

Prairie View A&M University
Chemical Engineering Department
CHEG 3023-P02: Unit Operations
Fall 2019 Syllabus

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Office Hours: MWF 2:30 - 4:50 p.m; WF 10 – 10:50 am

COURSE

Meeting Time: MWF 12:00 – 12:50 p.m.

Location: S.R. Collins Eng Tech Bldg 116

Prerequisites: CHEG 2053 with minimum grade of C

Required Text: Fluid Mechanics for Chemical Engineers, 3rd edition, N. de Nevers, McGraw-Hill, 2005, ISBN: 978-0-07-256608-6

References: Unit Operations of Chemical Engineers, 7th Edition, McCabe, Smith and Harriott, McGraw-Hill, 2005, ISBN: 0-07-284823-5

Evaluation: This course will utilize the following instruments to determine student grades and proficiency of the learning outcomes for the course. The course has been designed to ensure that students acquire a solid grounding in ABET Outcomes 2 and 7.

Description: Fluid statics and its applications, fluid flow phenomena, basic equations of flow, incompressible flow in pipes and channels, flow of compressible fluids, flow past immersed objects, transportation and metering of fluids, agitation and mixing of liquids.

Goals: The goal of this course is to prepare the students in the following:

1. Ability to analyze problems in unit operations and provide sufficient conclusions.
2. Ability to develop and perform experiments using fluid flow, pumps, and meters.
3. Ability to provide clear and concise information regarding a chemical engineering unit operations project.
4. Ability to acquire critical information necessary for a chemical engineering unit operations project using appropriate tools and strategies.

GRADING POLICY

Item	Points
Attendance	10
Tests	40
Homework/Project	5
Quiz	20
Final Project/Report/Presentation	25

Grade Scale:	Points
A =	100 - 90
B =	89 - 80
C =	79 - 70
D =	69 - 60
F =	59 or below

A signifies that the student has mastered the subject matter and understands all concepts covered.

B signifies that the student has a good understanding of the subject matter with few exceptions.

C signifies that the student has an adequate understanding of the material and can follow most concepts.

D signifies that the student does not understand important class concepts needed to be successful in future courses.

F signifies that the student has missed significant assignments or does not understand several concepts.

TESTS & TESTING POLICY

- In class exams are closed book with the exception of the final exam which is open book.
- **NO MAKE-UP EXAMS WILL BE GIVEN.** A missed exam due to an excusable absence will not be added into the students Test Average; therefore, only three tests will count for that student. Only the hardcopy edition of the text may be used on open book exams. **NO EXCEPTIONS!**
- No electronic device will be allowed including iPads and eReaders.
- No graphing calculators are allowed for any test or quiz. Students must purchase a small scientific calculator to use on exams. A cell phone cannot be used as a replacement for a graphing calculator on an exam.
- No bathroom breaks are allowed during a test or a quiz. If a student leaves the room during this time, their exam/quiz will be collected and considered finished by the student.
- Any sightings of a cellular phone during an exam or a quiz will automatically result in a grade of zero for that student, and the student will be referred to the department head. Such meetings must take place within a week of the violation.

QUIZZES

- Closed-book quizzes will be given throughout the semester. Quizzes will be based on material covered in class and homework assignments.
- A quiz can be given in class or online using Taskstream or eCourses.

HOMEWORK POLICY & GUIDELINES

- Practice problems have been provided for students on the tentative lecture schedule. These problems are for your independent practice and not for weekly submission.
- Specific homework assignments will be given throughout the semester as the instructor examines the specific need of the class.
- These assignments may be computer based or involve the textbook.
- Students must submit these assignments during a given time frame.
- If a student chooses to disobey the university's honor code and copy the solution manual instead of submitting the student's own independent work, the student will receive a grade of zero on the assignment and will be referred to the department head. Such meetings must take place within a week of the infraction.
- All homework assignments, when requested for submission, must be submitted on engineering paper.
- Staple assignment if it is more than one page.
- Write your name, date, and assignment number on the front page.
- Number your pages! From time-to-time, students staple the pages out of order.
- Homework is due at the beginning of the class period. **Late homework assignments will NOT be accepted!**

CLASS ACTIVITIES AND PARTICIPATION GRADES

- Class activities will often occur each week.
- No late or replacement assignments will be accepted.
- These activities may be computer based or involve the textbook.
- Students must submit these assignments during a given time frame.

BOOK POLICY

- The textbook for this course is **REQUIRED**. Students without textbooks will eventually fail the course; therefore, all students without a hard copy (or special cases) of the textbook will be dropped from the course on the 7th class day based on the policy of the College of Engineering.
- Books can be purchased through the bookstore or online.

FINAL EXAM PROCEDURES

- The comprehensive final exam will have a closed book and open book section.
- All students are required to take the final exam. No exemptions are given.
- It is the student's responsibility to arrive on time for the exam with all of the needed materials.

