activities.

you will submit homework assignments electronically on Blackboard. Submissions can be typed or handwritten and scanned, but please make sure that handwritten solutions are clear and legible.

The deadlines associated with each homework assignment are there to help you keep on track as we learn about various topics and prepare for exams. However, I recognize that life happens and things come up, so I am happy to be flexible if needed. Please reach out to me before the deadline if you will need an extension on a particular assignment. Even if you haven't asked for an extension, you are still welcome to turn in your homework after the deadline for partial credit. The table below the maximum amount of credit you can earn for homework submitted after your deadline.⁸

Homework submitted:	Percentage of points available to earn:
By the original or extended deadline (with a 10-minute grace period to allow for upload difficulties)	100%
Up to 24 hours (1 day) past the deadline	90%
24 – 48 hours (1 – 2 days) past the deadline	80%
48 – 72 hours (2 – 3 days) past the deadline	70%
72 – 96 hours (3 – 4 days) past the deadline	60%
>96 hours (>4 days) past the deadline until the end of the semester	50%

In addition to homework assignments, we will also have a few online Blackboard discussions throughout the semester. Your participation in these discussions will count toward your overall homework grade for the course. Our collaborative classroom community extends to these online discussions, and we all have a responsibility to show respect to one another across all our virtual and in-person interactions. Demonstrating respect for others will factor into the credit you earn for discussion posts.

Online Concept Checks⁹

We will have several small, low-stakes online assessments throughout the semester designed to check your understanding of topics covered recently in class. These are meant to be low-stress opportunities to solidify your comprehension and identify areas where you may not fully understand something. You are welcome to email me or come to my office to ask questions as you're working through each concept check. These will not have a time limit, and you will have up to two attempts available for each one on Blackboard. This means you can make mistakes, expand your understanding, and improve the second time!

Labs and Recitation Activities

Our weekly recitation sessions provide opportunities for a variety of additional activities, such as labs, problem solving time, exam preparation, and group project work, to support your learning in this class. We are planning to engage in 4 labs throughout the semester, and these lab activities will take place during your recitation time in Link 0019. You will work together with a lab group, and your group will submit a report for each lab. I know that group work can sometimes be a challenge, and you probably have some ideas about what works well for you. Prior to our first lab, we will work together to decide how we all want to approach lab groups, creating policies and best practices that are consistent and acceptable to everyone. These policies will cover topics such as: whether group members will change or remain the

⁸ I've updated this paragraph to focus more heavily on flexibility with deadlines, and I've made the late policy clearer by adding the table below. Apart from framing and clarity, the policy change I've made is that students can turn homework in more than 5 days after the deadline and still receive some partial credit. I think this helps to demonstrate that I still believe engaging in homework practice is important for learning the material, even after the deadline has passed.

⁹ I've updated this section on concept checks to emphasize the low-stress, low-stakes nature of these minor assessments. I've also highlighted the fact that each concept check allows for two attempts on Blackboard, which helps to avoid penalizing mistakes at this formative stage of learning.

same during the semester, if and when we complete peer assessments of group members, and how to handle scenarios where a group member misses a lab. I plan to use a survey to help gather ideas and preferences in a democratic way, and this survey will also provide you an opportunity to tell me more about yourself, your goals, and your strengths (which I may use to help form groups).¹⁰

I plan to structure the lab activities themselves in a way designed to help you get the most out of them and connect them to what we are doing in class. Here's a summary of the plan:¹¹

