

COURSE RECORD

Code	MBG 111
Name	General Biology I
Hour per week	8 (4 + 4)
Credit	6
ECTS	7
Level/Year	Undergraduate/1
Semester	Fall
Type	Compulsory
Prerequisites	
Description	This course will provide students the background knowledge to take more advanced biology courses but will also be useful to understand biological principles for everyday life. The course will cover multiple areas of biological organization, from tiny atoms to biological molecules. Students in this course will discover biological processes, cycles and properties that are key to the study of life. The students will learn the process of scientific thinking and basic biological experimentation techniques required to test the biological concepts that involves topics such as; molecules, enzymes, basic biological processes, and cell structure and division.
Objectives	O1. Describing life's underlying chemical composition: electrons, protons, neutrons, atoms, bonds; emergent characteristics of water and pH scale major classes of macromolecules O2. contrasting the structures that comprise prokaryotic, animal, and plant cells. O3. Describing the cellular basis of energy conversion, enzymatic promotion of chemical reactions, and transport across selectively permeable membranes, cellular respiration and photosynthesis O4. Describing the roles of cellular reproduction in living cells, including the processes and outcomes of mitosis and meiosis, simple Mendelian inheritance patterns and some common variations and learning nucleic acid structure and functions
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. have knowledge for advanced biology lectures LO2. design and analyse the experiments in accordance with the topics covered LO3. have knowledge for the tools for life-long learning LO4. have knowledge for specific field they might be more interested after covering general concepts

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	3	5	4	4	4	4	4
LO2	5	5	3	5	5	5	5	5	5	5
LO3	5	5	4	4	5	4	4	5	5	5
LO4	5	3	4	3	5	4	4	5	3	4

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

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COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to Biology: Exploring Life: What is Life, Foundations in Biology and the Scientific Method	LO1,LO2,LO3
The Chemistry of Life	LO1,LO2,LO3
The Molecules of Life	LO1,LO2,LO3
A Tour of The Cell	LO1,LO2,LO3, LO4
The Working Cell and How Cells Harvest Chemical Energy: Cellular energy and enzymes, Cellular metabolism	LO1,LO2,LO3
The Cellular Basis of Reproduction and Inheritance, Patterns of Inheritance	LO1,LO2,LO3, LO4
Molecular Biology of the Gene: From DNA to Protein	LO1,LO2,LO3, LO4

DERS BİLGİLERİ

Kodu	MBG 111
İsmi	Genel Biyoloji I
Haftalık Saati	8 (4 + 4)
Kredi	6
AKTS	7
Seviye/Yıl	Lisans/1
Dönem	Güz
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	
İçerik	Biyolojiye giriş dersidir. Öğrencilerin, biyolojinin temel prensipleri hakkında bilgi sahibi olması amaçlanmakla beraber ders daha sonara alınacak ileri düzey biyoloji dersleri içinde gerekli temeli sağlayacaktır. Atomdan biyolojik moleküllere kadar biyolojik organizasyonun birçok aşaması ders kapsamında işlenecek ve öğrencilerin birçok biyolojik proses, döngüler ve özellikleri hakkında temel bilgileri edinmesi sağlanacaktır.

COURSE RECORD

Code	MBG 112
Name	General Biology II
Hour per week	8 (4+4)
Credit	6
ECTS	8
Level/Year	Undergraduate/1
Semester	Spring
Type	Compulsory
Prerequisites	
Description	This course will introduce the fundamental concepts in biology, including prokaryotes; protists; fungi; plant and animals. They will learn structure, growth, nutrition, transport, reproduction, development, and control systems of plants and animals. This course will also focus on relationships between structure and function with respect to evolutionary adaptation and changes in different systems of plants and animals. Organization of cells into tissues to organs and organ systems in plants and animals will be studied experimentally in the practical course hours. Moreover, structural and functional relationships between digestive, reproductive and transport systems in selected systems will be examined during this lab.
Objectives	O1. Providing the fundamental concepts in biology, including prokaryotes; protists; fungi; plant and animals. O2. Providing information in structure, growth, nutrition, transport, reproduction, development, and control systems of plants and animals
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Identify the differences between prokaryotes and protists LO2. Describe the different types of plants and fungi LO3. Identify the differences between invertebrates and vertebrates and how diverse they are. LO4. Identify the different structures and functions of animal tissues, organs and organs system and describe the mechanisms through which the digestive system acquires and process nutrients.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	5	5	3	3	2	3	1
LO2	5	5	5	5	5	2	2	2	3	1
LO3	5	5	5	5	5	2	2	2	3	1
LO4	5	5	5	5	5	2	2	2	3	1

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Identify the differences between prokaryotes and protists, Describe the different types of plants and fungi, Describe the plant anatomy, structure, growth and reproduction	LO1, LO2
Identify the differences between invertebrates and vertebrates and how diverse they are.	LO3
Identify the different structures and functions of animal tissues, organs and organs system. Describe the mechanisms through which the digestive	LO3, LO4

system acquire and process nutrients.

Describe the respiratory and circulatory systems and the organs involved in these systems. LO4

Identify the differences between innate and adaptive immune responses and how the disorders in the immune system arise. LO4

Describe the processes of thermoregulation and osmoregulation and their importance to control the body's temperature and water balance.

Describe the process of chemical regulation and its importance in the vertebrate endocrine system, Identify the differences between asexual and sexual reproduction. Describe the processes of human reproduction, development and embryonic development. Describe the nervous system's structure and function and how nerve signals are transmitted throughout the body. Describe the animal nervous system especially the human brain. Describe the processes of sensory reception, hearing and balance, vision and taste and smell.

DERS BİLGİLERİ

Kodu	MBG 112
İsmi	Genel Biyoloji II
Haftalık Saati	8 (4+4)
Kredi	6
AKTS	8
Seviye/Yıl	Lisans/1
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	
İçerik	Bu ders, prokaryotlar da dahil olmak üzere biyolojideki temel kavramları tanıttacaktır; protistler; mantarlar; bitki ve hayvanlar. Öğrenciler, bitki ve hayvanların anatomisini ve fizyolojisini keşfetmek için bir yolculuğa çıkacaklar. Bitki ve hayvanların yapısını, büyümesini, beslenmesini, taşınmasını, üremesini, gelişmesini ve kontrol sistemlerini öğreneceklerdir. Bu ders ayrıca, farklı bitki ve hayvan sistemlerindeki evrimsel adaptasyon ve değişiklikler açısından yapı ve işlev arasındaki ilişkilere odaklanacaktır. Ayrıca hayvanlar alemindeki omurgasızlar ve omurgalıları arasındaki farklara da değinilecektir. Bu ders, bitki ve hayvanların temel biyolojik kavramlarını kapsamak için idealdir. Bitki ve hayvanlarda hücrelerin dokulara, organlara ve organ sistemlerine organizasyonu uygulamalı ders saatlerinde deneysel olarak işlenecektir. Ayrıca, bu laboratuvarında seçilen sistemlerde sindirim, üreme ve taşıma sistemleri arasındaki yapısal ve işlevsel ilişkiler incelenecektir.

