Syllabus [2025Year 1 Term]

Course Information

Course Title	Biochemical Engineering	Credits	3
Course Code	355670-1	Required/Elective (For Undergraduate Courses)	Selective majors
Department or Major	Department of Chemical Engineering	Language	English
Methods of Teaching		Lecture Room	화9,10,11/목12,13,14(3공515)
Time Allotment	Lecture(2) Experiments(0) Trainging & Practice(0) Performance(0) Designing & Planning(1)	Cyber Lectures	
Course Type	offline		

Lecturer

Lecturer	Name	Lee Woo Kul	Rank	Professor	Final Academic Degree	공학박사
	Department & college	Department of Chemical Engineering		Office	College of Engineering - Building 3 213	
	Office Phone Number	031-8005-3540		e-mail	leewo@dankook.ac.kr	
	Field of Interest					

Course Summary

Course Description	- In this class, students are required to perform design assignment. At the same time, students are required to present the results of their design. Students have to submit their design report. - Biochemical engineering is a subject deals with biological mechanism and phenomena that can be utilized in engineering fields for the improvement of life quality of human beings. The primary objectives of this class are as follow: 1) Students improve their understanding on fundamental principles of bioengineering 2) Students learn about enzyme reaction kinetics, cell cultures, operations of various types of bioreactors for the production of precious bioproducts such as vaccines and enzymes. 3) Students develop their ability to design bioreactors under various conditions. - Lecture materials and questions related to this class can be discussed through E-learning campus website.

Description Related Courses	- Life Science Fundamentals This class introduces fundamental inforation and knowledge on life engineering.
Course Goals	1. Active talents (with logical reasoning abilities) Can conduct analysis based on fundamental knowledge 2. Innovative talents (with knowledge integration capabilities) Can generate solutions based on analysis results 3. Dedicated talents (with collaborative skills) Can comprehend assigned tasks as team members and derive outcomes
Projected Results	1. Raising the ability to solve design problems using fundamental knowledge 2. Improving the ability to design systems while considering practical constraints 3. Enhancing the ability to contribute to achieving results in tasks assigned to the team as a team member. 4. Cultivating the ability to effectively communicate with team members for task execution as a member of the team.
Percentage of the original language classes(%)	100% (Lecture will be given in English only)

Syllabus

Times	Lecture Topic	Lecture Goals	Lecture Methods	Assignments
1	- Introduction to the lecture - What is bioprocess engineers?	- Course guideline - Introduction to term prolect - Can explain the bioprocess engineer's role	강의,	Syllabus/Textbook
2	- Basics of biology: Engineer's perspectives	Can explain the history on the technical development of biological catalysts	강의,	
3	- Nature of enzyme - Enzyme kinetics	Can characterize the nature and reaction kinetics of enzymes / Can determine and intererete the enzyme kinetics and parameters	강의,	HW #1
4	- Inhibited enzyme kinetics	Can explain the Inhibitory enzymatic reactions	강의,	
5	- Effects of pH and temperature on enzyme kinetics	Can determine the effects of solution pH and T on enzyme kinetics	강의,	
6	- Immobilized enzyme systems	Can understand enzyme immobilization and kinetics in immobilized systems	강의,	HW #2
7	- How cells grow?	Can explain the specific cell grwoth rate, cell mass determi	강의,	

Times	Lecture Topic	Lecture Goals	Lecture Methods	Assignments
		nation techniques, and various coefficients		
8	- Environmental effects on cell growth kinetics - Mid term	Can explain the effects of temperature, pH, dissolved oxygen, redox potential, ionic strength on cell growth	강의,	Mldterm exam
9	- Operating considerations for bioreactor - Ideal chemostat	Can determine the operating parameters of bioreactor and understand the basics of chemostat	강의,	
10	- Selection of cultivation method - Chemostat with recycle	Can determine the bioreactor type and understand the operation of chemostat with recycle	강의,	HW #3
11	- Bioreactors: Fed-batch reactors immobilizaed systems	Can design various types of bioreactors including fed-batch reactor and understan the concept of the immobilized cell system	강의,	
12	- Bioreactor: Packed bed reactors	Can design the packed bed reactors based on operating conditions	강의,	HW #4
13	- Stoichiometrics of microbial growth	Can explain the definitions and stoichiometric calculations of cell growth	강의,	
14	- Final exam	Summary and final examination	강의,	Final exam
15	- Design presentation & discussion	Presentation of design results	강의, 토의토론수업,	Submit final report and presentation term project

Methods of Grading

sequence	Description	Percentage	Details
1	Mid-tem Exam	20%	Written exam.
2	Final-exam	30%	Written exam.
3	Pop Quizzes	0%	
All		100%	

sequence	Description	Percentage	Details
4	Assignments	10%	
5	Reports	0%	
6	Presentations & Discussions	0%	
7	Attendance	20%	
8		0%	
9	Others	20%	Report and presentation of design assignment (설계 과제 결과보고서 및 발표 평가)
All		100%	

Core of Value

핵심가치	전공역량	역량정의	역량구분	값(%)
혁신 (Discovery)	창의적문제해결 (Creative problem-solving)	주어진 상황과 문제를 창의적으로 해결할 수 있는 능력	주역량	50%
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	부역량	25%
능동 (self- Determination)	논리적사고 (Logical thinking)	전공관련 지식을 필요에 따라 다양하게 적용하고 활용할 수 있는 능력	부역량	25%

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

Textbook(s) & References

Description	Title	Author	Publisher
Required Textbook	Bioprocess Engineering: Basic Concepts	Michael L Shuler and Fikret Ka	Prentice Hall
Recommended Textbook	Biochemical Engineering Fundamentals	J.E. Bailey	McGraw-Hill Education

Memo

1. Lectures will be primarily focused on theoretical discussions.
2. For lecture-related questions or necessary matters, please utilize the e-learning campus.
3. Attendance Policy:
1) Absence of more than 1/3 of the total lecture days.
2) Grade will not be granted (10 absences out of a total of 30 sessions).
3) Deduction of 1 point per absence.
4) Deduction of 0.5 points per tardiness.
4. Examination Policy:
1) Open-book time may be provided during the exam.
→ Students who leave early will be considered to have forfeited the open-book time.
2) Examination scores are non-negotiable.
5. Assignment Policy:
1) Homework should be uploaded to the e-learning submission site before due date.
2) Submissions after the due date will not be accepted.
6. Design Assignment:
1) Assigned as an open-ended question.
2) Students will perform the design through team activity.
3) Lecturer will not provide guidance on team-specific design content.
4) Submission of results report in the 15th week, with all team members participating in the presentation of the design outcomes.