TUSKEGEE UNIVERSITY
COLLEGE OF ENGINEERING, ARCHITECTURE AND PHYSICAL SCIENCES
MECHANICAL ENGINEERING DEPARTMENT

Spring/2011

Course: MENG 0313, Section 01, Fluid Mechanics
3 Credit Hours, MWF 10 –11 AM, Room LHFH 402

Prerequisite: MATH 0209 (Ana.Geom & Calc. III) and MENG 0212 (Dynamics)

Instructor: Dr. Tao Xing
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Office Hours: MWF 3 – 5 PM. Other times are available by appointment only.

Course Description: To understand the properties and behavior of fluids and the basic principles of fluid mechanics applied to fluids at rest and in motion and to be able to apply these principles to solve simple engineering problems, and also learn about dimensional analysis, modeling and similitude.

Course Materials

Textbook: Fundamentals of Fluid Mechanics, 5th Edition, by B. R. Munson, D. F. Young, and T. H. Okishii, John Wiley & Sons, New York, 2006

Grading:

Homework	10%
Attendance	10%
Tests (3)	50%
Final Exam	30%

Dress Code: Attire is business casual (unless otherwise noted); absolutely no hats

Scale: A = 90-100, B = 80-89, C = 70-79, D = 60-69, E = Below 60

Other Policies:

1. Attendance/class participation is highly encouraged. If you sign in and leave the class early, or if you are late by 30 minutes to the class, you will be considered absent. The student is responsible for his/her own missed lectures/assignments.
2. No late homework will be accepted. It should be turned in by the due date.

3. Test dates are NOT fixed. They can change slightly. No make-up tests/exams will be given except in very exceptional circumstance pre-excused by the instructor. Any unexcused absence from test/exam will lead to a ZERO grade for that homework/test/exam.
4. Cheating during text/exam could lead to an "E" grade in the course.
5. No food or drink will be allowed in the class.
6. No use of cell phones allowed in the class or during tests/exams.

Course Objectives:

Students will:

(1) be familiar with the properties and behavior of liquids and gases, classification of various types of flows, and understand the basic concepts of boundary layer and its importance in fluid mechanics;
(2) be familiar with the hydrostatic equation and its application to engineering problems;
(3) be familiar with the Bernoulli equation and its application to flow measuring devices such as Pitot tube and Venturi meter, and to solve engineering problems;
(4) be familiar with the velocity field, acceleration field, control volume and system representations, and the Reynolds Transport Theorem
(5) understand the four basic principles of fluid mechanics: continuity equation, momentum equation, energy equation and state equations, and their application to engineering problems;
(6) understand dimensional analysis and be able to use non-dimensional parameters in solving fluid flow problems, and do similitude and modeling in fluid mechanics and
(7) be familiar with the laminar and turbulent pipe flows and used Moody chart to compute head loss.

Concepts:

The following concepts are covered within each objective

Objective 1:

Concept 1 ---- Introduction to Fluid Mechanics

Objective 2:

Concept 2 ---- Fluid Statics

Objective 3:

Concept 3 ---- Elementary Fluid Dynamics – The Bernoulli Equation

Objective 4:

Concept 4 --- Fluid Kinematics

Objective 5:

Concept 5 --- Finite Control Volume Analysis
Concept 6 --- Differential Analysis of Fluid Flow

Objective 6:

Concept 7 --- Similitude, Dimensional Analysis, and Modeling

Objective 7:

Concept 8 --- Viscous Flow in Pipes

Course Outcomes:

At the time of graduation, the students will have:

a. an ability to apply knowledge of math, science and engineering
b. an ability to design and conduct experiments, as well as to analyze and interpret data
c. an ability to design a system, component, or process to meet desired needs
d. an ability to function on multi-disciplinary teams
e. an ability to identify, formulate and solve engineering problems
f. an understanding of professional and ethical responsibility
g. an ability to communicate effectively
h. the broad education necessary to understand the impact of engineering solutions in a global and societal context
i. a recognition of the need for, and an ability to engage in life-long learning
j. a knowledge of contemporary issues
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Outcomes	**a**	**b**	**C**	**d**	**e**	**f**	**g**	**H**	**i**	**j**	**k**
Objective 1	x				x						
Objective 2	x				x						
Objective 3	x				x						
Objective 4	x				x						
Objective 5	x				x						
Objective 6	x				x						
Objective 7	x				x						

COURSE OUTLINE

MENG 0313 FLUID MECHANICS

TOPIC	TEXT CHAPTER	SESSIONS
Introduction to Fluid Mechanics	1	1-3
Fluid Statics	2	4-10
Test # 1*		11
Elementary Fluid Dynamics - The Bernoulli Equation	3	12-15
Test # 2*		16
Fluid Kinematics	4	17-20
Finite Control Volume Analysis	5	21-27
Test # 3*		28
Differential Analysis of Fluid Flow	6	29-32
Similitude, Dimensional Analysis, and Modeling	**7**	33-36
Viscous Flow in Pipes	8	37-41
Test # 4*		42
Final Exam		To be announced

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*Test dates are tentative