SYLLABUS
MAE331 – Fluid Mechanics (CRN: 10831)
Term: Spring 2015

Meeting time & Room:	**MWF 12:00 - 12:50 pm, 205 MRB**
Instructor office, phone and email:	**Dr. Wade Huebsch,** Office ESB 331 Ph. (304) 293-3146, e-mail: wade.huebsch@mail.wvu.edu
Office Hours:	TBA
TA & Office Hours:	TBA
Textbook:	Fundamentals of Fluid Mechanics (Custom Book), 7th edition, John Wiley & Sons, Inc.,
Author/ISBN:	Munson, Okiishi, Huebsch, and Rothmayer, ISBN 9781118608722 (this ISBN also contains the WileyPLUS registration code)
Prerequisites:	MAE-241 Statics and MATH-251 Multivariable Calculus (Co-Requisite).
Supplies/Other:	Access to the Internet on a PC or laptop.

Course Objectives

This is a first course in fluid mechanics, typically taken by students from various engineering departments. The objective is to develop a knowledge of fluid mechanics. The course will include the following topics of discussion: fluid statics, the Bernoulli equation, mass, momentum, energy conservation, dimensional analysis, similitude, internal and external flows, laminar and turbulent boundary layer flows.

Course Learning Objectives: Students will be able to develop and demonstrate	**ABET Outcomes***
1. Develop a logical approach to solving engineering problems in fluid statics and fluid dynamics.	A
2. Be able to detect the types of problems that can be solved in a simple analytic process.	A
3. Apply knowledge from mathematics, physics, and statics to solve fluid flow problems.	A
4. Learn to apply assumptions and simplifications in the solution to various fluid problems.	A
5. Understand that the study of fluids and their motion is an enormous field and there are still fluid flow phenomena that are not well understood; fluid mechanics continues to be an active area of research and innovation.	J
6. Gain an appreciation that we are surrounded by fluid mechanics in every-day life.	

This course effectively supports more ABET Outcomes than those shown in this table, but will provide evidence to support the assessment of ABET outcomes A and J.

Outcome A: *"Graduates will have an ability to apply knowledge of mathematics, science and engineering."*
Outcome J: *"Graduates will have knowledge of contemporary issues."*

TOPICS FOR THE COURSE:

I	**INTRODUCTION TO FLUID MECHANICS** Fluid characteristics, dimensions and systems of units. Measures of fluid mass and weight. Ideal gas law. Viscosity, vapor pressure and surface tension.	3 hr.
II	**FLUID STATICS** Pressure variation in a fluid at rest. Pressure measurement. Manometry. Hydrostatic force on plane and curved surfaces. Buoyancy, flotation, stability.	5 hr.
III	**ELEMENTARY FLUID DYNAMICS – THE BERNOULLI EQUATION** Newton's Second Law. F=ma along and normal to a streamline. Static, Stagnation, Dynamic, and Total Pressure. Bernoulli equation.	3 hr.
IV	**FLUID KINEMATICS** Velocity field. Acceleration field. Reynolds Transport theorem.	2 hr.
V	**FINITE CONTROL VOLUME ANALYSIS** Conservation of Mass—The Continuity Equation. The Linear Momentum and Moment-of-Momentum Equations. The Energy Equation. Comparison of the Energy Equation with the Bernoulli Equation.	7 hr.
VI	**DIFFERENTIAL ANALYSIS OF FLUID FLOW** Fluid element kinematics. Differential form of the Conservation of Mass. Differential form of the Conservation of Linear Momentum.	3 hr.
VII	**DIMENSIONAL ANALYSIS, SIMILITUDE AND MODELING** Dimensional Analysis. Buckingham Pi Theorem. Common Dimensionless Groups in Fluid Mechanics. Correlation of Experimental Data. Modeling and Similitude.	5 hr.
VIII	**VISCOUS FLOW IN PIPES** Fully developed laminar flow. Fully developed turbulent flow. Pipe flowrate measurement.	7 hr.
IX	**FLOW OVER IMERSED BODIES** Boundary layer. Drag. Lift.	6 hr.