COURSE RECORD

Code	MBG 115
Name	Chemistry for Life Sciences I
Hour per week	4 (4 + 0)
Credit	4
ECTS	5
Level/Year	Undergraduate/1
Semester	Fall
Type	Compulsory
Prerequisites	
Description	This course is designed to teach students basic concepts of chemistry. It starts with introduction to chemistry and progresses toward chemistry of life covering topics such as the basic properties of atoms and molecules, chemical reactions and their kinetics, laws of thermodynamics and gas laws. During the course, the related topics from life sciences will be used as an example.
Objectives	O1. Describing the basic concepts of general chemistry O2. Explaining the importance of chemistry in biological processes. O3. Appreciating the importance of chemistry in biological processes. O4. Valuing the importance of chemistry in biological processes
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. explain the basic concepts of general chemistry LO2. describe the importance of chemistry in biological processes. LO3. recognize the importance of chemistry in biological processes. LO4. apply the importance of chemistry in biological processes.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	3	2	4	1	1	3	4	1	1
LO2	5	3	2	2	1	1	3	4	1	1
LO3	5	3	2	2	1	1	3	4	1	1
LO4	5	3	2	2	1	1	3	4	1	1

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
General information about the class / Basic Concepts About Matter	LO1, LO2
Measurements in Chemistry	LO1, LO2, LO3
Atomic Structure and the Periodic Table	LO1, LO2
Chemical Compounds	LO1, LO2, LO3
Chemical Calculations: Formula Masses, Moles, and Chemical Equations	LO1, LO2, LO3
Chemical Reactions	LO1, LO2, LO3, LO4
Aqueous Solutions	LO1, LO2, LO3
Gases, Liquids, and Solids,	LO1, LO3, LO4
Thermochemistry	LO1, LO2
Electrons in Atoms	LO1, LO2
Chemical bonding I: Basic Concepts	LO1, LO2, LO3
Important chemical reactions in biological systems	LO1, LO2, LO3, LO4

DERS BİLGİLERİ

Kodu	MBG 115
İsmi	Yaşam Bilimleri İçin Kimya I
Haftalık Saati	4 (4 + 0)
Kredi	4
AKTS	5
Seviye/Yıl	Lisans/1
Dönem	Güz
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	
İçerik	Bu ders öğrencilere kimyanın temel kavramlarını öğretmek için tasarlanmıştır. Kimyaya giriş ile başlar ve atomların ve moleküllerin temel özellikleri, kimyasal reaksiyonlar ve kinetikleri, termodinamik yasaları ve gaz yasaları gibi konuları kapsayan yaşamın kimyasına doğru ilerler. Ders süresince yaşam bilimlerinden ilgili konular örnek olarak kullanılacaktır.

COURSE RECORD

Code	MBG 116
Name	Chemistry for Life Sciences II
Hour per week	4 (4 + 0)
Credit	4
ECTS	5
Level/Year	Undergraduate/1
Semester	Spring
Type	Compulsory
Prerequisites	
Description	This is a follow up course of MBG 115 Chemistry for life sciences. This course will continue providing fundamental knowledge and principles of chemistry. It will cover multiple areas of chemistry; the basics of analytical chemistry, physical chemistry, organic chemistry and organometallic chemistry. During this course, the students are expected to understand the structure of atom, relation of atom structure to its chemical reactivity, energy of a chemical reactions, chemical equilibrium, chemical trends in periodic table and very basics of organic chemistry and biochemistry. Students will discover chemical processes, cycles and properties that are key to the study of life.
Objectives	O1. Teaching basic concepts of chemistry O2. Explaining students the connection between life and the basic concepts of chemistry
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. explain the basic concepts in chemistry such as equilibrium, thermodynamics and so on. LO2. make the connection between basic concepts of chemistry and life sciences. LO3. be able to investigate biological event on molecular level. LO4. explain the importance of chemistry for life sciences.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	3	2	4	2	1	3	4	1	1
LO2	5	3	2	2	2	2	3	4	1	1
LO3	5	3	2	2	2	1	3	4	1	1
LO4	5	3	2	2	1	2	3	4	1	1

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
The principles of chemical equilibrium	LO1 LO2, LO3, LO4
Solubility and complex ion equilibria	LO1 LO2, LO3, LO4
Second and third law of thermodynamics	LO1 LO2, LO3, LO4
Spontaneous change using entropy and gibbs Energy	LO1 LO2, LO3, LO4
The chemical kinetics	LO1 LO2, LO3, LO4
The quantum-mechanical model of the atom	LO1 LO2, LO3, LO4
Electrochemistry	LO1 LO2, LO3, LO4
Chemistry of the main group elements	LO1 LO2, LO3, LO4
Radioactivity and nuclear chemistry	LO1 LO2, LO3, LO4
Transition metals and coordination compounds	LO1 LO2, LO3, LO4

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Organic compounds	LO1 LO2, LO3, LO4
The structure and reaction of organic compounds	LO1 LO2, LO3, LO4
Basics of biochemistry	LO1 LO2, LO3, LO4

DERS BİLGİLERİ

Kodu	MBG 116
İsmi	Yaşam Bilimleri İçin Kimya II
Haftalık Saati	4 (4 + 0)
Kredi	4
AKTS	5
Seviye/Yıl	Lisans/1
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	
İçerik	Yaşam bilimleri için kimya II (MBG 116) dersi Yaşam bilimleri için kimya (MBG 115) dersinin devamıdır. Bu ders kimyanın temel bilgi ve ilkelerini sağlamaya devam edecektir. Bu ders kimyanın birçok alanını kapsayacaktır; analitik kimya, fiziksel kimya, organik kimya ve organometalik kimyanın temelleri. MBG 116 dersinde öğrenciler atomun yapısını, atom yapısının kimyasal tepkime ile ilişkisini, kimyasal reaksiyonların enerjisini, kimyasal dengeyi, periyodik tablodaki kimyasal eğilimleri ve organik kimya ve biyokimyanın temellerini anlamaları beklenir. Öğrenciler, yaşam araştırmasının anahtarı olan kimyasal süreçleri, döngüleri ve özellikleri öğreneceklerdir.