1. *Pre-lab handout*: You will read a brief pre-lab handout describing the main question we will aim to answer, and the equipment we will be using. This handout will often be framed as a task your group receives from a supervisor, to experimentally estimate a value that will be used in a design.
2. *In-lab introduction (~5 minutes)*: I will introduce the question we'll be exploring and any equipment we'll be using, reviewing the information from the pre-lab handout.
3. *In-lab experimental design (~15 minutes)*: You will work with your group to brainstorm how to use the equipment provided to answer the question. This can be a challenge, especially when you're unfamiliar with the equipment: I encourage you to talk with me and/or the TA to explore and receive feedback on your ideas. Your group will fill out a worksheet outlining your ideas, which you'll turn in during the lab session. (This will be graded for effort, not correctness!)
4. *In-lab data collection (~60 minutes)*: Based on all groups' ideas (with guidance from me and the TA as needed), we will come up with a data collection plan together and implement it. Groups will typically rotate through to use the equipment and collect some of the data needed, and then we'll compile all the data from the lab section for you to use in your report. When your group is not collecting data, your group will have time to start writing your lab report and/or do homework.
5. *Post-lab data analysis and report writing*: After collecting data in the lab, your group will work together to analyze it and report your findings. I'm planning for the reports to be relatively brief (2-3 pages, plus an appendix for data and calculations).
6. *Report swapping for peer review*: During the following week's recitation session, groups will swap first drafts of their reports to receive some feedback. You will get credit for submitting your first draft before the recitation, but I will not grade it. The intention here is for you to see another group's approach and receive feedback on your own, to help you improve the final draft.
7. *Final report submission*: Typically, your group's final version of the report will be due two weeks after the lab (one week after peer review). I will be grading this one!

As noted above, we'll work together to define some elements of this process in greater detail.

Group Projects

This course will include multiple group projects, which will be explained in more detail later in the semester. While there will be several in-class group activities, the two most substantial group projects will include the following:

- *Fluid mechanics case study*: Groups will select and research a natural or engineered system that uses fluid mechanics principles (rivers, dams, levees, water distribution systems, etc.). Early in the semester, we will decide together whether each group will choose their topic separately, or if each recitation session will identify a large case study, with each group in that recitation session focusing on a related sub-topic.¹² At the end of the semester, groups will present on their system,

¹⁰ I've updated this paragraph to include student co-creation of policies surrounding lab groups, which will be derived from an online survey and discussions during the first 2 weeks of recitation sessions.

¹¹ This added summary of the lab procedure reflects a new process I'd like to try, which will hopefully provide scaffolding of the experimental design and implementation process, greater opportunity for student creativity, and space for peer-to-peer engagement around lab reports.

¹² This represents another instance where I'd like to co-create this aspect of the project with students: Will each group select their topic in isolation, or will each recitation session choose a large case study where each group focuses on a particular aspect?

sharing background information, a calculation that demonstrates an application of one or more concepts from our class, and a discussion of social and/or environmental impacts of the system. One member from each group will also participate in a panel Q&A session focused on the case study, which will take place on the same day as the presentation.

- *Pipe design project:* During class time, you will work with a group of your choosing to contribute to the design of a water supply system, using the principles and equations related to pipe design that we will be learning about in this course. There will also be time for you to work on this outside of class, if needed. Your group will submit a memo summarizing your analysis and design recommendations.

Exams

There will be three exams in this course: two given during the semester and a final given during the final exam period. The course schedule outlines the material each exam will cover. I want to acknowledge that exams can often be a major source of stress and anxiety. It's my goal to reduce this anxiety as much as possible, primarily by treating each exam as a structured series of learning opportunities. Here's what that will look like for this class:¹³

- *Group review and problem scoping:* We will devote part of the recitation session right before an exam to review, where I will discuss what to expect on the exam. We will also look at key scenarios that will appear on the exam, and we'll work together to identify the types of analysis and design calculations that might be relevant, and needed information to complete those tasks.
- *In-class individual exam:* Exams will occur during class (except for the final, which will be during finals week), you'll complete them individually. Each exam will typically consist of calculation problems as well as a few related conceptual questions. I will provide you with relevant sections of the FE Handbook, which will act as an extended formula sheet (FE Handbook sections will be available on Blackboard for you to review beforehand). This gives you an opportunity to practice using the Handbook, to help you prepare for the FE Exam.¹⁴ You can also bring one sheet (front & back) of self-prepared notes.
- *Revision and reflection:*¹⁵ After I have graded the exams, you will have the opportunity to make corrections on calculation-based problems, enabling you to continue learning and improving your understanding. I don't curve exam scores, but by completing corrections, you can earn back up to half the points you lost originally. You also have the opportunity to complete a written reflection focused on how you prepared for the exam, how well it worked, and what improvements you could make next time. I encourage you to come talk to me and to work together with your classmates as you're making corrections.