TENTATIVE LECTURE SCHEDULE

Week	Lecture Topic	No. of lectures	Grading
1	Syllabus; Chapter 1: Definitions and Principles	2 lectures	
2	Chapter 2: Fluid Statics and Its Applications HOLIDAY: 9/2	2 lectures	
3	Chapter 3: Fluid Flow Phenomena	2 lectures	
4	Chapter 3: Fluid Flow Phenomena	2 lectures	
5	Chapter 4: Basic Equations of Fluid Flow	1 lecture	Exam 1 Sept
6	Chapter 4: Basic Equations of Fluid Flow	2 lectures	
7	Chapter 4: Basic Equations of Fluid Flow/ Chapter 5: Incompressible Flow in Pipes and Channels	2 lectures	
8	Chapter 5: Incompressible Flow in Pipes and Channels	2 lectures	
9	Chapter 6: Flow of Compressible Fluids Oct 17 – 19, 2019 – Midterms	1 lecture	Exam 2 Oct
10	Chapter 6: Flow of Compressible Fluids	1 lecture	
11	Chapter 7: Flow Past Immersed Objects	2 lecture	
12	Chapter 8: Transportation and Metering of Fluids	2 lectures	
13	Chapter 8: Transportation and Metering of Fluids Nov 21 – 23, 2019 – Thanksgiving	1 lecture	
14	Chapter 9: Agitation and Mixing of Liquids	1 lecture	Exam 3 Nov
15	Averages and Review for Final Dec 3 – Last Day of Class	1 review	
	Final Exam Period: Dec 4 – 10, 2019		Final Exam

UNIVERSITY RULES AND PROCEDURES

Disability statement (See Student Handbook)

Students with disabilities, including learning disabilities, who wish to request accommodations in class should register with the Services for Students with Disabilities (SSD) early in the semester so that appropriate arrangements may be made. In accordance with federal laws, a student requesting special accommodations must provide documentation of their disability to the SSD coordinator.

Academic misconduct (See Student Handbook)

You are expected to practice academic honesty in every aspect of this course and all other courses. Make sure you are familiar with your Student Handbook, especially the section on academic misconduct. Students who engage in academic misconduct are subject to university disciplinary procedures.

Forms of academic dishonesty

1. Cheating: deception in which a student misrepresents that he/she has mastered information on an academic exercise that he/she has not mastered; giving or receiving aid unauthorized by the instructor on assignments or examinations.
2. Academic misconduct: tampering with grades or taking part in obtaining or distributing any part of a scheduled test.
3. Fabrication: use of invented information or falsified research.
4. Plagiarism: unacknowledged quotation and/or paraphrase of someone else's words, ideas, or data as one's own in work submitted for credit. Failure to identify information or essays from the Internet and submitting them as one's own work also constitutes plagiarism.

Nonacademic misconduct (See Student Handbook)

The university respects the rights of instructors to teach and students to learn. Maintenance of these rights requires campus conditions that do not impede their exercise. Campus behavior that interferes with either (1) the instructor's ability to conduct the class, (2) the inability of other students to profit from the instructional program, or (3) campus behavior that interferes with the rights of others will not be tolerated. An individual engaging in such disruptive behavior may be subject to disciplinary action. Such incidents will be adjudicated by the Dean of Students under nonacademic procedures.

Sexual misconduct (See Student Handbook)

Sexual harassment of students and employers at Prairie View A&M University is unacceptable and will not be tolerated. Any member of the university community violating this policy will be subject to disciplinary action.

Attendance Policy

Prairie View A&M University requires regular class attendance. Excessive absences will result in lowered grades. Excessive absenteeism, whether excused or unexcused, may result in a student's course grade being reduced or in assignment of a grade of "F". Absences are accumulated beginning with the first day of class.

Student Academic Appeals Process

Authority and responsibility for assigning grades to students rests with the faculty. However, in those instances where students believe that miscommunication, errors, or unfairness of any kind may have adversely affected the instructor's assessment of their academic performance, the student has a right to appeal by the procedure listed in the Undergraduate Catalog.

COURSE OUTCOMES

Two major course outcomes will be assessed in this course using a number of performance criteria. The Course outcomes and their performance criteria are detailed below:

Course Outcome 1: This outcome is the same as program outcome 6.

Students will have an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

The two performance criteria used to assess this outcome are:

1. Ability to analyze problems in unit operations and provide sufficient conclusions.

Students are able to:

- (i) Classify unit operation problems as turbulent or laminar, static or dynamic.
- (ii) Draw a system and correctly label the sketch.
- (iii) Discuss the differences between compressible and incompressible flow.
- (iv) Calculate system parameters such as friction, friction factors, dimensionless numbers, pressure, pressure drop, velocity, volumetric flow rate, density, drag, interface height, or work.
- (v) Define a fluid and discuss the different types of fluids.
- (vi) Compare the differences in properties of a gas or a liquid.
- (vii) Discuss the function of pumps, valves, and meters.

2. Ability to develop and perform experiments using fluid flow, pumps, and meters.

Students are able to:

- (i) List known/unknown variables, assumptions, and relevant laws.
- (ii) Derive an applicable equation by reducing continuity equation, mechanical energy equation, etc.
- (iii) Calculate Reynolds number using the correct formula.
- (iv) Utilize Euler, Hagen-Poiseuille, or Bernoulli' equations.
- (v) Calculate friction and friction factors using correct equations.
- (vi) Consider safety and ethical implications.

Course Outcome 2: This outcome is the same as program outcome 7.

Students will have an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

The two performance criteria used to measure this outcome are:

1. Ability to provide clear and concise information regarding a chemical engineering unit operations project.

Given a problem, the student is able to:

- (i) Prepare a written report of based on experimental analysis and literature review.
- (ii) Design a system to meet a desired need.
- (iii) Present results from experiments in a PowerPoint or similar method of presentation.
- (iv) Depict preliminary results in the form of abstracts, memos, and project summaries.
- (v) Understand the basic operation of equipment.
- (vi) Describe the parts to pumps, valves, flanges, etc.
- (vii) Discuss the operation of units in a PowerPoint presentation.

2. Ability to acquire critical information necessary for a chemical engineering unit operations project using appropriate tools and strategies.

Given a problem, the student is able to:

- (i) Perform a literature review through search engine, databases, and library resources.
- (ii) Read table and graphs to determine properties such as friction factor, drag, or Reynold's number and use information in calculations and design.
- (iii) Use journal articles and book to gather information.
- (iv) Conduct interviews from vendors or experts to gain an understanding of a process or cost of equipment.