COURSE RECORD

Code	MBG204
Name	Biostatistics
Hour per week	5 (3 + 2)
Credit	4
ECTS	6
Level/Year	Undergraduate / 2
Semester	Spring
Type	Compulsory
Prerequisites	
Description	The aim of this course is to introduce students the fundamentals of biostatistics and biostatistics methods with specific applications and examples in life sciences and to make them understand and evaluate the literature in their field. The course content includes the following topics: introduction to biostatistics and basic concepts; descriptive statistics; probability and probability distributions; sampling methods and parameter estimation; introduction to hypothesis testing and testing statistical assumptions; one-sample, two-sample and multi-sample inference with hypothesis testing; nonparametric tests; categorical data analysis; correlation and regression analysis.
Objectives	O1. Introducing the fundamentals of Biostatistics O2. Understanding the problem and selecting appropriate statistical methods O3. Analyzing data with examples in life sciences and discussing the results in the view of Biostatistics O4. Planning a scientific study using appropriate study designs, statistical methods and hypotheses
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Describe the basic concepts of Biostatistics LO2. Calculate the descriptive statistics and choose the appropriate ones depending on the type of data LO3. Acknowledge the basis of probability, discrete and continuous probability distributions LO4. Distinguish the types of sampling methods, point and interval estimations about the unknown population parameter LO5. Perform hypothesis tests based on data assumptions, exploring relationship between variables, selecting appropriate correlation coefficient for given variables LO6. Interpret and report the analysis results using proper statistical methods

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	4	4	2	5	4	4	3	4	4	5
LO2	4	2	1	5	3	4	2	2	4	4
LO3	3	4	3	5	5	5	4	3	5	5
LO4	2	3	2	5	5	5	4	3	5	5
LO5	3	4	4	5	5	5	4	4	5	5
LO6	5	5	4	5	5	5	4	5	5	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to Biostatistics and Basic Concepts	LO1
Descriptive Statistics	LO1, LO2
Probability and Probability Distributions	LO3
Sampling Methods & Parameter Estimation	LO3, LO4
Introduction to Hypothesis Testing & Testing Statistical Assumptions	LO4, LO5
Hypothesis Testing: One-Sample Inference	LO5, LO6
Hypothesis Testing: Two-Samples Inference	LO5, LO6
Hypothesis Testing: Multi-samples Inference	LO5, LO6
Categorical Data Analysis	LO5, LO6
Correlation and Regression Analysis	LO5, LO6

DERS BİLGİLERİ

Kodu	MBG 204
İsmi	Biyoistatistik
Haftalık Saati	5 (3 + 2)
Kredi	4
AKTS	6
Seviye/Yıl	Lisans / 2
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	
İçerik	Bu dersin amacı öğrencilere biyoistatistik biliminin temelini öğretmek, istatistiksel modelleri yaşam bilimlerinden özel örnekler ve uygulamalar ile aktarmak ve kendi alanlarındaki literatürü istatistiksel açıdan değerlendirebilme ve anlama yeteneği kazandırmaktır. Ders şu konuları içermektedir: biyoistatistiğe giriş ve temel kavramlar; tanımlayıcı istatistikler; olasılık ve olasılık dağılımları; örnekleme yöntemleri ve parametre kestirimleri; hipotez testlerine giriş ve istatistiksel varsayımların kontrolü; tek örneklem, iki örneklem ve çok örneklem hipotez testleri; parametrik olmayan testler; kategorik veri analizi; korelasyon ve regresyon analizi.

COURSE RECORD

Code	MBG 205
Name	Cell Biology
Hour per week	7 (3 + 4)
Credit	5
ECTS	7
Level/Year	Undergraduate/2
Semester	Fall
Type	Compulsory
Prerequisites	MBG 111
Description	This course will focus on the cellular biology of higher organisms. Knowledge of the structure, function, and formation of cellular membranes and organelles, in addition to cellular growth and oncogenic transformation will be covered throughout the course. Also, this course will cover transport, receptors, and cell signaling; the cytoskeleton, the extracellular matrix, and cell movements; chromatin structure and RNA synthesis. The course focuses on the interaction of the cell and its social context that includes its neighboring cells, the extracellular matrix and the soluble mediators.
Objectives	O1. describing on the basic understanding of the molecular mechanisms underlying cellular processes O2. accomplishing the structure, function and specializations of the cell through a combination of lecture and laboratory sessions providing both theory and application
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Outline fundamental concepts of cellular function. LO2. Describe the scientific evidence underlying our current understanding of cellular processes. LO3. Explain the molecular mechanisms of cellular function LO4. Develop critical thinking processes and proficiency in scientific reading and writing will be emphasized throughout the course LO5. Develop skills, through lab experiments, in some of the specific methodologies used in the study of modern cell biology, common laboratory techniques used in the study of cells, including microscopy, immunohistochemistry, cell culture and cell transfection.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	5	5	4	5	5	5	4
LO2	5	5	5	5	3	4	5	5	4	4
LO3	5	5	5	5	4	4	5	4	4	4
LO4	5	5	5	5	5	4	5	5	4	4
LO5	5	5	5	5	4	4	5	5	5	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

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COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to the cell	LO1
Proteins	LO1, LO2
From DNA to Protein: How cells read the genome	LO1, LO2,LO3
Plasma membrane	LO1, LO2,LO3
Intracellular compartments and protein sorting and Intracellular trafficking	LO1, LO2,LO4
Energy conversion: Mitochondria and Chloroplast	LO1, LO2,LO3, LO5
Signal transduction pathways and cell communication	LO1, LO2,LO3
The Cytoskeleton and Cell junction	LO2, LO5
The cell cycle	LO2, LO3, LO5
Cell communities	LO1, LO2, LO3

DERS BİLGİLERİ

Kodu	MBG 205
İsmi	Hücre Biyolojisi
Haftalık Saati	7 (3 + 4)
Kredi	5
AKTS	7
Seviye/Yıl	Lisans/2
Dönem	Güz
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	MBG 111
İçerik	Bu ders, yüksek organizmaların hücresel biyolojisini ele alır. Hücresel büyüme ve onkojenik dönüşüme ek olarak, hücre zarlarının ve organellerinin yapısı, işlevi ve oluşumu ile ilgili bilgiler işlenmektedir. Ayrıca, bu ders taşıma, reseptörler ve hücre sinyalleşmesini; hücre iskeleti, hücre dışı matris ve hücre hareketleri; kromatin yapısı ve RNA sentezi. Ders, komşu hücreleri, hücre dışı matrisi ve çözünür araçları içeren sosyal bağlamı olan hücrelerin etkileşimine odaklanır.

COURSE RECORD

Code	MBG 206
Name	Microbiology
Hour per week	7 (3 + 4)
Credit	5
ECTS	7
Level/Year	Undergraduate/2
Semester	Spring
Type	Compulsory
Prerequisites	MBG 112
Description	Microbiology touches upon almost every aspect of human life. In this course, the microbial world, how to observe and classify microorganisms, and the differences between the prokaryotic and eukaryotic cells will be introduced. It will also cover microbial metabolism, microbial growth and the control of microbial growth as well as the fundamental concepts in microbial genetics and viruses. Additionally, the application areas of microbiology such as environment, food and industry will also be covered.
Objectives	O1. Learning the fundamentals of microbiology such microbial anatomy, growth, metabolism, genetics and classification. O2. Gaining experimental experience regarding basic microbiology lab skills. O3. Knowing about some of the application areas of microbiology such as food, industry and environment. O4. Developing teamwork skills through a group term project.
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. distinguish the prokaryotes and eukaryotes, and experimentally differentiate the Gram-negative and Gram-positive bacteria through Gram staining. LO2. describe the fundamental knowledge on microbial metabolism, growth and how to control microbial growth, and apply this knowledge into the practice. LO3. explain key genetic elements, processes and the regulation of bacterial in gene expression as well as list of biotechnological tools available for microbial genetics. LO4. classify microorganisms and viruses. LO5. exemplify some of the application areas of microbiology as the making of food and industrial products as well as environmental bioremediation. LO6. Design a term project on a real problem to be solved by the microbiological approaches as a team.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	5	5	5	5	2	4	2
LO2	5	5	5	5	5	5	5	2	4	2
LO3	5	5	5	3	4	4	1	0	4	1
LO4	5	5	3	3	4	1	0	0	4	1
LO5	5	5	2	2	4	0	0	0	4	0
LO6	5	5	5	5	5	5	5	4	4	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