I will provide more detailed information on this entire process later in the semester.

Reflection Journal

In my experience, regularly reflecting on what you're learning throughout the semester is an important part of the learning process, helping you to draw connections, identify areas of uncertainty or confusion, and build on topics that you find particularly interesting. With this in mind, I will ask you to complete weekly reflection journal entries on Blackboard during the semester (minimum of 2 sentences per entry). This is designed to give you an opportunity to reflect on what we've been learning each week, how it

¹³ The exam structure I've added here is designed to help reduce student stress and anxiety, and also to provide some degree of scaffolding around each of these large summative assessments.

¹⁴ Using the FE Handbook as a "formula sheet" is something new I will be trying, to help students gain familiarity with it for the FE Exam.

¹⁵ I have used these exam revision and reflection opportunities in previous years but have not standardized them in the syllabus like this. I've found that students have been very appreciative of these opportunities. I think they do a lot to reduce stress, and the reflection also acts as a simple exam wrapper.

relates to the rest of the course, and how it might fit into your overall education and future goals. Some possible things you could write about each week include:

- A topic we learned about that you found particularly interesting, and how it might relate to what you want to do in the future;
- How a topic from the week relates to other topic(s) we've covered earlier in the course;
- How a topic from the week relates to other topic(s) you've encountered in other courses;
- Something that isn't clear or that you feel you don't understand;
- Something that you enjoyed, helped you to learn, or was a challenge.

Your journal entries will only be visible to me, and I will be reading them each week. This is a great opportunity for you to provide some informal feedback about your experience in class at any point during the semester.¹⁶ I may respond to some of your entries directly, especially if you have a question about something. Each week's entry will be due at 10:00 am on the following Monday¹⁷ (this is typically when I will start reading them), and you will receive credit as long as you write something relevant that is at least 2 sentences long. To make it easier to keep track, there will be a separate assignment for each entry in Blackboard. I will plan to announce if a journal entry is not required during a certain week. Please feel free to let me know if you think a journal assignment should be available on Blackboard but is not.

POLICIES AND PROCEDURES

General guidelines for class engagement

- **Names:** I want to learn everyone's name in this class, and I will do my best to make this happen, but I ask that you please be patient with me. I sometimes struggle with this, but you can help me by being engaged during class, and by coming to see me during office hours. Also, please feel free to correct me if I make a mistake and call you by the wrong name or mispronounce your name. This will help me learn!
- **Electronic devices:** You are free to use laptops and other electronic devices during class to take notes, follow along with slides, and participate in activities. While these devices can be a valuable aid to learning (and we will sometimes use them for specific activities), please remember that they can also be a source of distraction, both for yourself and others nearby. To cultivate a strong classroom community, we should all practice the skill of being fully present for one another and resisting distraction. I know this is challenging, but I ask that you respect everyone's learning by doing your best to avoid distractions. On my end, I will do my best to keep you interested and engaged in what we're learning!¹⁸
- **In-class problem solving and discussions:**¹⁹ To do anything well, we need to practice. I aim to provide many opportunities for you to practice solving problems in class, to try things out and make mistakes without penalty, and to discuss related topics with your peers during class. In my

¹⁶ I added this sentence to emphasize that students can use these reflection journals as an opportunity to provide informal feedback. This won't be anonymous, but I will be the only one seeing the comments.

¹⁷ I changed the deadline for these reflection journal entries from Sunday at 11:59 pm to Monday at 10:00 am, in an effort to promote student wellbeing and avoid the perception that students should be working until midnight during the weekend.

¹⁸ For now, I've decided to maintain my previous policy of allowing electronic devices without restriction, but I have added some sentences in this section to emphasize the importance of developing community by being fully present and avoiding distractions.

