

## SCHOOL OF ENGINEERING

### COURSE SYLLABUS

**COURSE TITLE:** Fluid Mechanics

**TERM:** Spring

**COURSE:** ENGR 3343

**YEAR:** 2014

**SECTION NO.:** 003

**TIME:** MW 5:30 – 6:45 pm

**PLACE:** M 137

**INSTRUCTOR:** Dr. M. A. Karim, P.E.

**OFFICE LOCATION:** M-162B

**OFFICE HOURS:** M W 02:00 - 05:00 pm  
\*Other hours by appointment

**OFFICE PHONE:** (678) 915-3026

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**MY WEBSITE:** <http://educate.spsu.edu/mkarim>

**NUMBER OF CREDIT HOURS:** 3-0-3 (Lecture-Lab-Total)

**PREREQUISITS:** ENGR 2214 (Statics)

**COREQUISITS:** MATH 2306 (Differential Equations)

**COURSE DESCRIPTION:** A study of the fundamentals of fluid statics and dynamics including hydrostatic forces on submerged plates, continuity of fluid flow and fluid flow principles. Applications of turbulent and laminar flow in conduits are emphasized. The systems approach is practiced in analyzing the application of flow measuring devices, piping, pumps and turbines.

**REQUIRED or ELECTIVE:** Required

**REQUIRED TEXT:** **Engineering Fluid Mechanics** by Donald F. Elger, Barbara C. Williams, Clayton T. Crowe, and John A. Roberson, **John Wiley & Sons, Inc.**, Tenth Edition, 2009; ISBN: 978-1-118-16429-7.

**REFERENCE:** **Fundamentals of Fluid Mechanics** by Bruce R. Munson, Donald F. Young, and Theodore H. Okiishi, John Wiley & Sons, Inc., Fifth Edition, 2006; ISBN: 978-0-471-67582-2.

**OTHER MATERIALS:** Handouts may be provided as needed. It is recommended that students take notes in a three ring binder since they may be receiving handouts throughout the semester. **SPSU email** and **Georgia Desire 2 Learn (old Georgia View/Vista)** systems will be used for messages and content delivery, respectively. Students should access these sites regularly.

**COURSE LEARNING OUTCOMES:** Upon successful completion of this course, students shall be able to:

1. Apply Archimedes principle to fluid static problems
2. Determine the stability of objects
3. Solve manometer problems
4. Determine resultant forces on submerged surfaces
5. Solve impulse and momentum problems using conservation principles
6. Apply the general energy equation to fluid flow systems
7. Analyze normal flow using the Manning equation
8. Analyze pumping systems.

**COURSE REQUIREMENTS:**

1. **Attendance:** Students are expected to attend class. Advance notice of an absence should be provided whenever possible. Makeup exams, quizzes, and acceptance of late assignments will be considered only for documented medical reasons, emergency circumstances, or other university sponsored activities. The instructor can initiate withdrawal of a student from the course or fail the student in the course if a student is absent in 3 classes without any valid reason/excuse.
2. **Homework:** All problem assignments must be submitted in the next class following the class in which the topic is discussed. Late homework WILL NOT be accepted. Exceptions may be considered in case of illness, serious emergencies, or other university sponsored activities. However, appropriate evidence must be presented in order to qualify for exceptions. All homework must be submitted on 8½"x11" white paper or on engineering design paper (preferable) with a cover page. Cover page should include student's name, course number and name, assignment number, assignment date, and due date. Show the detail works for full credit. Graded homeworks will be returned to students; however, students need to preserve them until the grades are finalized and show them to the instructor if there is any dispute in grades.
3. **Exams:** All exams are closed books and notes unless advised otherwise. NO make-up exams will be given. Exceptions may be considered in case of illness, serious emergencies, or other university sponsored activities. However, appropriate evidence must be presented in order to qualify for exceptions. Graded exams will be returned to students; however, students need to preserve them until the grades are finalized and show them to the instructor if there are any disputes in grades.
4. **Cheating:** Cheating on assignment and particularly on the examinations will not be tolerated. If you are caught cheating, you will get zero on the exam. You will be asked to move if you are caught looking at another student's work. The instructor reserves the right to remove any student from the class if the student's behavior is of a disruptive nature or if there is an evidence of academic dishonesty.
5. **Term Paper/Presentation:** No term paper/presentation for this course. However, group assignment may be given, as necessary, for any group work.

6. **Class Decorum:** No cell phone use, checking emails, eating, and/or multitasking are allowed during the class. For emergency, cell phone can be operated in vibration mode; however, students can receive an emergency call only stepping out of the class room. No feet on the table and/or on the nearby chair are allowed during the class. It is also encouraged not to bring any foods in the class.
7. **Honor Code:** SPSU has an Honor Code and a procedure for handling cases when academic misconduct is alleged. All students should be aware of them. Information about the Honor Code and the misconduct procedure may be found at <http://www.spsu.edu/honorcode/>.
8. **ADA Provisions:** “Students with disabilities, as defined by the Americans with Disabilities Act (ADA) of 1990, should contact the instructor during the first week of the semester regarding the accommodations necessary to complete the requirements of this course. The instructor, with the help of SPSU, will make reasonable adjustments to take into consideration the specific handicap of each student covered under the ADA. The students can also contact SPSU ADA coordinator at 678-915-7244 for additional help.”