AGU Department of Molecular Biology and Genetics



COURSE CONTENT DETAILS

Topic	Outcomes
The Microbial World and You	LO1, LO4
Chemical Principles	
Observing Microorganisms through a Microscope	
Functional Anatomy of Prokaryotic and Eukaryotic cells	LO1, LO6
Microbial Metabolism	LO2
Microbial Growth	
The Control of Microbial Growth	
Microbial Genetics	LO3, LO6
Biotechnology and DNA technology	
Classification of Microorganisms	LO4, LO5, LO6
Viruses, Virioids and Prions	
Applications of Microbiology	

DERS BİLGİLERİ

Kodu	MBG 206
İsmi	Mikrobiyoloji
Haftalık Saati	7 (3+ 4)
Kredi	5
AKTS	7
Seviye/Yıl	Lisans/2
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	MBG 112
İçerik	Mikrobiyoloji, insan hayatının hemen hemen bütün yönlerine dokunur. Bu derste, mikrobiyal dünya, mikroorganizmalarının nasıl gözlemlendiği ve sınıflandırıldığı, ve prokaryotik ve ökaryotik hücreler arasında farklılıklar tanıtılacaktır. Ayrıca, bu ders mikrobiyal metabolizm, mikrobiyal büyüme, mikrobiyal büyümenin kontrolü, ve mikrobiyal genetik ve virüslere dair temel konseptlerini kapsayacaktır. Ek olarak, çevre, gıda ve endüstri gibi mikrobiyolojinin uygulama alanları işlenecektir.

COURSE RECORD

Code	MBG 207
Name	Organic Chemistry
Hour per week	5 (3+ 2)
Credit	4
ECTS	5
Level/Year	Undergraduate/2
Semester	Fall
Type	Compulsory
Prerequisites	MBG 115 & MBG 116
Description	This condensed organic chemistry course deals primarily with the basic principles of understanding the structure and reactivity of organic molecules. Emphasis is on substitution and elimination reactions and chemical reactions of the carbonyl group. The course also provides an introduction to the aromatic compounds and basic aromatic reactions. It gives information about the stereochemistry of organic molecules and deals with their importance in terms of biological systems.
Objectives	O1. Defining and employing the vocabulary of organic chemistry. O2. Drawing correct structural representations of organic molecules. O3. Writing reasonable transformations and mechanisms for alkanes, alkenes, alkynes, alkyl halides, alcohols, aromatic compounds and carbonyl compound O4. Employing stereochemical considerations when analyzing mechanisms and transformations.
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Recognize functional group classes commonly encountered in organic chemistry and name representative molecules from each class using IUPAC rules for organic nomenclature LO2. Predict structure and reactivity of alkanes, alkenes, alkynes, aromatic hydrocarbons, alcohols, ethers, epoxides, and alkyl halides based on such factors as carbon atom hybridization, bond length, bond strength, and bond polarity. LO3. Recognize and provide curved arrow mechanisms for the different types of organic reactions. LO4. Determine R and S configurations for chiral molecules and distinguish between enantiomers, diastereomers, meso compounds, and conformational isomers. LO5. Predict structure and reactivity of aldehydes, ketones, carboxylic acids, esters, amides, containing compounds, amines, and phenols. LO6. Recognize and provide curved arrow mechanisms for the following types of organic reactions: electrophilic & nucleophilic aromatic substitution, nucleophilic carbonyl addition, and substitution to a carbonyl.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	4	4	1	2	4	2	3	4	0	0
LO2	4	4	1	2	4	3	3	4	0	0
LO3	3	4	1	2	3	3	3	4	0	0
LO4	3	4	1	2	3	4	4	4	0	0
LO5	3	4	1	2	3	4	4	4	0	0
LO6	3	4	1	2	4	4	4	4	0	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Bonding and Molecular Structure, <i>Families of Carbon Compounds, Functional Groups & Acids and Bases</i>	LO1, LO2, LO3
<i>Nomenclature and Conformations of Alkanes and Cycloalkanes & Stereochemistry</i>	LO2, LO3, LO4
<i>Stereochemistry</i>	LO2, LO3, LO4
<i>Nucleophilic Reactions</i>	LO2, LO3, LO4
Alkenes and Alkynes & Their reactions	LO2, LO3, LO4, LO5
<i>Alcohols and Ethers, Alcohols from Carbonyl Compounds</i>	LO3, LO4, LO5
<i>Aromatic Compounds and Their Reactions</i>	LO3, LO4, LO5
<i>Carbohydrates and nucleic acids</i>	LO3, LO4, LO5

DERS BİLGİLERİ

Kodu	MBG 207
İsmi	Organik Kimya
Haftalık Saati	5 (3 + 2)
Kredi	4
AKTS	5
Seviye/Yıl	Lisans/2
Dönem	Güz
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	MBG 115 & MBG 116
İçerik	Bu yoğun organik kimya dersi, öncelikle organik moleküllerin yapısını ve reaktivitesini anlamının temel prensiplerini ele alır. Ana vurgu, organik moleküllerin yer değiştirme ve eliminasyon reaksiyonları, ve karbonil grubunun kimyasal reaksiyonları üzerindedir. Bu ders aynı zamanda aromatik bileşiklerin kimyasına ve temel aromatik reaksiyonlara da bir giriş sağlar. Organik moleküllerin steryokimyası hakkında bilgi vererek, biyolojik sistemler açısından önemini ele alır.