¹⁹ I've edited this section on in-class problem solving and discussion to emphasize the importance of practicing and trying things out, and to normalize mistakes. These in-class activities provide formative opportunities to do this without any sort of penalty for mistakes or lack of understanding.

experience, these activities can often help you learn more than just listening to me talk! But, I know that speaking up in class and engaging in group work can sometimes be a challenge. I will try to help by providing options for you to think about the question on your own first, before moving on to small-group discussions. In your groups, I'll ask that you try to make sure everyone has a chance to speak, and to be respectful of different communication styles. After small group discussions, I will typically ask a couple groups to share with the entire class. You may "pass" if your group really doesn't know what to say, but I'd encourage you to try, as you will likely learn more that way. No one gets everything right the first time! On the other hand, you are always free to call on me, if you have a question or want to offer an idea during class. I may not always have the answer either, but I'll do my best!

- End-of-semester grade adjustments: At the end of the semester, you may notice that your average is very close to a higher letter grade, and you may wonder if there's any way to reach that higher level. Generally, if you are within 0.5 percentage points of the next highest letter grade (for example, if you have an 89.5% and want to explore raising your grade from a B+ to an A-), you can feel free to get in touch with me. But please be aware that it won't be free. I will typically ask you to do extra work (such as redoing a homework assignment, writing an essay, or completing exam corrections), and this work will need to meet a certain standard to earn the higher grade.
- Reflection and feedback: I consider reflection to be an important part of the learning process, for you as well as for me. I encourage you to reflect regularly on what we're learning, and also how we're learning it. Please always feel free to offer feedback on how you feel the course is going. I care about your learning, and I'm always looking for ways to improve my teaching!

Additional course policies

1. Blackboard and Email

A Blackboard course site has been created for this class and can be accessed at <http://blackboard.syr.edu/>. Please plan to check the course site regularly for announcements, assignments, quizzes, class slides, and additional resources. **The most up-to-date version of the course schedule, which we may revise throughout the semester, will be available on Blackboard.** I will plan to announce any changes in class and will make announcements via Blackboard, but it's your responsibility to confirm deadlines and assignments on the most up-to-date version of the schedule. Blackboard announcements are sent via your SU email account, so please make sure you check your email regularly. When submitting materials, please note that the University's Blackboard Learning Management System is on Eastern Time.

Information about Blackboard is available on [Answers Blackboard](#); alternatively, you can contact Information Technology Services by sending an email to help@syr.edu, calling 315.443.2677, or in-person at the ITS Service Center, located at I-227 CST in the Life Sciences Complex. Business hours for the Service Center can be found on the ITS Website at http://its.syr.edu/its_service_center/

2. Use of Class Materials and Recordings

You are welcome to download all materials provided on Blackboard for your use in this class. However, I ask that you do not share these materials with other parties (e.g., websites, social media, other students outside of this class) without my permission. Doing so is a violation of intellectual property law and of the student code of conduct.

3. Attendance and Absences

Attendance in classes is expected in all courses at Syracuse University. While attendance does not directly factor into your grade for this class, showing up ready to engage will almost certainly improve your learning

and understanding of the material.²⁰ Students may contact the Case Management staff in the Dean of Students Office (<https://ese.syr.edu/dean-of-students/services/>) when they are absent from class for an extended period of time (48 hours or more). The Case Management staff will require documentation for the absence and will utilize Orange SUccess to send notifications to faculty to verify that documentation has been received for the stated absence. Barnes Center at the Arch (Health, Counseling, etc.) staff will not provide medical excuse notes for students. When Barnes Center staff determine it is medically necessary to remove a student from classes, they will coordinate with the case management staff to provide absence notification to faculty through Orange Success. That said, if you are not feeling well, you do not need to come to class. Please send me an email to let me know, and you can come see me as needed when you feel better.

