

# Process Technology I - Equipment (PTAC 1410) Summer Hybrid 2023



**Credit:** 4 semester credit hours (3 hours lectures, 3 hours lab)

**Prerequisite:** None.

## Course Design

All lecture materials are available through Blackboard and are to be covered by the student on their own time. Labs will be Monday through Thursday 5:30 PM to 7:30 PM on campus in T2 108. This is a

Summer I hybrid class that begins Thursday June 1 and ends Wednesday July 5.

## Course Description

Instruction to the use of common processing equipment.

## Required Textbooks and Materials

1. *Process Technology Equipment, CAPT*
  - a. ISBN number: 978-0137004126
  - b. Simtronics Student Workbook (Kampus Korner Bookstore only)
2. Equipment (To be purchased by the student)
  - a. hardhat
  - b. safety glasses
  - c. shoes (no open toes/sandals)

## Course Objectives

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

1. Define and use terminology.
2. Identify and describe components, basic functions and scientific principles associated with process equipment.

## Course Outline

1. Chapter 1...Introduction to Process Equipment
  - a. Key Terms
  - b. Process Tech Roles
  - c. Equipment
  - d. Safety & Environmental Hazards
2. Chapter 2...Process Drawings & Equipment Standards
  - a. Key Terms
3. Chapter 3...Piping, Tubing, Hoses, Fittings
  - a. Key Terms
  - b. Common drawings and uses
  - c. Common info on drawings
  - d. Symbols
  - e. Equipment standards

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- b. Piping, tubing, hoses & blinds
- c. Connecting methods
- d. Fitting types
- e. Leak testing
- 4. Chapter 4...Valves
  - a. Key Terms
  - b. Valve components
  - c. Types of valves
  - d. Hazards
  - e. Process tech role in operation & maintenance
- 5. Chapter 5...Tanks & Vessels
  - a. Key Terms
  - b. Types of tanks and vessels
  - c. Common components of vessels
  - d. Auxiliary equipment
  - e. Typical procedures
  - f. hazards
- 6. Chapter 6...Pumps
  - a. Key Terms
  - b. Types of pumps
  - c. Dynamic pumps
  - d. Positive displacement pumps
  - e. Operating principles
  - f. Purpose of a pump curve
- 7. Chapter 7...Compressors
  - a. Key Terms
  - b. Types of compressors
  - c. Positive displacement compressors
  - d. Operating principles
  - e. Typical procedures
- 8. Chapter 8...Turbines
  - a. Key Terms
  - b. Common types & Applications
  - c. Operating principles
  - d. Auxiliary equipment
- 9. Chapter 9...Electrical distribution & Motors
  - a. Key Terms
  - b. Types of current
  - c. Electrical transmission
  - d. Purpose of motors
  - e. Types of motors
  - f. Operating principles of electric motors
- 10. Chapter 10...Engines
  - a. Key Terms
  - b. Common types of engines
  - c. Uses of engines in the process industry
  - d. Typical procedures
- 11. Chapter 11...Heat Exchangers
  - a. Heat transfer overview
  - b. Theory of heat exchanger operation
  - c. Types of heat exchangers
  - d. Exchanger applications and services
- 12. Chapter 12...Cooling Towers
  - a. Types of cooling towers
  - b. Components and their purposes
  - c. Applications of cooling towers
  - d. Theory of operation
- 13. Chapter 13...Furnaces
  - a. Common designs
  - b. Furnace draft types
  - c. Furnace sections and components
  - d. Operating principles
- 14. Chapter 14...Boilers
  - a. General components
  - b. Water tube, waste heat and fire tube boilers
  - c. Theory of operation
- 15. Chapter 15...Auxiliary Equipment
  - a. Types of auxiliary equipment
  - b. Typical procedures
- 16. Chapter 16...Tools
  - a. Hand tools

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- b. Power tools
- c. Lifting equipment
- d. Basic tool safety
- 17. Chapter 17...Separation Equipment
  - a. Simple separators
  - b. Distillation
  - c. Extraction
  - d. Absorption and stripping
  - e. Adsorption
  - f. Evaporation
  - g. Crystallization
- 18. Chapter 18...Reactors
  - a. Chemical reactions
  - b. Types of reactions and reactors
  - c. Components of reactors
  - d. Theory of operation
- 19. Chapter 19...Filters and Dryers
  - a. Types of filters
- b. Filter ratings
- c. Types of dryers
- d. Typical procedures
- 20. Chapter 20...Solids Handling Equipment
  - a. Types of equipment
  - b. Typical procedures
- 21. Chapter 21...Environmental Control Equipment
  - a. Types of equipment
  - b. Federal regulations
  - c. Environmental rules and regulations
  - d. Typical procedures
- 22. Chapter 22...Mechanical Power Transmission and Lubrication
  - a. Bearings
  - b. Gears
  - c. Principles of lubrication

**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;

- 1. Unit tests 30%
- 2. Final exam 30%
- 3. Homework/quizzes 20%
- 4. Participation/lab 20%

**Course Requirements**

- 1. Operate exchanger models in mechanical lab
- 2. Line up pumps and exchangers in mechanical lab
- 3. Operate unit in the Mechanical lab
- 4. Draw and label components of the Mechanical lab unit
- 5. Trace the line-up of the Mechanical lab unit
- 6. Complete Simtronics Student Workbook

### **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 10 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.

### **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 online resource:

<http://www.lit.edu/depts/stuserv/special/defaults.aspx>

### **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](http://www.lit.edu) or obtained in print upon request at the Student Services Office.

### Course Schedule

<b>WEEK</b>	<b>TOPIC</b>	<b>REFERENCE</b>
<b>1</b>	Course introduction and policies	Handouts
	Introduction to Process Equipment	Chap. 1
	Process Drawings & Equipment Standards	Chap. 1 & 2
	Piping, Tubing, Hoses and Fittings	
	Valves	Chap. 4
<b>2</b>	Tanks and Vessels	Chap. 5
	TEST 1: Chapters 1-2-3-4-5	
	Pumps	Chap. 6 & 7
	Compressors	
	Turbines	Chap. 8 & 9
	Electrical Distribution and Motors	
	Engines	Chap. 10
	TEST 2: Chapters 6-7-8-9-10	
<b>3</b>	Heat Exchangers	Chap. 11 & 12
	Cooling Towers	
	Furnaces	Chap. 13 & 14
	Boilers	
	Auxiliary Equipment	Chap. 15
	TEST 3: Chapters 11-12-13-14-15	
<b>4</b>	Tools	Chap. 16 & 17
	Separation Equipment	
	Reactors	Chap. 18 & 19
	Filters and Dryers	
	Solids Handling Equipment	Chap. 20 & 21
	Environmental Control Equipment	
	Mechanical Power Transmission and Lubrication	Chap. 22
	TEST 4: Chapters 16-17-18-19-20-21-22	
Review for final exam Chapters 1-22		
	Complete Simtronics Student Workbook	
<b>5</b>	<b>COMPREHENSIVE FINAL EXAM</b>	