

**EGN3353C Fluid Mechanics  
Section#28C5**

**Lecture Location and Time:** MAEB 0211  
**Class Periods:** MWF 7 (1:55 pm to 2:45 pm)  
**Academic Term:** Spring 2025

*It may become necessary to modify this syllabus during the semester.  
In this event, students will be notified, and the revised syllabus will be posted on the course web site.*

**Instructor:**

Bruce Carroll  
Room 131 NEB  
[bfc@ufl.edu](mailto:bfc@ufl.edu)  
352-392-4943 (office)  
Office Hours: **TBD** (held via Zoom.)  
You can always contact the instructor to arrange Zoom meetings at other times.

**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**

MAC2313 with a minimum grade of C and EGM2511 and (EML3100 or EML3007 or BME3060)

*To summarize prerequisite knowledge ~ you need material from calculus 3, statics, and thermodynamics.*

**Materials and Supply Fees**

None

**Course Objectives**

The objective of the course is to introduce students to fluid mechanics. Students will learn underlying theory derived from fundamental engineering science principles and will apply the theory to solve complex engineering problems using knowledge of mathematics. In addition, students in this course will develop written communication skills, lifelong learning skills, and teamwork. The objective will be achieved through:

- Class lectures and examples.
- Student completion of homework.
- Student preparation for and completion of exams.
- Group project.

**Professional Component (ABET):**

This course prepares graduates to have a knowledge of aerodynamics and to have design competence that integrates aeronautical topics.

**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	Low
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	Low

\*Coverage is given as high, medium, or low. An empty box indicates outcome not significantly addressed by this course.

### Required Textbooks and Software

- *Fluid Mechanics*, Frank White and Henry Xue, McGraw Hill, 9<sup>th</sup> edition (2021).
  - Students must also have Connect for Introduction to Flight, 9<sup>th</sup> Edition.
  - The text and Connect are available through UF All Access which provides materials digitally. More information is provided at this link:
  - <https://www.bsd.ufl.edu/AllAccess/> (Click Opt-In)
  - For help with All Access see <https://www.bsd.ufl.edu/AllAccess/Home/Support>

### Additional Recommended Materials

There are no additional materials required for the course. However, there are several excellent textbooks available for Fluid Mechanics that you can consult if you want to read different descriptions of the topics:

- *Munson, Young and Okiishi's Fundamentals of Fluid Mechanics*, by Andrew Herhart, Philip Gerhart, and John Hochstein, 9<sup>th</sup> Edition, Wiley.
- *Fluid Mechanics: Fundamentals and Applications*, by Yunus Cengel and John Cimbala, 2018, McGraw-Hill.
- *Fox and McDonald's Introduction to Fluid Mechanics*, by John Mitchel, 10<sup>th</sup> Edition, 2020, Wiley. (I used this as an undergraduate)

### Required Computer:

It is important that you have your own computer. Details are provided on both the department and college websites:

- <https://www.eng.ufl.edu/students/resources/computer-requirements/>
- <https://mae.ufl.edu/academics/prospective/undergraduate/computer-requirements/>

### Course Schedule

- See table at end of syllabus.

### Attendance Policy, Class Expectations, and Make-Up Policy

Regular class attendance is expected as it will improve your performance in the course. Late HW and makeup exams are only allowed for students with documented circumstances consistent with UF policy. Students must contact the instructor as soon as possible to provide documentation and request a make-up exam. Excused absences must be consistent with university policies in the undergraduate catalog and require appropriate documentation. For more information on UF policies see <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

### Evaluation of Grades

- Reading: Reading assignments are assigned periodically during the semester and completed using the Connect Smart Book. Students must complete the assignment by the due date to receive credit.
- Online Homework: Online Homework are assigned periodically and are completed online with automated grading using Connect. Students must complete the assignment by the due date to receive credit.
- Detailed Homework: Homework will be assigned periodically during the semester. This homework is done by hand and submitted as a pdf via Canvas. Grading is done by the TA. Students must complete the assignment by the due date to receive credit.
- Project: Students will work in teams of 2 on the class project. The project must be submitted by the due date to receive credit.
- Final Exam: There is no final exam in this course.

Assignment	Percentage of Final Grade
Reading (SmartBook)	15%
Online Homework (Connect)	20%
Detailed Homework (pdf)	10%
Exams (In Class - 15% each)	45%
Group Projects	10%
	100%

### Grading Policy

Percent	Grade	Grade Points
94 to 100	A	4.00
<94 to 90	A-	3.67
<90 to 87	B+	3.33
<87 to 84	B	3.00
<84 to 80	B-	2.67
<80 to 77	C+	2.33
<77 to 74	C	2.00
<74 to 70	C-	1.67
<70 to 67	D+	1.33
<67 to 64	D	1.00
<64 to 61	D-	0.67
<61 to 0	E	0.00

More information on UF grading policy may be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

### ***Students Requiring Accommodations***

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

### ***Course Evaluation***

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.a.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.a.ufl.edu/public-results/>.

### ***In-Class Recording***

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

### ***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://sccr.dso.ufl.edu/process/student-conduct-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 in this class.

A violation of the honor code will result in academic sanctions (typically a failing grade of E assigned for the course) and further disciplinary action.

