

## Syllabus [2025Year 2 Term]

## Course Information

Course Title	Smart Process Design	Credits	3
Course Code	549970-1	Required/Elective (For Undergraduate Courses)	Selective majors
Department or Major	Department of Chemical Engineering	Language	English
Methods of Teaching		Lecture Room	화1,2,3/수4,5,6(3공516)
Time Allotment	Lecture(2) Experiments(0) Trainging & Practice(0) Performance(0) Designing & Planning(1)	Cyber Lectures	
Course Type	offline		
Cyber Lectures Preview			

## Lecturer

Lecturer	Name	Kyungjae Tak	Rank	Assistant Professor	Final Academic Degree	공학박사
	Department & college	Department of Chemical Engineering		Office	College of Engineering – Building 3 214	
	Office Phone Number	—		e-mail	kjtak@dankook.ac.kr	
	Field of Interest					

## Course Summary

Course Description	Students will explore chemical processes used in real-world industries and learn how to design and analyze these processes by integrating the knowledge acquired in chemical engineering. The course covers not only traditional evaluation methods such as economic analysis but also incorporates more recent and increasingly important approaches, including environmental impact assessments and sensitivity analysis under uncertainty. Through team projects, students will investigate current key issues in chemical process industries and design and evaluate processes related to these issues.
Description Related Courses	1. Chemical Engineering Stoichiometry 2. Chemical Engineering Thermodynamics 1 3. Chemical Engineering Thermodynamics 2
Course Goals	1. Understanding the chemical flowcharts from upstream (oil & gas industry) to downstream (refinery and petrochemical industry)

	2. Understanding waste treatment methods and clean processes 3. Understanding the process analysis methods, such as techno-economic evaluation (TEA), life cycle assessment (LCA), and global sensitivity analysis (GSA)
Projected Results	1. Able to understand commercialized chemical processes and explain classical chemical engineering. 2. Able to understand the conceptual design of chemical processes 3. Able to conduct process evaluations from the economic and environment perspective
Percentage of the original language classes(%)	
Cyber Lectures Preview	

## Syllabus

Times	Lecture Topic	Lecture Goals	Lecture Methods	Assignments
1	Introduction to Smart Process Design			
2	Oil & Gas Processes			
3	Oil & Gas Processes			
4	Refinery Processes			
5	Refinery Processes			
6	Petrochemical Processes	Chemical Process Design		
7	Petrochemical Processes			
8	Clean and Separation Processes			
9	Clean and Separation Processes			
10	Chemical Process Design			
11	Analysis of Capital Cost Estimation			
12	Analysis of Operating Cost Estimation			
13	Economic Evaluation			
14	Life Cycle Assessment			
15	Final Exam			

## Methods of Grading

sequence	Description	Percentage	Details
1	Mid-term Exam	0%	
	All	100%	

sequence	Description	Percentage	Details
2	Final-exam	80%	
3	Pop Quizzes	0%	
4	Assignments	10%	
5	Reports	0%	
6	Presentations & Discussions	0%	
7	Attendance	10%	
8		0%	
9	Others	0%	
All		100%	

## Core of Value

핵심가치	전공역량	역량정의	역량구분	값(%)
혁신 (Discovery)	창의적문제해결 (Creative problem-solving)	주어진 상황과 문제를 창의적으로 해결할 수 있는 능력	부역량	0%
혁신 (Discovery)	도전 (Challenging)	전공 지식을 새로운 분야와 융합하고 아우를 수 있는 능력		0%
혁신 (Discovery)	지식융합 (Knowledge convergence)	새로운 분야를 개척하거나 도전적으로 임할 수 있는 능력		0%
헌신 (Dedication)	세계시민 (Universal value)	세계 공동체 구성원으로 전공자로서 국제적 이슈에 대응할 수 있는 능력		0%
헌신 (Dedication)	상호협력 (Cooperation)	공동의 목적 달성을 위해 타인과 상호협력을 할 수 있는 능력		0%
헌신 (Dedication)	공동체 (Sense of community)	공동체의 구성원으로서 필요한 태도와 윤리의식을 가질 수 있는 능력		0%
능동 (self-Determination)	자기주도 (Self-Managing)	주어진 상황과 문제를 주도적이고 능동적으로 해결할 수 있는 능력		0%
능동 (self-Determination)	지식활용 (Knowledge application)	주어진 상황과 문제에 대해 논리적으로 파악하고 분석할 수 있는 능력	주역량	0%
능동 (self-Determination)	논리적사고 (Logical thinking)	전공관련 지식을 필요에 따라 다양하게	부역량	0%

핵심가치	전공역량	역량정의	역량구분	값(%)
		적용하고 활용할 수 있는 능력		
능동 (self-Determination)	의사소통 (Articulation)	대화를 통해 다양한 의견을 조율하고 합의를 이끌어 낼 수 있는 능력		0%

## Textbook(s) &amp; References

Descrip tion	Title	Author	Publisher
Refer ence s	Analysis, Synthesis, and Design of Chemical Processes	Turton, Shaeiwitz, et al.	Pearson
Refer ence s	Product and Process Design Principles	Seider, Lewin, Seader, et al.	Wiley
Refer ence s	Plant Design & Economics for Chemical Engineers	Peters, Timmerhaus, West	McGraw-Hill
Refer ence s	Systematic Methods of Chemical Process Design	Biegler, Grossmann, Westerberg	Pearson

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