CLASS ATTENDANCE POLICY

Class attendance is mandatory (attendance will be randomly taken). The subject matter is challenging and can be difficult to understand without attending class.
It is essential to keep up with the homework assignments. If you are having difficulty, I will be available to help you in any way I can.
Students are responsible for missed work and for assignments given during absences. For anticipated special circumstances student must seek instructor's approval.

CLASS RULES

1. Professional attitude in class is expected from all students.
2. No cell phone use allowed in class (off or vibrate). Disruptive behavior in class will not be allowed (that includes reading newspaper, falling asleep, using music players and talking). If you violate this rule you will be asked to leave. Simple as that.
3. Late assignments will be penalized 10% per day.
4. All assignment problems must be presented on individual pages on plain white paper or engineering pad paper (each page must have DATE and NAME). Completeness, neatness and legibility in assignments, exams and projects are mandatory. Sloppiness will be penalized at instructor's discretion.

TEACHING PHILOSOPHY

1. As the instructor, I will do everything possible to help you learn and understand the material, but you must do your part. The student is ultimately responsible for actually learning the material.
2. In my course, a grade of "C" means that you have gained an average knowledge of the topic material and have a grasp of only the basic concepts. It is not a trivial matter to obtain an "A" in my course, but by the same token, it is also difficult to get an "F".
3. If you have a question on material, the textbook, homework, how I graded, and life in general, come and see me. I am always open to answering your questions or meeting with you to discuss your questions and concerns.

GRADING	**WEIGHT**
Homework/Project	10%
3-4 Quizzes	10%
Exam #1	25%
Exam #2	25%
Final Exam	30%

** Peer evaluation will be factored in the individual grade for project*

GRADING SCHEDULE

Grade is assigned based on **performance, NOT on "effort"**.

90 - 100	A
80 - 89	B
70 - 79	C
60 - 69	D
0 - 59	F

NOTE: a final course score of 59.4% and below is a letter grade of "F", whether you are graduating or not, have a job lined up or not. No exceptions.

HOMEWORK

Homework must be done on time in order to be successful in this class. Assignments must be submitted IN CLASS at the time they are due. Late assignments will be penalized 10% per day.

Late assignments will not be accepted after solutions are discussed in class or after one week past due. Homework must be submitted on standard size paper, preferably engineering paper. Do not tear sheets out of a spiral notebook and do homework on them.

EXAMS

Two tests and a final exam will be given. All exams are closed book and closed notes. Formula sheets will be provided. Tests will cover the assigned material and will be similar to homework problems assigned in class. If an exam is missed without prior knowledge, a grade of zero will be given. Make-up exams only apply in the cases of illness or emergencies.

TERM PROJECT

This project is focused on addressing the ABET outcome that graduates will have knowledge of contemporary issues. Details will be provided at a later date.

IMPORTANT DATES

January 12, 2015	First Day of Classes
January 16, 2015	Last day to add/drop courses
January 19, 2015	Martin Luther King Day (recess
February 13, 2015	**Exam 1 (Friday)**
February 27, 2015	Mid Semester
March 18, 2015	**Exam 2 (Wednesday)**
March 20, 2015	Last day to drop a class
March 21-29, 2015	Spring Recess
April 3, 2015	Friday before Easter (recess)
April 30, 2015	Last Day to withdraw from the University
May 1, 2015	Last day of class
May 4-9, 2015	Final Examination Week
May 4, 1015	**Final Exam 3:00 to 5:00 pm (Monday)**
May 15, 2015	Commencement

STATEMENT ON ACADEMIC INTEGRITY

The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the Student Conduct Code at http://www.arc.wvu.edu/rightsc.html. Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see me before the assignment is due to discuss the matter.

INCLUSIVITY STATEMENT

The West Virginia University community is committed to creating and fostering a positive learning and working environment based on open communication, mutual respect, and inclusion.

If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with the Office of Accessibility Services (293-6700). For more information on West Virginia University's Diversity, Equity, and Inclusion initiatives, please see http://diversity.wvu.edu