18 APR 2018 CC/ 28 MAY 2018 UC

DEPARTMENT OF CHEMICAL ENGINEERING
College of Engineering
University of the Philippines Diliman, Quezon City

COURSE SYLLABUS
ChemE 191 Chemical Process Industries

A. Course Catalogue Description

1. **Course Number:** ChemE 191
2. **Course Title:** Chemical Process Industries
3. **Course Description:** Survey of the different industrial chemical processes; unit operations and processes in chemical industries
4. **Prerequisite:** ChemE 145 Chemical Plant and Process Economics
5. **Semester Offered:** Second Semester
6. **Course Credit:** 2u
7. **Number of Hours:** 6h
8. **Meeting Type:** laboratory
9. **Course Goals:** To introduce students to the different chemical process industries, their current market and economic trends, and the technological advances that drive them

B. Rationale

This course provides an in-depth study of the different local chemical industries, including an overview of related technological advances and analyses on market trends and how these industries contribute to the growth of the country.

C. Course Outline

1. Course Outcomes (CO)

Upon completion of the course, students must be able to:

- **CO 1.** describe chemical plant processes, equipment, quality management systems, plant safety practices, plant organizational structure, packaging and warehousing systems;
- **CO 2.** identify other chemical manufacturing aspects and the practice of the profession from literature reviews; and
- **CO 3.** write an industry profile on the assigned chemical product(s) based on engineering economics, manufacturing processes of the plant, HSE practices- including the corporate social responsibilities of the company- and the industry's current and future research and development.

Course Outcomes and Relationship to Program Learning Objectives

Course Outcomes	Program Learning Objectives*				
	A	B	C	D	E
Describe chemical plant processes, equipment, quality management systems, plant safety practices, plant organizational structure, packaging and warehousing systems	■	■			■
Identify other chemical manufacturing aspects and the practice of the profession from literature reviews	■	■		■	■
Write an industry profile on the assigned chemical product(s) based on engineering economics, manufacturing processes of the plant, HSE practices- including the corporate social responsibilities of the company- and the industry's current and future research and development	■	■		■	■

* **A** Equip students with strong technical education in chemical engineering necessary to succeed in their chosen careers and to become responsive citizens.
B Develop the students' ability to effectively communicate technical information to any audience.
C Train students to function in multidisciplinary teams, manage projects, and take leadership roles in their respective fields.
D Engage students in research, innovation, and life-long learning to identify opportunities, and address issues and challenges in their respective spheres of influence.
E Instill in students a strong commitment to the ethical practice of their profession; to health, safety, and environment; and to service to society.

2. Course Content

Topics	No. of Hours
Business profile 1. Industry profile a. Overview of the industry, its product and processes b. Product history, where and when it all started c. Product description, including product types and classification 2. Market and Economics Profile a. Economic of raw materials b. Production and consumption c. Economics of production d. Market dynamics (segmentation, application, competition) e. Economic growth f. Regional and global market	32
Plant Visit	
Manufacturing process: technical description of the unit processes and operations 1. Raw material analysis 2. Manufacturing process and process flow diagram (including process controls) 3. Equipment design and safety 4. Supply chain process (distribution and logistics)	32

Topics	No. of Hours
Other aspects of the chemical industry 1. Health, safety and environment (HSE) a. Occupational health (if applicable) b. Process safety (including safe handling of chemicals) c. Waste management (including pollution prevention technologies) 2. Research and development: on-going R&D and future innovations a. Product development b. Process development c. Market development	32
Final Paper	
Total number of hours	**96**

3. Course Coverage

Week	CO	TOPIC	ESSENTIAL/ KEY QUESTIONS	Suggested Teaching and Learning Activities	Suggested Assessment Tools
1-6	1	**Business profile** 1. Industry profile a. Overview of the industry, its product and processes b. Product history, where and when it all started c. Product description, including product types and classification 2. Market and Economics Profile a. Economic of raw materials b. Production and consumption c. Economics of production d. Market dynamics (segmentation, application, competition) e. Economic growth f. Regional and global market	What is the current state of the Philippine chemical industry? What are the key factors in the growth and competitiveness of the chemical industry?	lecture, consultation session	progress report, oral presentation, final paper

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Week	CO	TOPIC	ESSENTIAL/ KEY QUESTIONS	Suggested Teaching and Learning Activities	Suggested Assessment Tools
6-11	1,2	**Manufacturing process: technical description of the unit processes and operations** 1. Raw material analysis 2. Manufacturing process and process flow diagram (including process controls) 3. Equipment design and safety 4. Supply chain process (distribution and logistics)	What are the information that must be specified when describing a chemical process?	lecture, consultation session	progress report, oral presentation, final paper
11-16	3	**Other aspects of the chemical industry** 1. Health, safety and environment (HSE) a. Occupational health (if applicable) b. Process safety (including safe handling of chemicals) c. Waste management (including pollution prevention technologies) 2. Research and development: on-going R&D and future innovations a. Product development b. Process development c. Market development	How are product distribution and logistics set up for a particular chemical industry? What are the important HSE considerations for a given chemical industry? What are the latest technology applied in a given chemical process industry?	lecture, consultation session	progress report, oral presentation, final paper

4. Course Requirements

1. Progress reports
2. Final paper
3. Oral presentation

REFERENCES:

Jamlang, J. Y., Marañon, M. T. T., and Rigor, G. J. O. (2016). Ethylene production via oxidative dehydrogenation of ethane on molybdenum-vanadium-tellurium-niobium mixed oxide catalyst (Plant design report). University of the Philippines Diliman.

Park, C. S. (2016). *Contemporary Engineering Economics* 6th Ed. London, UK: Pearson Education Ltd.

Spellman, F. R. (2016). Handbook of Environmental Engineering. Boca Raton, FL: CRC Press.

Wiley Online Library. *Kirk-Othmer Encyclopedia of Chemical Technology*. Accessible online: https://onlinelibrary.wiley.com/doi/book/10.1002/0471238961.

Witcoff, H. A., Reuben, B. G., and Plotkin, J. S. (2013). *Industrial Organic Chemicals* 3rd Ed. NJ: John Wiley and Sons Inc.