Course Information
Class Days/Time: MWF 10:00 – 10:50
Classroom: KL 206
Pre-Requisites: EGR 202: Engineering Thermodynamics
Co-Requisites: MTH 219: Applied Differential Equations
Instructor: Markus P. Rumpfkeil
Office Location: KL 361 F
Email Address: Markus.Rumpfkeil@udayton.edu
Office Hours: Any time I am in my office

Course Web Page
All course materials such as the syllabus, major assignments, and handouts can be found on the course web site located at http://academic.udayton.edu/MarkusRumpfkeil/MEE308.html

Course Description
An introductory course in fluid mechanics. Fundamental concepts including continuity, momentum, and energy relations. Control volume analysis and differential formulations. Internal and external flows in laminar and turbulent regimes. 3 semester hours.

Course Topics
1. Introduction, Mathematical and Physical Preliminaries
2. Fluid Statics
3. Conservation of Mass and Newton’s 2\textsuperscript{nd} Law applied to Finite and Differential Control Volumes
4. Some Exact Solutions of the Navier-Stokes Equations and Bernoulli’s Equation
5. Dimensional Analysis and Similitude
6. Pipe Flow Problems
7. Laminar and Turbulent Boundary Layers

Textbook/s
Recommended Text: Introduction to Fluid Mechanics, R.W. Fox and A.T. McDonald
Viscous Fluid Flow, F.M. White
Incompressible Flow, R.L. Panton
Fundamental Mechanics of Fluids, I.G. Currie

Overall Course Goals or Student Learning Objectives
- Introduce concepts, principles, laws, observations, and models of fluids at rest and in motion
- Provide basis for understanding fluid behavior, engineering design and control of fluid systems
- Develop competence with mass, momentum, and energy balances for determining resultant interactions of flows in engineered and natural systems
- Develop basis for correlating experimental data, designing tests, and using scale models of fluid flows
- Learn methods for computing head losses (major, minor) and flows in simple pipes
- Learn about nature of rotation, resistance (viscous, turbulent), boundary layers (laminar, turbulent), and flow separation
- Apply all these equations to analyze fluid problems by making good assumptions and learn systematic engineering method to solve practical fluid mechanics problems
Course Content Learning Outcomes

Upon successful completion of this course, you will be able to:

- Determine pressures and forces in fluids at rest
- Determine velocity and acceleration of a fluid at a point
- Apply control volumes to solve fluid flow problems through the application of integral conservation laws of mass, momentum, and energy
- Apply the differential conservation equations of mass and momentum to fluid flow problems
- Determine pressure variations in a flowing fluid using Bernoulli’s principle
- Design scale model tests in fluid flows
- Apply basic fluid mechanics principles to the flow of viscous fluids in pipes
- Calculate the thickness of a boundary layer and its skin friction drag

Assignments and Grading Policy

Homework Assignments – 40% of overall mark
Mid-term Exams (two in class) – each 20% of overall mark
Final Project – 20% of overall mark

Assignments are usually due one week after their assignment date. Students can hand them in as groups of up to two students. Assumptions will be stated as required in the solution, and if the assumption is not an obvious one, the motivation for making it will be explained. Steps are to be explained with phrases inserted much like an example problem from any engineering text or an instructor’s in-class example.

Grading Scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>A</th>
<th>A-</th>
<th>B+</th>
<th>B</th>
<th>B-</th>
<th>C+</th>
<th>C</th>
<th>C-</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Score</td>
<td>93%</td>
<td>90%</td>
<td>87%</td>
<td>83%</td>
<td>80%</td>
<td>77%</td>
<td>73%</td>
<td>70%</td>
<td>60%</td>
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</tbody>
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How to do well in this course: Find a study group! Find a study group! Find a study group! (Seriously, this is very important)! Take advantage of office hours! If you have a question, ask it – no matter how silly you think it is. Enjoy the subject and its numerous applications in science and engineering!
Classroom Protocol

All electronic devices including cell phones must be turned off and should not be visible at any time during class unless specifically directed by the instructor.

Notebook computers may be used in class for taking notes and specified in-class activities, not for instant messaging, email or other distractions unless otherwise instructed.

All email messages will be sent to you via your UD Mail (Google) Account, so you should be in the habit of checking that account every day or you should ensure that Google Apps forwards messages to another account of your choice. To verify your email address, visit http://porches.udayton.edu.

In addition, as a student in this class, you are expected to:

- Take ownership and responsibility for the conduct of the class.
- Always treat class members with respect.
- Be considerate and limit materials or actions that others might find distracting, such as conversations, work from other classes, newspapers, video games, etc.
- Be prepared to contribute to group and class discussions in a courteous, substantive, and thoughtful manner.