COURSE RECORD

Code	MBG 208
Name	Molecular Biology
Hour per week	7 (3+4)
Credit	5
ECTS	7
Level/Year	Undergraduate/2
Semester	Spring
Type	Compulsory
Prerequisites	MBG 111
Description	The aim of this course is to introduce the major processes in the central dogma of molecular biology and help students to develop the knowledge and practical skills to pursue further studies in the molecular biology. In laboratory hours, the students will design and conduct and report basic molecular biology experiments.
Objectives	O1. Introducing the major processes in the central dogma of molecular biology O2. Helping students to develop the knowledge and skills to understand molecular biology O3. Teaching basic molecular biology experiments to pursue further studies in the molecular biology. O4. Reading and interpreting scientific papers that utilize molecular biology technologies
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Describe the processes in the central dogma. LO2. recognize a broad range of experimental techniques used in molecular biology and how they were used to improve our understanding of molecular biology. LO3. interpret scientific papers that utilize molecular biology technologies LO4. Conduct basic molecular biology experiments LO5. have knowledge of interpreting the results obtained in the conducted experiments, and report the results.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	5	3	3	3	3	4	2
LO2	5	4	5	5	5	3	5	5	5	3
LO3	5	5	5	5	4	3	5	5	5	4
LO4	4	5	4	5	5	5	5	5	4	3
LO5	3	5	5	5	5	5	5	5	5	4

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

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COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to course, Nucleic Acids and Central Dogma	LO1, LO2
Genome Structure, Chromatin and Nucleosomes	LO1, LO2, L04, L05
DNA Replication	LO1, LO2, L03, L04, L05
DNA Damage, DNA Repair Mechanisms	LO1, LO2, L03, L04, L05
Recombination, Transposition	LO1, LO2, L03, L04, L05
Transcription, RNA Splicing	LO1, LO2, L03, L04, L05
Translation	LO1, LO2, L03

DERS BİLGİLERİ

Kodu	MBG 208
İsmi	Moleküler Biyoloji
Haftalık Saati	7 (3+4)
Kredi	5
AKTS	7
Seviye/Yıl	Lisans/2
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	MBG 111
İçerik	Bu dersin amacı, “santral dogma” merkezi dogmadaki ana süreçleri tanıtmak ve öğrencilerin moleküler biyolojide daha ileri çalışmaları sürdürmek için bilgi ve pratik becerilerini geliştirmelerine yardımcı olmaktır. Laboratuvar saatlerinde öğrenciler temel moleküler biyoloji deneylerini tasarlayacak, yürütecek ve raporlayacaklardır.,

COURSE RECORD

Code	MBG 209
Name	Fundamentals of Genetics
Hour per week	7 (3+4)
Credit	5
ECTS	7
Level/Year	Undergraduate/2
Semester	Fall
Type	Compulsory
Prerequisites	
Description	This course will focus on teaching the structure of DNA, prokaryotic and eukaryotic gene expression, the molecular process of gene expression, a genetic regulatory system, Meiosis, mitosis, Mendelian and non-Mendelian genetics, translation and Proteins, Gene Mutation, DND repair and Transposition, Epigenetics, Emerging Roles of RNA and Gene Therapy.
Objectives	O1. Comprehending genetic history (Mendelian laws, first genetic disorders, and so on) as well as changes in the human genome, O2. Comprehending the first human genome project, and its impact on human health. O3. Exploring chromosomal abnormalities and diseases caused by mutations. O4. Exploring the molecular basics of cell division.
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. define Mendelian and non-Mendelian genetics, Drosophila's genetics, the structure of DNA, prokaryotic and eukaryotic gene expression, the molecular process of gene expression, a genetic regulatory system, Meiosis, mitosis, translation and Proteins, LO2. explain Gene Mutation, DND repair and Transposition, Epigenetics, Emerging Roles of RNA LO3. identify Gene cloning, Recombinant DNA Technology, modification of Mendelian Ratios LO4. define gene therapy

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	5	5	3	5	0	0	0
LO2	5	5	5	5	5	3	5	3	3	3
LO3	0	0	0	0	0	5	5	5	5	5
LO4	0	0	0	0	0	5	5	5	5	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to Genetics	LO1, LO2
Mitosis and Meiosis	
Mendelian and Non- Mendelian Genetics, Modification of Mendelian Ratios	
Sex Determination and Sex Chromosome	LO1, LO2
The Human Genome Project, 1000 Genomes	
DNA structure and Analysis, DNA replication	LO1, LO2
The Genetic Code and Transcription	LO3, LO4
Translation and Proteins	LO3, LO4

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Gene Mutation, DND repair and Transposition	LO3, LO4
Epigenetic	LO3, LO4
DNA Forensic	LO3, LO4
Genomics and Personalized Medicine	
Gene Therapy	
Genetically Modified Food	

DERS BİLGİLERİ

Kodu	MBG 209
İsmi	Genetiğin Temelleri
Haftalık Saati	7 (3 + 4)
Kredi	5
AKTS	7
Seviye/Yıl	Lisans/2
Dönem	Güz
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	
İçerik	Bu ders DNA'nın yapısı, prokaryotik ve ökaryotik gen ekspresyonu, gen ekspresyonunun moleküler süreci, genetik düzenleyici sistem, mayoz, mitoz, Mendel ve Mendel olmayan genetik, translasyon ve Proteinler, gen mutasyonu, DND onarımı ve transpozisyon, epigenetik, RNA ve Gen Terapisinin ortaya çıkan rollerini öğretmeye odaklanacaktır.

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COURSE RECORD

Code	MBG 210
Name	Science and Ethics
Hour per week	2 (2 + 0)
Credit	2
ECTS	4
Level/Year	Undergraduate / 2
Semester	Spring
Type	Compulsory
Prerequisites	
Description	The course focuses on the introduction to the ethics of science and research, the rules and contents of the ethics of science and research, the aim and the importance of making ethical decisions regarding the scientific research and studying ethical issues concerning human-based research. In addition to that, ethics for the usage of stem cells, genetically modified organism, cloning, ethics for drug developing and the scientific publications will be covered throughout the course.
Objectives	O1. Recognizing the concept of ethics. O2. Enhancing skills to apply ethical theories to issues arising in science. O3. Motivating thinking on ethical problems in science.
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Define the basic concepts of ethics and understand historical relation between science and ethics LO2. Explain the basic concepts of science. LO3. Distinguish the effect of ethics on scientific research LO4. Relate the connection of ethical conduct of research for society LO5. Discuss ethical Issues in Scientific Publication and in the Laboratory

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	4	3	3	4	4	2	3	5	5	5
LO2	5	5	3	4	4	2	3	5	5	5
LO3	4	4	3	3	3	2	3	5	5	5
LO4	4	3	3	3	3	2	3	5	5	5
LO5	5	3	3	4	3	2	3	5	5	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction for the basic concepts of Ethics	LO1, LO2
Historical relation between science and Ethics	LO1, LO2
Learning the effect of ethics on scientific research	LO1, LO3
The impact of ethical conduct of research for society	LO2, LO4
The understanding of ethical issues in science and scientific research	LO2, LO3
Ethical Issues in the Laboratory	LO5
Ethical Aspects of Livestock Genetic Engineering	LO4, LO5
Peer review of publications (BiorXiv) after the publications.	LO3, LO4, LO5

DERS BİLGİLERİ

Kodu	MBG 210
İsmi	Bilim ve Etik
Haftalık Saati	2 (2 + 0)
Kredi	2
AKTS	4
Seviye/Yıl	Lisans/2
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	
İçerik	Bu ders kapsamında, bilim ve araştırma etiğine giriş, bilim ve araştırma etiğinin kuralları ve içeriği, bilimsel araştırmalarla ilgili etik kararlar almanın amacı ve önemi ve insan temelli araştırmalarla ilgili etik konuların incelenmesi konularına odaklanılacaktır. Buna ek olarak, ders boyunca kök hücre kullanımı, genetiği değiştirilmiş organizma, klonlama, ilaç geliştirme etiği ve bilimsel yayınlara ilişkin etik konuları işlenecektir.

