

EGN 3353C Section 32H7 - Fluid Mechanics Spring 2020

Class Periods: MWF2 8:30-9:20

Location: NPB 1002

Instructor

- Kurt Schulze, Ph.D., P.E.
- Office location: NEB 231
- Office Hours: TBD
- Email: schulzek@ufl.edu

Teaching Assistants

- **Riasat Azim**, Office location and hours:
(Please contact through the Canvas website, <http://elearning.ufl.edu/>)

Course Description

Statics and dynamics of incompressible fluids. Application to viscous and inviscid flows. Dimensional analysis. Compressible flow. Credits: 3

Course Pre-Requisites / Co-Requisites

MAC 2313, EGM 2511 and EML 3100, or EML 3007

Course Objectives

This course provides an introduction to fluid mechanics. It stresses fundamental engineering science principles applied to fluid mechanical systems. Students will learn the governing integral and differential equations for viscous and inviscid fluids and will apply these equations to internal and external flows. Upon completion of this course, students are expected to have developed a working understanding of the basic theory of incompressible and compressible fluid mechanics. Students will learn problem-solving techniques and have the opportunity to apply these techniques to a variety of problems.

Materials and Supply Fees: None

Professional Component (ABET):

This course utilizes fundamentals of mathematics, physics, and chemistry to develop analytical methodologies for engineers to utilize for design and analysis work of fluid machines and systems.

Mathematics	35%
Physical Sciences	50%
Engineering Design	10%
Social Sciences & Humanities	5%

Relation to Program Outcomes (ABET):

Outcome	Coverage*
1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High
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	Medium
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	

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not part of the course.

Required Textbooks and Software

Philip Pritchard & John Mitchell, "Introduction to Fluid Mechanics," 9th Edition, Wiley, ISBN-9781118912652

This course is participating in UF All Access, which is a program designed to provide the most affordable option for students. <https://www.bsd.ufl.edu/G1C/bookstore/allaccess.asp>

- The required course material is delivered digitally through WileyPlus, containing a fully searchable etext and the required homework for this course. You may purchase an access code at a discounted price by going to this link:

<https://www.bsd.ufl.edu/G1C/bookstore/UFAllAccessInstructions.pdf>

This link authorizes the cost of the access code to be charged directly to your student financials account.

Attendance and Expectations: Lecture attendance is imperative. Although attendance will not be taken or used in assigning grades, students will be held responsible for knowing all changes made to scheduling and all class announcements. There is a direct correlation between class attendance and class success. During class, cell phones must be turned off or muted. Don't bring food to class.

Note: Although information will be posted on the website, class announcement prevail in case there are discrepancies.

Assessment Methods and Grading: Homework will be assigned throughout the semester. Homework will be graded.

Please submit your solutions ONLY via Canvas. The HW problems may be downloaded from the course web site <https://lss.at.ufl.edu/> (use Canvas system).

There will be four exams during the semester in class. All exams will be cumulative but will emphasize the most recently covered material. The exams will be during the regular class period. The week of the exams are tentatively shown on the schedule and as follows:

Exam #1 week of January 27

Exam #2 week of February 24

Exam #3 week of March 30

Exam #4 week of April 20

The relative weighting of the HW Problems and Exams in the final grade will be:

- | | |
|------------|-----------------------|
| a. HW | 30% Homework matters! |
| b. Quizzes | 10% |
| c. Exams | 60% |

In general, exams will closely follow homework problems in scope and complexity. Late assignments will not be accepted.

Quizzes are unannounced and only be taken during the class period. Only exceptions are for medical emergencies or prior excusal for official university activities. Yes, you will need to be to be in class to get credit for the quizzes.

If a student feels that an exam or homework is graded unfairly, or if there is an error in the grading, please bring it to the instructor attention within a week after the graded material is handed back. Scores will not be reconsidered beyond the one week period.

Grading Scale:

93 – 100: A	87 – 89.9: B+	77 – 79.9: C+	60 – 69.9: D	0 – 59.9: E
90 – 92.9: A-	83 – 86.9: B	73 – 76.9: C		
	80 – 82.9: B-	70 – 72.9: C-		

If you cannot attend an exam or cannot meet a due date, you must contact the instructor at least 1 week prior to the exam or due date. Failure to contact the instructor prior to the exam will result in a zero on that exam. Arrangements will be made for students involved in conflicting official university activities.

Make-up Policy: No late assignments will be accepted. Make up exams are not normally allowed. If you cannot attend an exam or cannot meet a due date, you must contact the instructor at least 1 week prior to the exam or due date. Failure to contact the instructor prior to the exam will result in a zero on that exam. The only exception is sudden acute illness or an emergency. Arrangements will be made for students involved in conflicting official university activities.

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.
<https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.

Notes on Homework Problems

- Homework (HW) problems are an essential element of this course.
- Students are encouraged to discuss the general principles involved in the homework sets with one another, but the detailed solution of each problem should be completed individually. Submitting a HW solution that is directly copied from another source is considered a violation of the honesty policy.
- Before solving a problem, students should draw a **schematic** of the physical problem to be considered and think about the appropriate **assumptions** and mathematical formulation for the basic laws that you consider necessary for solutions.

Tentative Reading Assignment & Approximate Schedule for EGN 3353C, Spring 2020

Textbook: Pritchard & Mitchell, "Introduction to Fluid Mechanics," 9th Edition, Wiley

Week of	Topic	Recommended Reading Assign.	Comments
January 6	Fluids Intro. Fluid as a Continuum Velocity Field, Viscosity	1.1, 1.2, 1.3, 1.4 2.1, 2.2, 2.3, 2.4	
January 13	Basic Eq.of Fluid Statics, Manometers, Submerged Surfaces	3.1-3.4	
January 20	Basic laws Control Volume Conservation of Mass	4.1-4.3	Jan 20 is a holiday
January 27	Momentum Equation Exam review Exam 1 this week during class hours	4.4	Exam date and time subject to change.
February 3	Momentum Equation cont. Angular-Momentum Eq.	4.4, 4.7	
February 10	Conservation of Mass Stream Function Motion of a Fluid Particle	5.1-5.3	
February 17	Motion of a Fluid Particle, cont Momentum Equation	5.3-5.4	
February 24	Momentum Eq for Frictionless Flow Exam Review Exam 2 this week during class hours	6.1	Exam date and time subject to change.
March 9	Bernoulli Equation Irrotational Flow	6.2, 6.6	Week of Mar 2 is Spring break
March 16	Irrotational Flow Dimensionless Analysis	6.6 7.2, 7.3	
March 23	Dimensionless Analysis Flow Similarity Internal Incompressible Flow	7.4 7.5 8.1	
March 30	Internal Incompressible Flow. Exam review. Exam #3 this week during class hours	8.2, 8.3	Exam date and time subject to change.
April 6	Internal Incompressible Flow	8.4-8.6	

April 13	Internal Incompressible Flow Solution of Pipe Flow Problems External Incompressible Flow	8.7 -8.8 9.1-9.2	
April 20	Exam Review Exam 4 this week during class hours Classes end 22 Apr		PLEASE NOTE: Exam date and time subject to change.