**GRADING POLICY:** All exams, quizzes, and assignments must be completed satisfactorily in order to pass the course. The evaluation process described below is subject to change by the instructor. Changes will be announced in the class.

**Class Work:**

1. Homework	- 10%
2. Quiz	- 20%
3. Midterm 1	- 20%
5. Midterm 2	- 25%
5. Final Exam	- 25%
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<b>TOTAL</b>	<b>- 100%</b>

**Total Grade:**

**Scale, Letter Grade, and GPA**

90%	-	100%	A	4.0 (Excellent)
80%	-	90%	B	3.0 (Good)
70%	-	80%	C	2.0 (Satisfactory)
60%	-	70%	D	1.0 (Passing)
	<	60%	F	0.0 (Failure)
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The following symbols are approved for use in the cases indicated, but will not be included in the determination of the grade point average.

**"I"** This symbol indicates that the student was doing satisfactory work but, for non-academic reasons beyond his control, was unable to meet the full requirements of the course. The requirements for removal of an "I" are left to the respective institutions; however, if an "I" is not satisfactorily removed after three quarters of residence, the symbol "I" will be changed to the grade "F" by the appropriate official. (See Southern Tech policy - Removal of an Incomplete "I", on page 2).

**"W"** This symbol indicates that a student was permitted to withdraw without penalty. Withdrawals without penalty will not be permitted after the mid-point of the total grading period (including final examinations) except in cases of hardship as determined by the appropriate official of the respective institution.

**"V"** This symbol indicates that a student was given permission to audit this course. Students may not transfer from audit to credit status or vice versa.

"K" This symbol indicates that a student was given credit for the course via a credit by examination program approved by the respective institution's faculty (CLEP, AP, Proficiency, etc.)

**SCHEDULE:** Two 75-minute classes or 3-50 minute classes or 1-150 minutes class per week.

**TENTATIVE LECTURE TOPIC/OUTLINE:** The following lecture topic/outline is subject to change by the instructor. Changes will be announced in the class.

Class/Week	Tentative Lecture Topic/Outline	Homework	Chapter
Week 1	Topic 1: Introduction	HW # 1: 1-31, 46, 47, 48, & an extra = 5 problems	Chapter 1 + Handouts
Week 2	Topic 2: Fluid Properties	HW # 2: 2-30, 47, & 52 = 3 problems	Chapter 2 + Handouts
Week 3 – 4	Topic 3: Fluid Statics – Pressure, Manometer, Submerged Surfaces, Buoyancy, and Stability	HW # 3: 3-24, 48, 52, 72, 106, & 120 = 6 problems	Chapter 3 + Handouts
Week 4	Midterm 1 Exam	---	---
Week 5	Topic 4: Fluid Dynamics – Fluid Kinematics and The Bernoulli Equation	HW # 4: 4-51, 55, 86, & an extra problem = 4 problems	Chapter 4 + Handouts
Week 6	Topic 5: Control Volume Approach – Reynolds Transport Theorem and Continuity Equation	HW # 5: 5-21, 64, 65, 72, & 87 = 5 problems.	Chapter 5 + Handouts
Week 7	Topic 6: Momentum Equation	HW # 6: 6-10, 13, 46, 67, & 71 = 5 problems	Chapter 6 + Handouts
Week 8	Topic 7: Conservation of Energy and Energy Equation	HW # 7: 7-27, 32, 40, 63, 66, & 70 = 6 problems	Chapter 7 + Handouts
Week 9	Spring Break (March 3 – 7, 2014) – No Class	---	---
Week 10	Topic 7: Continue + Topic 8: Dimensional Analysis and Similitude	HW # 8: 8-4, 17, & 48 = 3 problems	Chapter 8 + Handouts
Week 10	Midterm 2 Exam	---	---
Week 11	Topic 9: Drag and Lift	HW # 9: 11-21, 33, & 37 = 3 problems	Chapter 11 + Handouts
Week 12 - 13	Topic 10: Open Channel Flow	HW # 10: 15-7, 12, 28, 53, & 56 = 5 problems	Chapter 15 + Handouts
Week 14 - 15	Topic 11: Pump and Turbine	HW # 11: 14-16, 19, 29, 37, & 40 = 5 problems	Chapter 14 + Handouts

<b>Class/Week</b>	<b>Tentative Lecture Topic/Outline</b>	<b>Homework</b>	<b>Chapter</b>
<b>Week 16</b>	<b>Topic 12: Compressible Flow</b>	<b>HW # 12:</b> 12-14, 20, 21, 39, & 42 = <b>5 problems</b>	Chapter 12 + Handouts
<b>Week 17</b>	<b>Final Exam – Comprehensive (Common to all Sections)</b>		