4. Student Mental Health

Mental health and overall well-being are significant predictors of academic success. As such it is essential that during your college experience you develop the skills and resources effectively to navigate stress, anxiety, depression, and other mental health concerns. Please familiarize yourself with the range of resources the Barnes Center provides (<https://ese.syr.edu/bewell/>) and seek out support for mental health concerns as needed. Counseling services are available 24/7, 365 days, at 315-443-8000.

5. Academic Integrity

As a pre-eminent and inclusive student-focused research institution, Syracuse University considers academic integrity at the forefront of learning, serving as a core value and guiding pillar of education. Syracuse University's Academic Integrity Policy provides students with the necessary guidelines to complete academic work with integrity throughout their studies. Students are required to uphold both course-specific and university-wide academic integrity expectations such as crediting your sources, doing your own work, communicating honestly, and supporting academic integrity. The full Syracuse University Academic Integrity Policy can be found by visiting <https://class.syr.edu>, selecting "Academic Integrity," and "Expectations and Policy."

Upholding Academic Integrity includes the protection of faculty's intellectual property. Students should not upload, distribute, or share instructors' course materials, including presentations, assignments, exams, or other evaluative materials without permission. Using websites that charge fees or require uploading of course material (e.g., Chegg, Course Hero) to obtain exam solutions or assignments completed by others, which are then presented as your own violates academic integrity expectations in this course and may be classified as a Level 3 violation. All academic integrity expectations that apply to in-person assignments, quizzes, and exams also apply online.

Students found in violation of the policy are subject to grade sanctions determined by the course instructor and non-grade sanctions determined by the School or College where the course is offered. Students may not drop or withdraw from courses in which they face a suspected violation. Any established violation in this course may result in course failure regardless of violation level.

*Artificial intelligence:*²¹ Based on the specific learning outcomes and assignments in this course, artificial intelligence is permitted on the following: all homework assignments, lab reports, and group projects. See the assignment instructions for more information about what artificial intelligence tools are permitted and

²⁰ I added this sentence to highlight the value of attendance (and active engagement) for learning, beyond the standard SU policy/expectation.

²¹ I've expanded the list of items where AI use is permitted, because AI could be a useful tool to aid student learning as they are working through homework problems and interpreting lab activities. On each assignment, I plan to clearly explain what I see as acceptable AI use (primarily brainstorming and identifying resources for further study), and submission of each assignment will include a brief survey for the student to disclose and describe their AI use.

to what extent, as well as citation requirements. If no instructions are provided for a specific assignment, then no use of any artificial intelligence tool is permitted. Any AI use beyond that which is detailed in course assignments is explicitly prohibited except when documented permission is granted.

6. Disabilities Accommodations

Syracuse University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. There may be aspects of the instruction or design of this course that result in barriers to your inclusion and full participation in this course. I invite any student to contact me to discuss strategies and/or accommodations (academic adjustments) that may be essential to your success and to collaborate with the Center for Disability Resources (CDR) in this process.

If you would like to discuss disability-accommodations or register with CDR, please visit [Center for Disability Resources](#). Please call (315) 443-4498 or email disabilityresources@syr.edu for more detailed information.

The CDR is responsible for coordinating disability-related academic accommodations and will work with the student to develop an access plan. Since academic accommodations may require early planning and generally are not provided retroactively, please contact CDR as soon as possible to begin this process.

7. Faith Tradition Observances

[Syracuse University's Religious Observances Policy](#) recognizes the diversity of faiths represented in the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their traditions. Under the policy, students are given an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance, provided they notify their instructors no later than the academic drop deadline. For observances occurring before the drop deadline, notification is required at least two academic days in advance. Students may enter their observances in MySlice under Student Services/Enrollment/My Religious Observances/Add a Notification.