University Policies

Intellectual Property Statement

The materials shared with you during this course are authored and owned by the instructor, the department, the school and/or the book publisher. Copyright laws must be respected in using these materials. For example, unless authorized to do so, do not share course materials with anyone outside the course.

Academic Honesty

I encourage you to talk with each other about the readings and ideas brought up in class. But in all assignments to be graded as individual work you are expected to do your own written work. In the case of group work, all members of a group will be held responsible for the content of work turned in to satisfy group assignments. The instructor will keep a healthy eye out for possible plagiarism when reading your work. Here is some advice to help you avoid plagiarizing:

It is best to express the ideas you use in your own words. In the case of both individual and group work, words or ideas that come from someplace or someone else must be cited: “A good rule of thumb is this: Whenever you consciously borrow any important element from someone else, any sentence, any colorful phrase or original term, any plan or idea - say so, either in a footnote, bibliography, or parenthesis” (from “Academic Honesty in the Writing of Essays and Other Papers,” Carleton College, 1990). For specific university policies concerning academic honesty, see the in the Academic Catalog University’s Academic Honor Code.

http://catalog.udayton.edu/undergraduate/generalinformation/academicinformation/theacademichonorcode/

Dropping the Course

You are responsible for understanding the university’s policies and procedures regarding withdrawing from courses. You should also be aware of the current deadlines and penalties for dropping classes. Information on withdrawal from courses is available in the Academic Catalog under Grades and Scholarship. You may also want to speak with your academic advisor or the Deans Office from your college or school.

http://catalog.udayton.edu/undergraduate/generalinformation/academicinformation/gradesandscholarship/
Student Evaluation of Teaching

The university will ask for your anonymous feedback regarding instruction in this course through the online Student Evaluation of Teaching (SET) as your candid, respectful opinions and constructive suggestions have an impact on the quality of teaching at UD. Instructions for how to complete SET will be sent to your UD email account toward the end of the semester, and I may give you additional instructions (for example, whether you will complete SET in the classroom). If you encounter technical problems accessing SET, contact the UDit Help Desk at 937-229-3888 or email HelpDesk@udayton.edu. To learn more about SET, visit go.udayton.edu/set

University Services

It is the University’s goal that learning experiences be as accessible as possible. Your learning in this course is important to me, and I want you to be aware of existing supports on campus which are available to all university students.

Support for Your Learning in This Course

The Ryan C. Harris Learning Teaching Center's Office of Learning Resources (OLR) is a learning resource for students, parents, faculty, and staff at the University of Dayton. OLR offers a wide variety of information and services to help everyone become a successful learner. Peruse the website, attend one of our offerings, or contact our office and meet with a staff member -- however you look at it, OLR is Your Partner in Learning!

Please contact OLR at 937-229-2066 (TTY 937-229-2059 for deaf/hard of hearing) or visit the office on the ground floor of Roesch Library (LTC 023) if you would like to talk about how you could become a more effective learner. You can also check out the website: go.udayton.edu/learning.

Students with Disabilities

If you anticipate or experience physical or academic barriers based on disability, please let me know immediately so that we can discuss options. You are also welcome to contact the LTC's Office of Learning Resources (OLR) to discuss reasonable accommodations. Please contact OLR at 937-229-2066 (TTY 937-229-2059 for deaf/hard of hearing), by email at disabilityservices@udayton.edu or stop by OLR in the LTC, room 023 Roesch Library. If you have an Accommodation Letter provided by OLR, please contact me to discuss.

If you need assistance accessing print material including textbooks and electronic material such as PDF documents, please review the OLR website information about alternative formats under Disability Resources. (go.udayton.edu/disability --> Alternative Formats)

Free writing and research support available in the knowledge hub

The Write Place and Roesch Library's reference services have united in a newly renovated space called the Knowledge Hub on the first floor of Roesch Library. In the Knowledge Hub, all UD students can receive free research and writing assistance on any assignment, at any stage of the writing process. No appointments are necessary (though you're welcome to make one; call 937-229-4270).

Drop-in hours are 10 a.m. to 8 p.m. Monday through Thursday; 10 a.m. to 2 p.m. Friday; and 4 to 8 p.m. Sundays. Research and writing support services for the Fall 2014 term begin Monday, Sept. 8. For more information, visit the first floor of Roesch Library. For details about services provided by either Write Place or Roesch Library, see the Knowledge Hub.

http://www.udayton.edu/libraries/borrowing_hours_and_services/knowledge_hub.php