

## Process Technology II - Systems (PTAC 2420)



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

**Prerequisite/Co-requisite:** PTAC 1302, 1410/SCIT 1418, PTAC 2438

### Course Description

A study of various process systems including related scientific principles.

### Required Textbooks and Materials

1. *Process Technology Systems* by Michael Speegle
  - a. ISBN number: 1418039993
2. *Simtronics Students Workbook* (Kampus Korner Bookstore only)

### Course Objectives

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

1. Describe the purpose and function of common process systems;
2. Explain and demonstrate the operation of each process system.

### Course Outline

- A. The Systems Concept
- B. Overview of Industrial Water Treatment
  - a. Industrial Problems with water
  - b. Primary water treatment
  - c. Secondary water treatment
  - d. Water softening
  - e. coagulation
- C. Fire water, wastewater and storm water systems
  - a. Fire water system overview
  - b. Fire water system operation
  - c. Safety, health and environment
  - d. Wastewater systems overview
  - e. Sanitary sewer system
  - f. Wastewater system responsibilities
  - g. Storm water system
- D. Potable water, process water and demineralized water systems
  - a. Potable water system overview
  - b. Process water system overview
  - c. Demineralized water system
- E. Cooling Water systems
  - a. Cooling water system overview
  - b. Cooling water system operation
  - c. SHE

- F. Plant air, instrument air and nitrogen systems
  - a. Plant air and instrument air system overview
  - b. Plant air system
  - c. Plant air system operation
  - d. Instrument air system overview
  - e. Instrument air system operation
  - f. Breathing air systems
  - g. S<sup>2</sup>HE
  - h. Plant nitrogen system overview
  - i. Plant nitrogen operating system
- G. Natural gas and fuel gas systems
  - a. Natural gas system overview
  - b. Natural gas system operation
  - c. Fuel gas system overview
  - d. Fuel gas system operation
- H. Steam generation and boiler feed water systems
  - a. Steam generation system overview
  - b. Boiler feed water control system
  - c. Steam generation system operation
  - d. Boiler feed water system
  - e. Boiler feed water system overview
- I. Steam distribution and condensate systems
  - a. Steam distribution system overview
  - b. Steam distribution system operation
  - c. Steam condensate system overview
- J. Electrical power generation and distribution systems
  - a. Electrical power and distribution system overview
  - b. Electrical power and distribution system operation
- K. Relief and flare system
  - a. Relief gas system overview
  - b. Relief gas system operation
  - c. Flare system overview
  - d. Flare system operation
  - e. Thermal oxidizers
- L. Refrigeration systems
  - a. Refrigeration system overview
  - b. Refrigeration system operation
- M. Distillation systems
  - a. Distillation system overview
  - b. Distillation system operation
- N. Combustion systems
  - a. Combustion system overview
  - b. Combustion system operation
- O. Extraction systems
  - a. Extraction system overview

- b. Extraction system operation
- P. Adsorption systems
  - a. Adsorption systems overview
  - b. Adsorption system operation
- Q. Absorption and stripping systems
  - a. Absorption and stripping system overview
  - b. Absorption and stripping system operation
- R. Reactor systems
  - a. Overview
  - b. Operation
- S. Centrifuge systems
  - a. Overview
  - b. Operation
- T. Crystallization systems
  - a. Overview
  - b. Operation
- U. Filtration systems
  - a. Overview
  - b. Operation
- V. Drying systems
  - a. Overview
  - b. Operation
- W. Material storage and blending systems
  - a. Material storage and blending systems overview
  - b. Blending systems
  - c. Material storage and blending systems operation

### **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        | 40% |
| 2. Final exam        | 40% |
| 3. Homework/quizzes  | 5%  |
| 4. Participation/lab | 15% |

### **Course Requirements**

1. Operate cooling tower and heat exchanger models
2. Line up pumps and exchangers in mechanical lab
3. Operate tabletop distillation unit
4. Draw and label components of the outside distillation unit
5. Trace the line-up of the outside distillation 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. 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.
5. 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.
6. 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

WEEK	TOPIC	REFERENCE
1	Course introduction and policies <ul style="list-style-type: none"> <li>• The Systems Concept</li> </ul>	Handouts Chap. 1
2	<ul style="list-style-type: none"> <li>• Overview of Industrial Water Treatment</li> </ul>	Chap. 2
3	<ul style="list-style-type: none"> <li>• Fire Water, Wastewater &amp; Storm Water Systems</li> <li>• Potable Water, Process Water &amp; Demineralized Water Systems</li> </ul>	Chap. 3 & 4
4	<ul style="list-style-type: none"> <li>• Cooling Water Systems</li> </ul>	Chap. 5
5	TEST 1: Chapters 2-3-4-5 <ul style="list-style-type: none"> <li>• Plant Air, Instrument Air and Nitrogen Systems</li> <li>• Natural Gas and Fuel Gas Systems</li> </ul>	Chap. 6 & 7
6	<ul style="list-style-type: none"> <li>• Steam Generation and Boiler Feedwater System</li> <li>• Steam Distribution and Condensate System</li> <li>• Electrical Power Generation and Distribution Systems</li> </ul>	Chap. 8-9-10
7	TEST 2: Chapters 6-7-8-9-10 <ul style="list-style-type: none"> <li>• Relief and Flare System</li> <li>• Refrigeration Systems</li> </ul>	Chap. 11 & 12
8	<ul style="list-style-type: none"> <li>• Distillation Systems</li> </ul>	Chap. 13
9	<ul style="list-style-type: none"> <li>• Combustion Systems</li> <li>• Extraction Systems</li> </ul>	Chap. 14-15
10	<ul style="list-style-type: none"> <li>• Adsorption Systems</li> <li>• Absorption and Stripping Systems</li> </ul>	Chap 16-17
11	<ul style="list-style-type: none"> <li>• Reactor Systems</li> </ul>	Chap. 18
12	TEST 3: Chapters 11-12-13-14-15-16-17-18 Centrifuge Systems Crystallization Systems	Chap. 19-20

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Course Syllabus

WEEK	TOPIC	REFERENCE
13	<ul style="list-style-type: none"><li>• Filtration Systems</li><li>• Drying Systems</li></ul>	Chap. 21-22
14	<ul style="list-style-type: none"><li>• Material Storage and Blending Systems</li></ul> TEST 4: Chapters 19-20-21-22-23	Chap. 23
15	Review for final exam Finish Simtronics Student Workbooks	
16	COMPREHENSIVE FINAL EXAM	