8. Diversity and Inclusion

Syracuse University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. If there are aspects of the instruction or design of this course that result in barriers to your inclusion or accurate assessment or achievement, or if you have any suggestions to improve the quality of the course materials, please contact me. My goal as your instructor is to create a learning environment that supports a diversity of thoughts, perspectives, and experiences, honors your identities (including race, gender, class, sexuality, religion, ability, citizenship, etc.), and makes everyone feel comfortable. To help accomplish this: If you have a name and/or set of pronouns that differ from those that appear in your official SU records, please let me know. If you feel like your performance in the class is being impacted by your experiences outside of class, please don't hesitate to come and talk with me. I want to support and be a resource for you. If something was said in class (by anyone) that made you feel uncomfortable, please talk to me. As a participant in course discussions, you should also strive to honor the diversity of your classmates.

ABET Student Outcomes

ABET is an international accreditation organization dedicated to ensuring that engineering programs meet an accepted set of quality standards for the profession. All engineering programs at Syracuse are ABET accredited. To assess student learning in engineering programs, ABET employs the following set of student outcomes.²²

Engineering programs must demonstrate that their graduates have:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Finally, here's a little poem of encouragement as we start the semester. Remember, it's okay if you don't understand or achieve something immediately. Keep at it, ask for help, and try a different approach. We'll get there!²³

Perseverance

What is the chance that a raindrop falls
Precisely upon a speck of dust?
Does it matter?
Perhaps we're safe to trust
That if the rain falls hard enough
The drops which flood the surface must,
As they scatter,
Wash away that stubborn speck of dust.

²² I added this short paragraph to help explain the purpose of ABET student outcomes, since students often don't have a great sense for what ABET assessment and accreditation mean.

²³ I updated this final paragraph slightly, to further emphasize that it's okay to make mistakes and not understand something right away. I've also updated the language a bit to suggest that we (the student and I) will work on it together.

COURSE SCHEDULE

Please note that a detailed version of this schedule will be maintained on Blackboard. This schedule may change throughout the semester, so please check Blackboard periodically for any updates.

Week	Class	Topic	Associated reading	Lab/recitation	Assignments/notes
1	1	Introduction to fluids Characteristics of liquids and gases Compressibility Density and specific weight	Chapter 1 (1.1-1.6) Syllabus	Recitation: Approach to recitations & labs, co-creation of lab policies (discussion and survey), Blackboard navigation	*Reflection journal entries: Due every Monday at 10:00 am after Week 1
	2	Introduction to gas properties Ideal gas law Temperature, density, and pressure relationships Vapor pressure	Chapter 1 (1.7-1.9) Chapter 2 (2.7)		
2	3	Fluid properties 1: Shear stress and viscosity Fluid stresses: pressure and shear Viscosity and Newtonian Fluids	Chapter 2 (2.1-2.5)	Recitation: Review results of lab policy co-creation survey and set up lab groups; small group work time for homework 1 or 2	Concept check 1 due Discussion 1 due
	4	Fluid properties 2: Pressure and forces Pressure (absolute, gage, etc.) Common fluid forces Surface tension and capillarity	Chapter 2 (2.6) Chapter 3 (3.1) Pre-class video: Different ways to express pressure		Homework 1 due
3	5	Fluid statics 1: Hydrostatic equilibrium Hydrostatic conditions and equations Measuring pressure (piezometers, manometers, etc.)	Chapter 3 (3.2-3.3) Supplemental video: Units	Lab 1: Hydrostatic pressure forces	Concept check 2 due
	6	Fluid statics 2: Pressure forces 1 Pressure distributions on submerged planes Center of pressure and the area moment of inertia	Chapter 3 (3.4) Pre-class video: Centroids and moments of inertia		Homework 2 due
4	7	Fluid statics 3: Pressure forces 2 Practice with pressure forces ²⁴	Chapter 3 (3.5-3.6)	Recitation: Lab 1 report peer review; Exam 1 prep ²⁵	Concept check 3 due
	8	Fluid flow Flow classifications Flow rates	Chapter 4 (4.1-4.3) Chapter 5 (5.1)		Homework 3 due
5	9	EXAM 1: Fluid properties and statics (covering classes 1-7)		Recitation: Group project introduction & brainstorming	
	10	Continuity equation Control volumes and closed systems Fluid mass balance	Chapter 5 (5.2-5.4) Pre-class video: Flow modeling & Reynolds Transport Theorem		Discussion 2 due Lab 1 reports due

²⁴ I've removed a topic from this class (buoyancy, which I already only covered if time allowed) to provide more space for practicing key skills. I've converted the buoyancy discussion into a supplemental video, which students can watch if interested.