COURSE RECORD

Code	MBG 301
Name	General Biochemistry I
Hour per week	7 (3+4)
Credit	5
ECTS	8
Level/Year	Undergraduate / 3
Semester	Fall
Type	Compulsory
Prerequisites	MBG 111
Description	This course will introduce you to all of the chemical players of life; their structures and chemistry and, consequently, their function. Without this background, you cannot understand molecular biology. The biological macromolecules which this course focuses on are proteins, polysaccharides, lipids and nucleic acids, including the monomeric units of these macromolecules will be covered. This course will concentrate on the structures of these molecules, their functions, and the strong relationship between structure and function.
Objectives	O1. Identifying different classes of biomolecules (carbohydrates, proteins, lipids, nucleotides) and their structures, explain fundamental relationships between their structure O2. Describing the molecular principles for biocatalysis O3. Applying biochemistry related processes in laboratory conditions
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Elaborate biochemical processes deeply LO2. Discriminate structure-function of different biomolecules in biochemical processes LO3. Consider action of different catalysis mechanisms in biosystems LO4. Discuss basics biochemical techniques and have ability to perform the techniques

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	4	3	5	3	5	1	2	1
LO2	5	5	4	1	5	1	2	1	1	1
LO3	5	5	2	1	5	1	2	1	1	1
LO4	4	5	1	5	5	5	5	5	2	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

Performants outcome**COURSE CONTENT DETAILS**

Topic	Outcomes
Water, buffers and amino acids	LO1, LO2, LO4
Peptides and proteins, three-dimensional structure of proteins, protein function, hemoglobin	LO1, LO2, LO4
Enzymes, mechanism of inhibitors	LO1, LO3, LO4
Nucleotides and nucleic acids	LO1, LO2, LO4
Lipids, membrane structure and functions	LO1, LO2, LO4
Signaling pathways	LO1, LO2, LO4

DERS BİLGİLERİ

Kodu	MBG 301
İsmi	Genel Biyokimya I
Haftalık Saati	7 (3 + 4)
Kredi	5
AKTS	8
Seviye/Yıl	Lisans/3
Dönem	Güz
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	MBG 111
İçerik	Bu ders kapsamında yaşamın içinde rol alan kimyasallar ve bunların yapıları ve fonksiyonları ele alınacaktır. Bu bilgiler olmadan moleküler biyoloji tam anlamıyla kavranamayacağı düşünüldüğünde dersin önemi açığa çıkmaktadır. Bu derste protein, polisakkarit, lipit ve nükleik asit gibi biyolojik makromolüküller ve bu moleküllerin monomerlerine odaklanılacaktır. Ayrıca bu dersin içeriğinde biyolojik moleküllerin fonksiyonu ve fonksiyon-yapı ilişkisi öğrenilecektir.

COURSE RECORD

Code	MBG 312
Name	General Biochemistry II
Hour per week	4 (4 + 0)
Credit	4
ECTS	7
Level/Year	Undergraduate/3
Semester	Spring
Type	Compulsory
Prerequisites	MBG 301
Description	This course will concentrate on metabolic biochemistry: the investigation of metabolic responses that furnish the cell with the energy and crude materials fundamental for life. Understudies will look at the digestion of carbohydrates, fats, proteins, and nucleotides as well as the macromolecular machines that synthesize carbohydrates, lipids and proteins. Therapeutic relationships are strengthened throughout the course.
Objectives	O1. Engaging in the detailed exploration of biological macromolecule structure and function with emphasis on the mechanisms of protein/ligand binding, metabolic pathways and regulatory enzyme mechanisms O2. Introducing the fundamental principles of basic biosynthesis pathways of amino acids, fatty acids, vitamins as well as protein synthesis mechanisms and DNA repair. O3. Elucidating the metabolic processes and flow of energy in living organisms
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Identify the molecules involved in biochemical metabolic pathways. LO2. Recognize rate-regulatory steps in biochemical metabolic pathways. LO3. Account for more straightforward structure/function relationships for the most common cofactors. LO4. Demonstrate biochemical metabolic pathways and their regulation. LO5. Elucidate fundamental biochemical functions and concepts, including mechanisms of actions. LO6. Integrate and evaluate biochemical and physiological concepts and mechanisms related to normal healthy states to diseases or pathologic states.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	3	4	3	4	4	5	5	4
LO2	5	5	5	5	3	4	4	5	4	4
LO3	5	5	5		4	4	4	4	4	4
LO4	5	5	5		5	4	4	5	4	4
LO5	5	5	5	5	4	4	4	5	5	5
LO6	5	4	4	3	4	3	4	4	4	4

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

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COURSE CONTENT DETAILS

Topic	Outcomes
Chemical logic of metabolism	LO1
Carbohydrate metabolism	LO1,LO2,LO4
Citric acid cycle and Glyoxylate Cycle	LO1,LO2,LO3
Electron transport, Oxidative Phosphorylation	LO1,LO2,LO4
Photophosphorylation and Photorespiration	LO1,LO2,LO4
Lipid metabolism	LO1,LO2,LO3, LO4
Metabolism of Nitrogenous compounds	LO1,LO2,LO3, LO4
Nucleotide metabolism	LO1,LO2,LO3, LO4
Interorgan and Intracellular Coordination of Energy Metabolism in Vertebrate	LO1, LO2, LO6

DERS BİLGİLERİ

Kodu	MBG 312
İsmi	Genel Biyokimya II
Haftalık Saati	4 (4+ 0)
Kredi	4
AKTS	7
Seviye/Yıl	Lisans/3
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	MBG 301
İçerik	Bu ders metabolik biyokimyaya odaklanacaktır: hücreye yaşam için temel olan enerji ve ham maddeleri sağlayan metabolik tepkilerin araştırılması. Eksik çalışmalar karbonhidratların, yağların, proteinlerin ve nükleotitlerin yanı sıra karbonhidratları, lipidleri ve proteinleri sentezleyen makromoleküler makinelerin sindirimine bakacaktır. Kurs boyunca terapötik ilişkiler güçlendirilir.

