

## Advanced Industrial Process (PTAC 2371 )



**Credit:** 4 semester credit hours (3 hours lecture, 2 hours lab)

**Prerequisite/Co-requisite:** PTAC 2420

### Course Description

The study of the common types of industrial processes. Types of commercial processes will be explored and demonstrated.

### Required Textbook and Materials

1. Petroleum Refining, Fourth Edition, Leffler
  - a. ISBN number is 978-1-59370-158-1
2. Petrochemicals, Third Edition, Burdick and Leffler
  - a. ISBN 0-87814-798-5
3. Calculator

### Course Objectives

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

1. Explain reactions and operations of industrial processes. (SCANS C3.4, C5.5, C10.3, C11.4, C13.5, C15.4, C16.4, C17.3, C19.4, C20.4, F1.4, F2.4, F3.3, F4.4, F5.4, F6.4, F9.4, F12.5)
2. Explain chemical, physical and thermodynamic principles of Industrial processes ( C15.5, C16.4, C17.3, C18.2, C19.2, C20.4, F1.4,F2.4, F3,4, F4.5, F5.4, F6.4, F9.4, F12.5 )
3. Perform calculations of industrial processes including gravities and temperatures. (C15.5, C16.6, C18.4, C19.4, C20.5, F1.4, F2.4, F3.5, F4.5, F8.4, F9.5, F12.4, F13.5, F16.5 )

### SCANS Skills and Competencies

Beginning in the late 1980's, the U.S. Department of Labor Secretary's Commission on Achieving Necessary Skills (SCANS) conducted extensive research and interviews with business owners, union leaders, supervisors, and laborers in a wide variety of work settings to determine what knowledge workers needed in order to perform well on a job. In 1991 the Commission announced its findings in *What Work Requires in Schools*. In its research, the Commission determined that "workplace know-how" consists of two elements: foundation skills and workplace competencies.

### Course Outline

- |  |    |                                    |
|--|----|------------------------------------|
| A. Petroleum Refining                  | 2. | From the Oil patch to the refinery |
| 1. The Evolution of Petroleum Products | 3. | Crude Oil Characteristics          |
| acuum Flashing                         |    |                                    |

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|-----------------------------------|--|
| 4. Distilling                     | 1. Benzene                               |
| 5. Vacuum Flashing                | 2. Toluene and the xylenes               |
| 6. The Chemistry of Petroleum     | 3. Cyclohexane                           |
| 7. Refinery Gas Plants            | 4. Olefin Plants                         |
| 8. Cat Cracking                   | 5. The C4 Hydrocarbon Family             |
| 9. Alkylation                     | 10. Ethylene Oxide and Ethylene Glycol   |
| 10. Catalytic Reforming           | 11. Propylene Oxide and Propylene Glycol |
| 11. Hydrocracking                 | 12. Methanol and Synthesis Gas           |
| 12. Isomerization                 | 14. Other Alcohols                       |
| 13. Residue Reduction             | 15. Higher Alcohols                      |
| 14. Gasoline                      | 16. Surfonics by Batch Operations        |
| 15. Distillate and Residual Fuels |  |
- B. Petrochemicals  
Organic Chemistry

**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:

Classroom	15%
Exams	70%
Final Exam	15%

Late Penalties will be assessed on all work turned in late. 5 points per day

**Course Requirements**

1. Calculate temperature conversions
2. Calculate Specific and API gravities
3. Demonstrate knowledge of Refinery and Chemical plant processes
4. Explain requirements for gasoline, jet fuel and diesel engines

**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 3 times equals 1 absence.

### **Course Policies**

1. No food, drinks, or use of tobacco products in class.
2. No foul or harsh language will be tolerated
3. Turn off all Cell Phones during lectures
4. Headphones may be worn only upon Instructor approval
5. Do not bring children to class.
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 from expulsion from LIT.
7. If you wish to drop a course, the student is responsible for initiating and completing the drop process. If you stop coming to class and fail to drop the course, you will earn an 'F' in the course.
8. BACK-Ups. It is the student's responsibility to make back-up copies of their work. Do not rely on the server to be their 100% of the time. Faculty cannot help you if you lose your work. Remember that in order for your work to be graded, it must be in your account on the server.
9. Internet Usage
  - a. Classroom computers have access to the internet.
  - b. Student usage of the internet will be monitored.
  - c. Proper usage of the internet will be allowed. Used for classroom research or as directed.
  - d. Any unauthorized use of the internet will not be tolerated.
  - e. Improper usage of the internet, such as profanity, pornography, gambling, etc... will result in disciplinary action not limited to expulsion from LIT.

### **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**

<b>Week</b>	<b>Topic</b>	<b>Reference</b>
1	Course introduction and policies Crude Oil characteristics <ul style="list-style-type: none"><li>• Lecture</li></ul>	Chapters 1,2,3
2	Distillation and Vacuum Flashing	Chapter 4,5,6

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	And Chemistry	
	• Lecture	
3/4	Refinery Gas Plants and Catalytic Cracking	Chapter 7,8
	• Lecture	Test-1
5/6	Alkylation and Cat reforming And Hydrocracking	Chapter 9,10,11
7/8	Isomerization, and Residue Reduction Gasoline and Diesel	Chapter 12 ,13 Chapter 14,15
	• Lecture	
9/10	Organic Chemistry and Benzene, Toluene, and Xylene	Test-2 Chapter 1,2,3
11/12	Olefin Plants, Cyclohexane, And C4 Hydrocarbons	Chapters 4,5,6
	• Lecture	Test-3
13	Ethylene oxide, Ethylene glycol, Propylene Oxide, Propylene Glycol Methanol and Ammonia	Chapter 10,11,12
	• Lecture	
14/15/16	Other Alcohols, Higher Alcohols, Surfonics	Chapter 14,15 Handout Test-4 Final Comprehensive

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