### ***Commitment to a Safe and Inclusive Learning Environment***

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University’s core values, including the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Undergraduate Program Coordinator
- HWC OE Human Resources, 352-392-0904, [student-support-hr@eng.ufl.edu](mailto:student-support-hr@eng.ufl.edu)
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, [pld@ufl.edu](mailto:pld@ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto:nishida@eng.ufl.edu)

### ***Software Use and Copyrighted Material***

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use and the use of copyrighted material. 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: <https://registrar.ufl.edu/ferpa.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](mailto: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:** <https://counseling.ufl.edu>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

#### **Sexual Discrimination, Harassment, Assault, or Violence**

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, [title-ix@ufl.edu](mailto:title-ix@ufl.edu)

#### **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/>.

### Academic Resources

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

**Career Connections Center**, Reitz Union, 392-1601. Career assistance and counseling; <https://career.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://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>; <https://care.dso.ufl.edu>.

**On-Line Students Complaints:** <https://distance.ufl.edu/getting-help/>; <https://distance.ufl.edu/state-authorization-status/#student-complaint>.

EGN3353C Fluid Mechanics -- Tentative Course Schedule Spring 2025				Due
1	M	1/13	Lecture 1: Course Intro	
2	W	1/15	Lecture 2: Basic Concepts	Lecture 1 Quiz
3	F	1/17	Lecture 3: Absolute and Gage Pressure, Pressure Variations in Static Fluids	Connect Orientation
	M	1/20	Holiday	
4	W	1/22	Lecture 4: Manometers	Chap 1 SmartBook
5	F	1/24	Lecture 5: Hydrostatic Forces	HW1 Connect & pdf
6	M	1/27	Lecture 6: Hydrostatic Forces Continued	
7	W	1/29	Lecture 7: Buoyancy, Stability, Translational Acceleration, Rotational Acceleration	Chap 2 SmartBook
8	F	1/31	Lecture 8: Basic Laws, Reynolds Transport Theorem	HW2 Connect & pdf
9	M	2/3	Lecture 9: Conservation of Mass	
10	W	2/5	Lecture 10: Conservation of Mass Applications	Chap 3 Part 1 SmartBook
11	F	2/7	Lecture 11: Conservation of Linear Momentum	HW3 Connect & pdf
12	M	2/10	Lecture 12: Frictionless Flow: Bernoulli Equation	
13	W	2/12	Lecture 13: Examples	Chap 3 Part 2 SmartBook
14	F	2/14	Lecture 14: Angular Momentum	HW4 Connect & pdf
	M	2/17	<b>Exam 1</b>	
15	W	2/19	Lecture 15: Energy Equation	Chap 3 Part 3 SmartBook
16	F	2/21	Lecture 16: Differential Formulations, Acceleration Field	HW5 Connect & pdf
17	M	2/24	Lecture 17: Differential Form Mass Conservation	
18	W	2/26	Lecture 18: Differential Form Linear Momentum	Chap 4 Part 1 SmartBook
19	F	2/28	Lecture 19: Differential Form Angular Momentum	HW6 Connect & pdf
20	M	3/3	Lecture 20: Differential Form Energy Equation	
21	W	3/5	Lecture 21: Examples and Review	Chap 4 Part 2 SmartBook
22	F	3/7	Lecture 22: Vorticity and Irrotationality	HW7 Connect & pdf
	M	3/10	<b>Exam 2</b>	
23	W	3/12	Lecture 23: Frictionless Irrotational Flows	Chap 4 Part 3 SmartBook
24	F	3/14	Lecture 24: Examples	HW8 Connect & pdf
	M	3/17	Spring Break	
	W	3/19	Spring Break	
	F	3/21	Spring Break	
25	M	3/24	Lecture 25: Dimensional Analysis, Dimensional Homogeneity, Pi Theorem	
26	W	3/26	Lecture 26: Nondimensional Basic Equations, Modeling and Similarity	Chap 5 SmartBook
27	F	3/28	Lecture 27: Viscous Flow in Ducts, Reynolds Number Regimes	HW9 Connect & pdf
28	M	3/31	Lecture 28: Internal Viscous Flow, Head Loss, Fully Developed Flow	
29	W	4/2	Lecture 29: Turbulence	Chap 6, Part 1 SmartBook
30	F	4/4	Lecture 30: Types of Pipe Flow Problems, Noncircular Ducts	HW10 Connect & pdf
31	M	4/7	Lecture 31: Minor and Local Losses, Multi-Pipe Systems	
32	W	4/9	Lecture 32: Design of Pipe Systems	Chap 6 Part 2 SmartBook
33	F	4/11	Lecture 33: Compressible Flow, Speed of Sound	HW11 Connect & pdf
34	M	4/14	Lecture 34: Adiabatic and Isentropic Steady Flow	
35	W	4/16	Lecture 35 Project Overview	Chap 9 SmartBook
	F	4/18	<b>Exam 3</b>	
36	M	4/21	Project EPANET (zoom class only, not in lecture hall)	
37	W	4/23	Project EPANET (zoom class only, not in lecture hall)	Project Due
			<b>No Final Exam</b>	

<https://19january2017snapshot.epa.gov/water-research/epanet.html>