COURSE RECORD

Code	MBG 304
Name	Bioinformatics
Hour per week	5 (3 + 2)
Credit	4
ECTS	6
Level/Year	Undergraduate/3
Semester	Spring
Type	Compulsory
Prerequisites	
Description	This course is designed to introduce students to bioinformatics tools and analysis methods and therefore is a hands-on type. Most weeks will include both classroom lecture and computer lab time. Upon completion of the course, the students should be comfortable with handling biological data and online tools that are relevant to their research. The topics include databases, sequence alignment, homology search, phylogenetic trees, and structure prediction.
Objectives	O1. Applying methods from bioinformatics to biological research O2. Describing databases containing primary and derived data O3. Explaining relevant bioinformatics tools and resources
Learning Outcomes	LO1 Describe the basic principles and concepts of bioinformatics LO2 Identify different types of Biological Databases LO3 Effectively extract information from large databases and use this information in research LO4 Describe the basics of sequence alignment and analysis LO5 Describe biological macromolecular structures and structure prediction approaches LO6 Identify various tools and methodologies used in phylogenetic analysis

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	5	5	5	5	4	5	5
LO2	5	5	5	5	5	5	5	4	5	5
LO3	5	5	5	5	5	5	5	4	5	5
LO4	5	5	5	5	5	5	5	4	5	5
LO5	5	5	5	5	5	5	5	4	5	5
LO6	5	5	5	5	5	5	5	4	5	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to bioinformatics	LO1
Databases	LO2, LO3
Sequence analysis	LO1, LO2, LO3, LO4
Phylogenetic trees	LO4, LO6
Structure analysis	LO1, LO5
Biological networks	LO1, LO3

DERS BİLGİLERİ

Kodu	MBG 304
İsmi	Biyoinformatik
Haftalık Saati	5 (3 + 2)
Kredi	4
AKTS	6
Seviye/Yıl	Lisans/3
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	
İçerik	Bu ders öğrencilere biyoinformatik araçları ve analiz yöntemlerini tanıtmak için tasarlanmıştır ve bu nedenle uygulamalıdır. Çoğu hafta hem sınıf dersi hem de bilgisayar laboratuvarı zamanını içerecektir. Dersi tamamladıktan sonra öğrenciler, araştırmalarıyla ilgili biyolojik verileri ve çevrimiçi araçları rahatlıkla kullanabilmelidir. Konular veritabanları, dizi hizalama, homoloji araması, filogenetik ağaçlar ve yapı tahminini içermektedir.

COURSE RECORD

Code	MBG 305
Name	Special Techniques and Applications in Molecular Biology
Hour per week	5 (3+2)
Credit	4
ECTS	6
Level/Year	Undergraduate/3
Semester	Fall
Type	Compulsory
Prerequisites	MBG 208
Description	The course includes genetic engineering using various techniques, genome sequence analysis, gene expression analysis, protein analysis, proteomics and recombinant protein production, protein interaction and localization studies in vitro and in vivo. Learning both theoretical and practical knowledge of the molecular biology and genetics methodology will enable the student to acquire the ability to understand and design the projects.
Objectives	O1. Relating the knowledge of molecular biology with variety of molecular biology techniques O2. Comparing different molecular biology techniques O3. Developing critical thinking processes and proficiency in scientific reading O4. Developing skills to ask and answer critical questions
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Comprehend variety of molecular biology techniques LO3. Evaluate strengths and limitations of variety of experimental techniques LO4. Criticize molecular biology articles analytically LO5. Design experiments to answer specific biological problems

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	3	4	5	4	4	5	4	4
LO2	4	5	4	3	4	5	5	3	4	5
LO3	5	5	5	4	5	5	4	3	4	3
LO4	4	4	5	4	4	4	4	3	4	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Cell Culture Techniques, applications of iPSCs, SCs, organoids, etc. (class discussion and group assignments)	LO1, LO2, LO3
Principles of gene manipulation (Cloning vectors, expression vectors)	LO1, LO2, LO3
Gene transfer techniques (viral, nonviral, electroporation, Microinjection, etc.	LO1, LO2, LO3
Genome Editing	LO1, LO2, LO3, LO4
DNA sequence analysis methods	LO1, LO2, LO3, LO4
Gene expression, transcriptome, reporter assays	LO1, LO2, LO3, LO4
Epigenetics (DNA methylation Analysis, histone code)	LO1, LO2, LO3, LO4
Analysis of DNA-protein interactions	LO1, LO2, LO3, LO4
Protein-Protein interaction and localization	LO1, LO2, LO3, LO4
Protein purification and chromatography	LO1, LO2, LO3, LO4
Proteomics, metabolomics and Mass Spectrometry	LO1, LO2, LO3, LO4

DERS BİLGİLERİ

Kodu	MBG 305
İsmi	Moleküler Biyoloji’de Özel Teknik ve Uygulamalar
Haftalık Saati	5 (3+2)
Kredi	4
AKTS	6
Seviye/Yıl	Lisans/3
Dönem	Güz
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	MBG 208
İçerik	Bu ders genom dizi analizi, gen ekspresyon analizi, protein analizi, proteomik ve rekombinant protein üretimi, protein etkileşimi ve in vitro ve in vivo lokalizasyon çalışmaları gibi çeşitli moleküler biyoloji tekniklerini içerir Moleküler biyoloji ve genetik metodolojisinin hem teorik hem de pratik bilgilerini öğrenmek, öğrencinin projeleri anlama ve tasarlama becerisi kazanmasını sağlayacaktır.

COURSE RECORD

Code	MBG 306
Name	Gene Regulation
Hour per week	4 (4 + 0)
Credit	4
ECTS	7
Level/Year	Undergraduate/3
Semester	Spring
Type	Compulsory
Prerequisites	MBG 208
Description	This course will emphasize the basics and mechanisms of eucaryotic gene regulation with a specific focus on newly emerging topics. This course will be using current literature together with a main textbook. Topics will include transcriptional regulation of eukaryotic gene expression including cis elements (promoters, enhancers and insulators) and trans elements (transcription factors), key modules of differential gene expression, chromatin remodeling, the posttranscriptional regulation of gene expression including RNA interference, translational regulation etc.
Objectives	O1. Providing an understanding of the regulation of transcription in eukaryotic organisms O2. Providing the basics of post-transcriptional regulation O3. Providing the structure, formation and function of microRNAs O4. Making students understand how the process of translation is controlled.
Learning Outcomes	LO1. have a knowledge of detailed structure of genes, chromatin organization, transcription factors and how they are regulated. LO2. Identify the key components, mechanisms and multi levels of gene expression and its complexity LO3. the effects of transcription factors, their co-regulators and non coding RNAs on the regulation of eukaryotic genes. LO4. Have knowledge of designing, performing and analyzing gene expression related experiments.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	3	5	3	3	4	2	3	5	3	3
LO2	3	5	5	4	4	2	4	5	3	4
LO3	3	5	5	4	4	2	4	5	3	4
LO4	3	5	5	4	4	2	4	5	3	4

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Overview of gene expression	LO1, LO2, LO3, LO5
Transcriptional regulation	LO1, LO2, LO3, LO5
Chromatin view	LO1, LO2, LO3, LO4, LO5
Translational control	LO1, LO2, LO3, LO4, LO5
Non-coding RNA	LO1, LO2, LO3, LO4, LO5

DERS BİLGİLERİ

Kodu	MBG 306
İsmi	Gen Regülasyonu
Haftalık Saati	4 (4 + 0)
Kredi	4
AKTS	7
Seviye/Yıl	Lisans/3
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	MBG 208
İçerik	Bu ders yeni ortaya çıkan konulara odaklanarak ökaryotik gen regülasyonunun temelleri ve mekanizmalarına odaklanacaktır. Bu ders güncel literatürü ana ders kitabı ile birlikte kullanacaktır. Konular, cis elemanları (promotörler, arttırıcılar ve izolatörler) ve trans elemanları (transkripsiyon faktörleri), diferansiyel gen ekspresyonunun anahtar modülleri, cis ve trans elemanları arasındaki etkileşimleri belirleme yöntemleri, kromatin yeniden modellenmesi, posttranskripsiyonel düzenleme dahil olmak üzere ökaryotik gen ekspresyonunun transkripsiyonel regülasyonunu içerecektir. RNA etkileşimi ve gen ekspresyonunun çeviri seviyesinde kontrolünü içeren transkripsiyon sonrası mekanizmalar irdelenecektir.

