

Dr. Pulikkathara

**Prairie View A&M University
Chemical Engineering Department
CHEG 3023-P01: Unit Operations
Summer 2019 Syllabus**

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COURSE INFORMATION

Meeting Time: MTWR 12:30-1:50 p.m. Location: Gilchrist Engineering Building 109

Prerequisites: CHEG 2053 with minimum grade of C

Required Text: 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 6 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 | DESCRIPTION | % |
|-----------------------|---|-----|
| HOMEWORK | BOOK PROBLEMS, OTHER WRITTEN ASSIGNMENTS, | 25% |
| QUIZES | EVERY CHAPTER | 10% |
| EXAM 1, EXAM 2, FINAL | BASED ON QUIZZES AND HOMEWORKS | 50% |
| PROJECT | TEAM BASED; INDIVIDUALLY ASSESSED | 15% |

TESTS & TESTING POLICY

- In class exams are closed book. Formulas will be given.
- 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.
- 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 must be submitted on engineering paper.
- Write only on the front of the paper (see example).
- 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.

Dr. Pulikkathara

- 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 be closed book. Any relevant references will be provided.
- 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 : Subject to change.

| Week | Lecture Topic | # of lectures | Grading |
|------|---|---------------|------------------|
| 1 | Syllabus; Chapter 1: Definitions and Principles Chapter 2: Fluid Statics and Its Applications | 4 | HW, Quiz |
| 2 | Chapter 3: Fluid Flow Phenomena | 4 | HW, Quiz |
| 3 | Chapter 4: Basic Equations of Fluid Flow | 3 | Exam I, HW, Quiz |
| 4 | Chapter 4: Basic Equations of Fluid Flow/ Chapter 5: Incompressible Flow in Pipes and Channels | 4 | HW, Quiz |
| 5 | Chapter 6: Flow of Compressible Fluids Chapter 7: Flow Past Immersed Objects | 4 | Exam 2, HW, Quiz |
| 6 | Chapter 8: Transportation and Metering of Fluids | 4 | |
| 7 | Chapter 8: Transportation and Metering of Fluids | | |
| 8 | Chapter 9: Agitation and Mixing of Liquids | | |
| 9 | Chapter 9: Agitation and Mixing of Liquids Project Presentations | | |
| 10 | Averages and Review for Final Final Exam SOS | 4 | |

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. (vii) Use sensors to correctly monitor flow and pressure.

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.
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.

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.

Dr. Pulikkathara

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