Stephen F. Austin State University
ABET SYLLABUS
EGR 475.001 – Special Problems: Fluid Mechanics (Selected Elective)

**Course Description:**
Experimental and theoretical independent study in research. Not available for graduate credit. Prerequisite: 12 semester hours of engineering or physics. 3 credit hours.

**Prerequisites:** EGR 321 or PHY 321 - Dynamics  
**Co-Requisites:** None

**Instructor:** Christopher J. Aul


**Supplemental Materials:** None

**Topics Covered:**

**Course Learning Outcomes**
By the end of the course, a successful student will be able to:
1. Understand basics of hydrostatics to determine pressure at depth. (SO-e)
2. Calculate fluid flow analysis in both Eulerian and Lagrangian methods. (SO-a)
3. Analyze engineering problems using Reynolds Transport Theorem. (SO-e)
4. Solve conservation of mass problems using the continuity equation. (SO-e)
5. Analyze energy systems using Bernoulli Equation for various elements including pumps and turbines. (SO-c)
6. Calculate fluid momentum as it pertains to bodies at rest and in motion. (SO-a)
7. Understand how to apply control volumes to real-world engineering problems. (SO-c)
8. Calculate fluid flow using differential analysis. (SO-a)
9. Determine geometric relationships for similitude in fluid mechanics. (SO-k)
10. Apply methods of analysis for viscous flow in enclosed surfaces in pipes. (SO-e)
11. Determine conditions for rough pipe flow with a Moody diagram. (SO-k)
12. Calculate viscous fluid flow over external surfaces with boundary layers. (SO-e)
13. Analyze a contemporary subject in fluid mechanics and report on how methods described in class can be applied directly. (SO-j)

**Student Outcomes**
Graduates of the program will:
(a) an ability to apply knowledge of mathematics, 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 within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability
(d) an ability to function on multidisciplinary 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, economic, environmental 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
Course Outline
Engineering 475.001 – Fall, 2018
Fluid Mechanics
Department of Physics and Astronomy, Stephen F. Austin State University

Instructor: Christopher J. Aul, PhD
Email: aulcj@sfasu.edu
Office: 322E Miller Science
Phone: 936-468-1512
Office Hours: by appointment
Class Meetings: Informal, instructor’s office
Course Home Page: http://d2l.sfasu.edu

Course Description
The course covers basic concepts of a fluid and the fundamentals and applications of ideal and real fluid flow. Topics include fluid statics, conversation principles, the Bernoulli equation, dimensional analysis and similitude, internal and external viscous flow, fluid flow measurement devices, and others. Prerequisite: EGR 321 or PHY 321 - Dynamics

Text and Materials
Fluid Mechanics
Hibbeler, Pearson, 2nd Edition

Other materials needed in the course:
- Engineering paper that is grid ruled (assignment submission)
- Scientific calculator or better (for exams and homework)
- Ruler, compass, any other drafting tools for control volume sketches

Grading Policy:
There will be four exams in this course. Each exam is worth 25% of the final grade in the course. No other assignments will be collected for credit.
Letter grades are based on the following ranges:
A: 90.0 – 100, B: 80.0 - 89.9, C: 70.0 - 79.9, D: 60.0 - 69.9, F: 0 - 59.9.

Attendance Policy
Attendance to exams is mandatory. There will be four exams covering a specific set of text and homework material that student will be responsible for learning. The tentative dates of these exams are listed in the course outline shown in this document. Students will have one week after each exam to review the exams and discuss the grades (except for Exam 4). No make-up exams will be given except in the case of an excused absence. An official written notice is required for an excused absence within three days of the exam. Any makeup exam must be taken within three days of the missed exam.
**Email Communication**

All official course communication will be made using your SFA email account. You must use your SFA email account for all communications. You will be notified via your SFA email account about grades and attendance. You can look up your SFA email account or setup email forwarding using this link: [http://www.sfasu.edu/mysfa/o365/forwarding-email/](http://www.sfasu.edu/mysfa/o365/forwarding-email/)

It is important to practice good email communications in college courses. Use "EGR345" in the subject of your email messages. Use complete sentences and capitalization when appropriate. The body of your email messages should begin with your instructor's name and end with your name.

**Classroom Policies**

For the benefit of your fellow students and your instructor, you are expected to practice common courtesy with regard to all course interactions. For example:

- Be considerate toward your classmates and instructor and arrive to class on time.
- Do not leave class early and do not rustle papers in preparation to leave before class is dismissed.
- Avoid classroom distractions. Be attentive in class: stay awake, do not read newspapers, etc.
- If you are late to class or must leave early please inform your instructor in advance (enter or leave quietly, don’t walk across the front of the classroom (use the side aisles) and don’t walk in front of the projector).
- Cell phones, pagers and other communication devices must be turned off during class.
- Play well with others. Be kind and respectful to your fellow students and your teachers.

**Academic Integrity (A-9.1)**

Collaboration on examinations, in class assignments, and homework assignments is forbidden except where specifically specified as "Team" activities. For example, homework assignments can be worked on as a team but must be completed separately. In general, one team may not collaborate with another team on "Team" activities. Students violating this policy will be subject to procedures described in the Stephen F. Austin State University Policies and Procedures Manual. Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

**Definition of Academic Dishonesty**

Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one’s own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one’s paper without giving the author due credit.

Please read the complete policy at [http://www.sfasu.edu/policies/academic_integrity.asp](http://www.sfasu.edu/policies/academic_integrity.asp)

**Withheld Grades - Semester Grades Policy (A-54)**

Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

C. Aul  
EGR 345 – Fluid Mechanics  
aulcj@sfasu.edu
Students with Disabilities
To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.

Student Code of Conduct: Policy 10.4
Classroom behavior should not interfere with the instructor’s ability to conduct the class or the ability of other students to learn from the instructional program. Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This policy applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the iCare: Early Alert Program at SFA. Information regarding the iCare program is found at https://www.sfasu.edu/judicial/earlyalert.asp or call the office at 936-468-2703.

General Education Core Curriculum Objectives/Outcomes (EEO)
This course is not included in the general education core curriculum. Therefore, please see the learning outcomes above rather than any Exemplary Educational Objectives (EEOs).

Homework for each chapter, not collected:

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<th>Sections</th>
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<td>10.1-10.3</td>
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Exams 1-3 will be scheduled by the student starting at times between 8am and 3pm (excluding lunch) on the scheduled exam date. Exam 4 will be held during the final exam week conflict time at 1pm. Exams will be 2 hours in length and will be proctored by either faculty or staff of the department. Exams will be closed-book and student will be given access to a Fluid Mechanics Reference Manual during the exam. Paper will be supplied to student for the exam so all that is needed is a calculator and pencil.

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<thead>
<tr>
<th>Exam</th>
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