Unit Operations (CTEC 2545)

Credit: 5 semester credit hours (4 hours lecture, 4 hours lab)

Prerequisites: PTAC 2438, PTAC 2314

Course Description

Instruction in the principles of chemical engineering and process equipment with emphasis on scale-up from laboratory bench to pilot plant.

Required Textbook and Materials

1. *Simtronics Student Workbook – SPM 700* (Kampus Korner Bookstore only)
2. Equipment (purchased by the student)
   a. fire retardant clothing
   b. hardhat
   c. safety glasses
   d. ear plugs
   e. gloves
   f. shoes with a defined heel (no open toes/sandals)

Course Objectives

Upon completion of this course, the student will be able to:

A. Describe unit operation concepts;

B. Solve elementary chemical mass/energy balance;

C. Use the interpretation of analytical data in the application of distillation and fluid flow principles.

Course Outline

A. Introduction
   1. Discuss Introduction of faculty and students
   2. Review Syllabus
   3. Review Class Policies
   4. Review Lab Policies
   5. Operate Computer Equipment
   6. Operate Mechanical Lab Equipment
   7. Follow proper Safety Procedures

B. Simtronics Distillation Software
   1. Complete Lesson requirements
   2. Perform Simulator Tutorials
   3. Demonstrate proper Startup Procedures
   4. Demonstrate proper Shutdown Procedures
   5. Complete “what-if” scenarios in the Work Book

C. Mechanical Lab
   1. Introduction and Performance Objectives of Mechanical Lab
   2. Describe Factors that Affect a Mechanical Lab
   3. Explain Mechanical Lab Operation

4. Describe Mechanical Lab Equipment and Instruments
5. Explain Normal Mechanical Lab Conditions
6. Demonstrate Troubleshooting a Mechanical Lab
7. Perform Team Presentation on Procedures for Mechanical Lab

D. Distillation Table Top
1. Describe Performance Objectives of Distillation Table Top
2. Discuss Factors that Affect Distillation Table Top Operations
3. Perform Distillation Table Top Operation
4. Describe Distillation Table Top Equipment and Instrumentation
5. Describe Normal Distillation Table Top Conditions
6. Describe Troubleshooting Distillation Table Top Procedures
7. Perform Team Presentation on Operating Procedures for Distillation Table Top

E. Propylene Glycol (PG) Unit
1. List Introduction and Performance Objectives of PG Unit
2. Describe PG Unit
3. List Factors that Affect PG Unit
4. Describe PG Unit Operation
5. Describe PG Unit Equipment and Instrumentation
6. List Normal PG Unit Conditions
7. Describe Troubleshooting PG Unit
8. Perform Team Operation of PG Unit

Grade Scale

90 – 100	A
80 – 89	B
70 – 79	C
60 – 69	D
0 – 59	F

Course Evaluation

Final grades will be calculated according to the following criteria:

Homework	10%
Lab	50%
Final	40%

Course Requirements

1. Demonstrate proficiency on all Lab Equipment
2. Work as a Team for Writing Procedures and Presentations of Operating Procedures

Attendance Policy

1. Missing more than 20% of classes will result in an automatic “F” for the course.
2. Absences are counted for unexcused, excused and coming to class late.

3. Missing more than 20% of a class period will count as an absence.

4. Being tardy 2 times equals 1 absence.

Course Policies

1. No food, drinks, or use of tobacco products in class.
2. Beepers, telephones, headphones, and other electronic devices must be turned off while in class.
3. Do not bring children to class.
4. Assignments submitted late will be reduced 50 points each day.
5. If a test is missed due to an emergency situation, the student will have one week to make it up; otherwise a grade of 0 will be assigned. Students are responsible for scheduling the make-up date.
6. No cheating of any kind will be tolerated. Students caught cheating or helping someone to cheat can and will be removed from the class for the semester. Cheating can result in expulsion from LIT.
7. A student who wishes to drop a course is responsible for initiating and completing the drop process. A student who stops coming to class, and fails to drop the course, will earn an "F" in the course.

Student Code of Conduct Statement

It is the responsibility of all registered Lamar Institute of Technology students to access, read, understand and abide by all published policies, regulations, and procedures listed in the LIT Catalog and Student Handbook. The LIT Catalog and Student Handbook may be accessed at www.lit.edu or obtained in print upon request at the Student Services Office.

Disabilities Statement

The Americans with Disabilities Act of 1992 and Section 504 of the Rehabilitation Act of 1973 are federal anti-discrimination statutes that provide comprehensive civil rights for persons with disabilities. Among other things, these statutes require that all students with documented disabilities be guaranteed a learning environment that provides for reasonable accommodations for their disabilities. If you believe you have a disability requiring an accommodation, please contact the Special Populations Coordinator at (409) 880-1737 or visit the office in Student Services, Cecil Beeson Building.

Course Schedule

Week	Topic	Reference
1	Course introduction and policies • Lecture • Lab policies	Handouts
2	• Computer Equipment • Mechanical Lab Equipment • Safety Procedures	Handouts Computer Tutorials

CTEC 2545
Course Syllabus

Week	Topic	Reference
	• Simtronics Software	
3/4	• Simulator Tutorial • Startup Procedures • Shutdown Procedures • Start Completion of Work Book	Computer Tutorials
5/6	• Introduction and Performance Objectives of Mechanical Lab • Mechanical Lab Description • Factors that Affect a Mechanical Lab • Mechanical Lab Operation • PG Piping and Instrumentation Diagrams	Handouts Computer Tutorials
7/8	• Introduction and Performance Objectives of Distillation Table Top • Distillation Table Top Description • Factors that Affect Distillation Table Top • Distillation Table Top Operation • Distillation Table Top Equipment and Instrument Lists • Normal Distillation Table Top Conditions • Troubleshooting Distillation Table Top • Team Presentation on Procedures for Distillation Table Top	Handouts Computer Tutorials
9/10	• Introduction and Performance Objectives of the Propylene Glycol Unit • Propylene Glycol Unit Description • Factors that Affect a Propylene Glycol Unit	Handouts Computer Tutorials
11/12	• Propylene Glycol Unit Operation • Propylene Glycol Unit Equipment and Instrument Lists • Normal a Propylene Glycol Unit Conditions • Troubleshooting a Propylene Glycol Unit	Handouts Computer Tutorials
13/14	• Troubleshooting a Propylene Glycol Unit	Handouts Computer Tutorials
15/16	• Final Review • Final Exam	Handouts Computer Tutorials