

AME 309 – Dynamics of Fluids

Fall 2018

Units: 4.0

Lecture hours: Tue & Thu, 12:00-1:50 pm, MHP B7B

Instructor: Prof. Lionel VINCENT (email: lionelvi@usc.edu)

Office hours: Tue 3-5pm & Thu 3-5pm - VHE 418

Teaching Assistant: Jonathan Hoy, Office hours: Wed 5-7pm & Fri 4-6pm - VHE 202 (TA office)

Textbook: Frank White, Fluid Mechanics, 8th Ed, McGraw-Hill, Inc. (recommended)

Grade breakdown:

- Homework: 15% of final grade.
- Midterm exams: 2 × 20% of final grade.
- Final exam: 30% of final grade. **Scheduled Tuesday, December 11, 2018, 11 am – 1 pm.**
- Project: 15% of final grade.

Learning objectives

This course is intended to:

- Introduce the fundamental analytical treatment of fluids as a continuum medium.
- Provide a first exposure to three approaches of analysis of fluid flows: control volume (integral) analysis, differential analysis and dimensional analysis.
- Teach problem-solving strategies in engineering applications of fluids, including fluid systems in static equilibrium and in motion, and applying the most suitable methodology in each case.
- Integrate fluid flow analysis, basic numerical methods, design, experimental testing, data collection and post-processing for a fluid-system of practical engineering relevance, to be accomplished in a team project.

Discussion board

Piazza (<https://piazza.com>) will be used for all electronic discussions. Please post your questions (regarding homework assignments, class logistics, exams, etc.) on Piazza instead of using email. You can access Piazza through the Blackboard page for this course (under Content).

Class name on Piazza: **AME 309 (28737): Dynamics of Fluids**

Assignment Submission Policy

- No late homework will be accepted.
- Discussion of homework assignments with your classmates is allowed but each student should develop and write their own original solution.
- Assignments should be submitted in stapled US letter-sized paper, with legible and logically organized solutions that explicitly include all necessary steps and assumptions (if any) made.
- Course grading policy and letter grade equivalence:
<http://arr.usc.edu/services/grades/gradinghandbook/gradingpolicies.html>

Course schedule – Weekly breakdown (W = week, HW = homework, PR = Project report)

W	Chapter	Date	Topics	Assignment
1	1 (,5)	Aug 21 Aug 23	Introduction to fluids; continuum hypothesis; dimensions Kinematics	
2	2	Aug 28 Aug 30	Fluid statics	HW1 due
3	3	Sep 04 Sep 06	Analysis methods; systems and control volumes; fluxes Reynolds' transport theorem; conservation of mass	HW2 due
4	3	Sep 11 Sep 13	Conservation of momentum	HW3 due
5	3	Sep 18 Sep 20	Bernoulli's equation Conservation of energy	HW4 due
6	4	Sep 25 Sep 27	Differential analysis of fluid motion	
7	4	Oct 02 Oct 04	Stream function, vorticity, irrotationality, velocity potential Midterm 1 (in classroom)	HW5 due
8	5	Oct 09 Oct 11	Dimensional analysis and similarity & Project kick-off meeting	
9	6	Oct 16 Oct 18	Duct flow & Project discussion on methodology	PR1 due
10	7	Oct 23 Oct 25	Boundary layers	HW6 due
11	7 8	Oct 30 Nov 01	Flow past immersed bodies Potential flow	PR2 due HW7 due
12	9	Nov 06 Nov 08 Nov 09	Midterm 2 (in classroom) Introduction to compressible flow of perfect gases Rocket Day (6:30-9:00am)	
13	9	Nov 13 Nov 15	Isentropic steady flow; smoothly varying cross-section Normal shock waves	HW8 due
14	9	Nov 20	Nozzle flow	
15	9	Nov 27 Nov 29	Oblique shocks Prandtl-Meyer expansions	Final PR due HW9 due
16		Dec 11	Final exam (11 am – 1 pm)	

Academic Dishonesty Sanction Guidelines

Violation	USC – Recommended sanction	AME – Recommended sanction
Copying answers from other students on any course work **	F for course	First offense: F on assignment Second offense: F for course
One person allowing another to cheat from his/her exam or assignment	F for course for both persons	If assignment: First offense: F on assignment Second offense: F for course If exam: F for course
Possessing or using material during exam (crib sheets, notes, books, etc.) which is not expressly permitted by the instructor.	F for course.	First offense: F on exam. Second offense: F for course.
Continuing to write after exam has ended.	F for course.	F on exam
Taking exam from room and later claiming that the instructor lost it.	F for course and recommendation for further disciplinary action (possible suspension).	F for course
Changing answers after exam has been returned.	F for course and recommendation for further disciplinary action (possible suspension).	F for course
Fraudulent possession of exam prior to administration.	F for course and recommendation for suspension.	F for course
Obtaining a copy of an exam or answer key prior to administration.	Suspension or expulsion from the university; F for course.	F for course
Having someone else complete course work for oneself.	Suspension or expulsion from the university for both students; F for course.	F for course
Plagiarism — Submitting other's work as one's own or giving an improper citation.	F for course.	First offense: F on assignment. Second offense: F for course.
Submission of purchased term papers or papers done by others.	F for course and recommendation for further disciplinary action (possible suspension).	F for course
Submission of the same assignment to more than one instructor, where no previous approval has been given.	F for both courses.	F for both courses
Unauthorized collaboration on an assignment.	F for the course for both students.	First offense: F on assignment. Second offense: F for course.
Falsification of information in admission applications (including supporting documentation).	Revocation of university admission without opportunity to reapply.	Revocation of university admission without opportunity to reapply.
Documentary falsification (e.g., petitions and supporting materials; medical documentation.)	Suspension or expulsion from the university; F for course when related to a specific course.	Suspension or expulsion from the university; F for course when related to a specific course.
Plagiarism in a graduate thesis or dissertation.	Expulsion from the university when discovered prior to graduation; revocation of degree when discovered subsequent to graduation.***	Expulsion from the university when discovered prior to graduation; revocation of degree when discovered subsequent to graduation.***

*Assuming first offense; **Exam, quiz, tests, assignments or other course work; ***Applies to graduate students

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, “Behavior Violating University Standards” <https://policy.usc.edu/scampus-part-b/>. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Support Systems:

Student Counseling Services (SCS) - (213) 740-7711 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. <https://engemannshc.usc.edu/counseling/>

National Suicide Prevention Lifeline - 1-800-273-8255

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. <http://www.suicidepreventionlifeline.org>

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-4900 - 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. <https://engemannshc.usc.edu/rsvp/>

Sexual Assault Resource Center

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: <http://sarc.usc.edu/>

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086

Works with faculty, staff, visitors, applicants, and students around issues of protected class. <https://equity.usc.edu/>

Bias Assessment Response and Support

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. <https://studentaffairs.usc.edu/bias-assessment-response-support/>

The Office of Disability Services and Programs

Provides certification for students with disabilities and helps arrange relevant accommodations.

<http://dsp.usc.edu>

Student Support and Advocacy – (213) 821-4710

Assists students and families in resolving complex issues adversely affecting their success as a student

EX: personal, financial, and academic. <https://studentaffairs.usc.edu/ssa/>

Diversity at USC

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. <https://diversity.usc.edu/>

USC Emergency Information

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible, <http://emergency.usc.edu>

USC Department of Public Safety – 213-740-4321 (UPC) and 323-442-1000 (HSC) for 24-hour emergency assistance or to report a crime.

Provides overall safety to USC community. <http://dps.usc.edu>