²⁵ Each recitation following a lab is now partly devoted to peer reviews on first drafts of lab reports (groups swap with one another). These recitations in Week 4 also include preparation activities for Exam 1 (review and problem scoping)

6	11	Bernoulli equation Fluid mass and energy balance (simplified) Measuring velocity and pressure	Chapter 4 (4.4-4.7) Supplemental video: Pitot static tube	Lab 2: Open channel flow measurement using weirs	
	12	Momentum equation Newton's 2nd law and linear momentum Problem solving with the momentum equation	Chapter 6 (6.1-6.5)		Concept check 4 due
7	13	Energy equation 1 Types of energy and work Fluid energy balance Power of pumps and turbines	Chapter 7 (7.1-7.5)	Recitation: Lab 2 report peer review; selection of group project topics	Homework 4 due
	14	Energy equation 2 Head losses Hydraulic and energy grade lines	Chapter 7 (7.6-7.8) Chapter 5 (5.5)		
8	-	FALL BREAK		Recitation: Exam 2 prep (Thursday section only; no Tuesday sessions)	
	15	Conduit flow 1 Flow classifications and Reynolds number Friction (major) losses and the Darcy-Weisbach equation	Chapter 10 (10.1-10.5)		Concept check 5 due Lab 2 reports due
9	16	Conduit flow 2 Moody diagram Component (minor) losses	Chapter 10 (10.6-10.8) Supplemental video: Minor losses in pipe components	Recitation: Exam 2 prep (Tuesday sections only; no Thursday session)	Homework 5 due
	17	<i>EXAM 2: Fluid dynamics (covering classes 8, 10-14)</i>			
10	18	Open channel flow 1 Flow classifications Hydraulic radius Manning equation	Chapter 15 (15.1-15.3) Pre-class video: Applying the energy equation to open channel flow	Lab 3: Manning Equation & channel roughness	
	19	Open channel flow 2 Specific energy and critical flow Flow transitions Hydraulic jumps	Chapter 15 (15.4-15.6)		Discussion 3 due
11	20	Graphical analysis of open channel flow (specific energy curves)		Recitation: Lab 3 report peer review; project work time and check-ins	Homework 6 due
	21	Numerical analysis of open channel flow (finding uniform flow depth)			
12	22	Pipe flow design activity (pipe sizing)		Lab 4: Specific energy & hydraulic jumps	Concept check 6 due
	23	Pipe flow design activity (parallel pipes)			Lab 3 reports due
13	24	Work and Q&A time for pipe flow design activity ²⁶		Recitation: Project practice	Homework 7 due

²⁶ I've added extra work time for student groups to engage in a complex design activity. The topics covered previously in Week 13 are now included in the options students can choose from for Class 25. This also provides an additional opportunity for student choice toward the end of the semester.

	25	<i>We'll choose one of these 3 options:</i> Drag forces and skyscraper design Lift forces and aerodynamics More time for pipe design projects	Chapter 11 Pre-class video: Introducing drag and lift	presentations & feedback; optional Lab 4 report peer review or project work time ²⁷	Pipe flow design memo due Monday, November 23, at 10:00 am
14	-	THANKSGIVING BREAK			
	-	THANKSGIVING BREAK			(No reflection journal entry)
15	26	<i>Group project presentations</i>		Recitation: Final exam prep	
	27	<i>Group project presentations</i>			Lab 4 reports due
16	28	<i>Group project presentations</i> <i>Course wrap-up</i>		None	(No reflection journal)

²⁷ I'm planning to give project groups an opportunity to practice their presentations during recitation in Week 13. I've also made the final lab report peer review optional here, to give students greater ownership over their report writing process for this last report.