

Syllabus [2025Year 2 Term]

Course Information

Course Title	Organic and Biochemistry	Credits	3
Course Code	545700-1	Required/Elective (For Undergraduate Courses)	Selective majors
Department or Major	Convergent Systems Engineering	Language	English
Methods of Teaching		Lecture Room	목9,10,11,12,13,14(국제608)
Time Allotment	Lecture(3) Experiments(0) Trainging & Practice(0) Performance(0) Designing & Planning(0)	Cyber Lectures	
Course Type	offline		
Cyber Lectures Preview			

Lecturer

Lecturer	Name	Lee Sanghun	Rank	Professor	Final Academic Degree	한의학박사
	Department & college	Medical Consilience Engineering		Office	International Hall 413	
	Office Phone Number	031-8005-3954		e-mail	shlee92@dankook.ac.kr	
	Field of Interest					

Course Summary

Course Description	This course is to learn the principles of molecular chemistry and molecular biology for the purpose of understanding life phenomena. By understanding their role in living life, they are the basis for the study of metabolism, which will be learned in the next semester, and provide important knowledge for understanding and research of cell biology and molecular biology.
Description Related Courses	General biology; Organic chemistry
Course Goals	
Projected Results	What you will learn through taking this course is as follows. General Chemistry Fundamentals, Chemical Structure, Free Energy, Evolutionary/Genetic Fundamentals [chapter 1]; Water, acid/base, buffer solution [chapter 2] Chemical and physics

	ical properties of amino acids, 3D structure of protein, 1/2/3/4 structure [chapter 3/4] Protein function [chapter 5] Chemical activity, regulation, properties of enzymes [chapter 6] carbohydrates and glycoproteins; sugars, proteoglycans, glycoproteins, glycolipids, sugar codes [chapter 7] nucleotides and nucleic acids [chapter 8]; DNA-based information technology [chapter 9] lipids of triglycerides, phospholipids, sphingolipids and sterols [chapter 10] biomembrane and basic structure, membrane dynamics and transport [chapter 11], and biosignaling [chapter 12].
Percentage of the original language classes(%)	
Cyber Lectures Preview	

Syllabus

Times	Lecture Topic	Lecture Goals	Lecture Methods	Assignments
1	The Foundations of Biochemistry	Cellular Foundations; Chemical Foundations; Physical Foundations; Genetic Foundations; Evolutionary Foundations	이러닝 ,	
2	Water	Weak Interactions in Aqueous Systems; Ionization of Water, Weak Acids, and Weak Bases; Buffering against pH Changes in Biological Systems; Water as a Reactant; The Fitness of the Aqueous Environment for Living Organisms	이러닝 ,	
3	Amino Acids, Peptides, and Proteins	Amino Acids; Peptides and Proteins; Working with Proteins; The Structure of Proteins: Primary Structure	이러닝 ,	
4	The Three-Dimensional Structure of Proteins	Overview of Protein Structure; Protein Secondary Structure; Protein Tertiary and Quaternary Structures; Protein Denaturation and Folding	이러닝 ,	
5	Protein Function	Reversible Binding of a Protein to a Ligand; Oxygen-Binding Proteins; Complementary Interactions between Proteins and Ligands; The Im	이러닝 ,	

Times	Lecture Topic	Lecture Goals	Lecture Methods	Assignments
		Immune System and Immunoglobulins; Protein Interactions Modulated by Chemical Energy: Actin, Myosin, and Molecular Motors		
6	Enzymes	An Introduction to Enzymes; How Enzymes Work; Enzyme Kinetics as an Approach to Understanding Mechanism; Examples of Enzymatic Reactions; Regulatory Enzymes	이러닝 ,	
7	Carbohydrates and Glycobiology	Monosaccharides and Disaccharides; Polysaccharides; Glycoconjugates: Proteoglycans, Glycoproteins, and Glycosphingolipids; Carbohydrates as Informational Molecules: The Sugar Code; Working with Carbohydrates	이러닝 ,	
8	Mid-term examination			
9	Nucleotides and Nucleic Acids	Some Basics; Nucleic Acid Structure; Nucleic Acid Chemistry; Other Functions of Nucleotides	이러닝 ,	
10	DNA-Based Information Technologies	Studying Genes and Their Products; Using DNA-Based Methods to Understand Protein Function; Genomics and the Human Story	이러닝 ,	
11	Lipids	Storage Lipids; Structural Lipids in Membranes; Lipids as Signals, Cofactors, and Pigments; Working with Lipids	이러닝 ,	
12	Biological Membranes and Transport	The Composition and Architecture of Membranes; Membrane Dynamics; Solut	이러닝 ,	

Times	Lecture Topic	Lecture Goals	Lecture Methods	Assignments
		e Transport across Membranes		
13	Biosignaling	General Features of Signal Transduction; G Protein-Coupled Receptors and Second Messengers; Receptor Tyrosine Kinases; Receptor Guanylyl Cyclases, cGMP, and Protein Kinase G; Multivalent Adaptor Proteins and Membrane Rafts; Gated Ion Channels; Integrins: Bidirectional Cell Adhesion Receptors; Regulation of Transcription by Nuclear Hormone Receptors; Signaling in Microorganisms and Plants; Sensory Transduction in Vision, Olfaction, and Gustation; Regulation of the Cell Cycle by Protein Kinases; Oncogenes, Tumor Suppressor Genes, and Programmed Cell Death	이러닝 ,	
14	Bioenergetics and Biochemical Reaction Types	Bioenergetics and Thermodynamics; Chemical Logic and Common Biochemical Reactions; Phosphoryl Group Transfers and ATP; Biological Oxidation-Reduction Reactions	이러닝 ,	
15	Final examination			

Methods of Grading

sequence	Description	Percentage	Details
1	Mid-tem Exam	40%	
2	Final-exam	40%	
3	Pop Quizzes	0%	
All		100%	

sequence	Description	Percentage	Details
4	Assignments	0%	
5	Reports	0%	
6	Presentations & Discussions	0%	
7	Attendance	20%	
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	부역량	0%
능동 (self-Determination)	논리적사고 (Logical thinking)	전공관련 지식을 필요에 따라 다양하게 적용하고 활용할 수 있는 능력	주역량	0%
능동 (self-Determination)	의사소통 (Articulation)	대화를 통해 다양한 의견을 조율하고 합		0%

핵심가치	전공역량	역량정의	역량구분	값(%)
n)		의를 이끌어 낼 수 있는 능력		

Textbook(s) & References

Description	Title	Author	Publisher
Required Textbook	Principles of Biochemistry	David L. Nelson	W. H. FREEMAN AND COMPANY

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