COURSE RECORD

Code	MBG 309
Name	Human Genetics
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3
Semester	Fall
Type	Compulsory
Prerequisites	MBG 209
Description	The main aim of this course is to provide an insight into Human Genetics. This lecture will encompass genetic inheritance, understanding genomes, genetic variation, epigenetics etc.
Objectives	O1. Providing information on Basics of DNA, Chromosomes, Cells, Development, and Inheritance O2. Understanding genomes O3. Understanding genetic variation between individuals and species
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Describe different types of Human Diseases LO2. Explain genomes type LO3. Distinguish genetic variation between individuals and species LO4. Discuss basics of human genetic disease LO5. Discuss application of human molecular genetics technics to understand the mechanism of diseases and the possible treatment of the diseases.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	5	5	5	3	2	0	0
LO2	5	5	5	5	5	5	3	2	0	0
LO3	5	5	5	5	4	4	3	2	0	0
LO4	2	2	2	2	5	5	5	5	5	5
LO5	2	2	2	2	5	5	5	5	5	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Understanding Human Disease, The Genetic System: Chromosomes, Genetic and Physical Mapping of the Human Genome, Discovering Human Disease Genes	LO1, LO2, LO3
Molecular Genetics of Complex Disorders	LO1, LO4, LO5
Genomic Imprinting: An Epigenetic Modification, Molecular Genetics of Mitochondrial Disorders, Molecular Genetics of Muscle Disorders	LO1, LO3, LO4, LO5
Molecular Genetics of Neurological Disorders	LO1, LO4, LO5
Molecular Genetics of the Eye	LO1, LO4, LO5
Molecular Genetics of Cancer Syndromes, Counseling, Diagnostic Testing, and Management of Genetic Disorders	LO1, LO4, LO5

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DERS BİLGİLERİ

Kodu	MBG 309
İsmi	İnsan Genetiği
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3
Dönem	Güz
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	MBG209
İçerik	Bu dersin temel amacı, İnsan Genetiği hakkında bir fikir vermektir. Bu ders genetik kalıtım, genomları anlama, genetik varyasyon, epigenetik vb. konuları kapsayacaktır.

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COURSE RECORD

Code	MBG 404
Name	Current topics in Molecular Biology
Hour per week	3 (3+0)
Credit	3
ECTS	6
Level/Year	Undergraduate/4
Semester	Spring
Type	Compulsory
Prerequisites	
Description	This course aims to improve the presentation skills of the students. The course will be co-taught by several faculty members or guest speakers from other universities as seminars to widen the perspective of the students. The aim of this seminar is to explain a range current topic in molecular biology according to the expertise of the lecturer of the week. These meetings should also provide an opportunity for career advice. Students will also have the opportunity to give presentations about the topic of the week.
Objectives	O1. Developing the ability to analyze current literature O2. Leading a comprehensive discussion on that literature O3. Developing scientific conversation skills
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Gain experience in critically evaluating the current literature in molecular biology. LO2. Become familiar with the current literature and techniques in molecular biology LO3. Gain confidence in scientific presentations and discussions. LO4. Present findings from primary literature in a scientific manner

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	4	2		1		2		3	3
LO2	5	3	2		3		2		2	2
LO3	3						3			4
LO4	4	4						5	4	4

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topics	Outcomes
1-14 Presentations	LO1, LO2, LO3, LO4

DERS BİLGİLERİ

Kodu	MBG 404
İsmi	Moleküler Biyolojide Güncel Konular
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	6
Seviye/Yıl	Lisans/4
Dönem	Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	
İçerik	Bu ders öğrencilerin sunum becerilerini geliştirmeyi amaçlamaktadır. Ders, öğrencilerin bakış açısını genişletmek için çeşitli öğretim üyeleri veya diğer üniversitelerden misafir konuşmacılar tarafından seminerler olarak verilecektir. Bu seminerin amacı, haftanın öğretim görevlisinin uzmanlığına göre moleküler biyolojide güncel bir konuyu açıklamaktır. Bu toplantılar aynı zamanda kariyer tavsiyesi için bir fırsat sağlamalıdır. Öğrenciler ayrıca haftanın konusu hakkında sunum yapma fırsatı bulacaklar.

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COURSE RECORD

Code	MBG 499
Name	Summer Internship
Hour per week	2 (0+2)
Credit	1
ECTS	6
Level/Year	Undergraduate
Semester	Fall, Spring
Type	Compulsory
Prerequisites	
Description	This course aims to present the work of students during their summer internship. The students carry out their internship and following fall or spring, they require to present their study.
Objectives	O1. Exploring career alternatives prior to graduation. O2. Integrating theory and practice.
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. gain knowledge of a specific company/industry/academia LO2. improve competency in specific areas related to your academic major LO3. develop skills in research, analysis, organization, teamwork, initiative LO4. Assess interests and abilities in their field of study.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	2				2		3	3	5	5
LO2				4	4		4		5	4
LO3				5	4	5	5		5	4
LO4	4			4	5		4		5	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topics	Outcomes
Conducting summer internship	LO1, LO2, LO3, LO4

DERS BİLGİLERİ

Kodu	MBG 499
İsmi	Yaz stajı
Haftalık Saati	2 (0 + 2)
Kredi	1
AKTS	6
Seviye/Yıl	Lisans/3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Zorunlu
Ön Şart	
İçerik	Bu ders, öğrencilerin yaz stajları sırasında yaptıkları çalışmaları sunmayı amaçlamaktadır. Öğrenciler stajlarını yaparlar ve güz veya bahar aylarında çalışmalarını sunmaları gerekir.

COURSE RECORD

Code	MBG 402
Name	Computational Biology
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 3,4
Semester	Fall, Spring
Type	Elective
Prerequisites	
Description	This course will provide up-to-date theories and methodologies in computational biology with emphasis on structural and dynamic aspects of biological systems at atomic scale. The classes consist of both classroom lectures and computer labs. Upon completion of the course, the students should be able to perform various computational analyses on biological systems. The topics include Linux basics, molecular modelling and visualization, molecular dynamics, search algorithms, statistical analysis of biological data.
Objectives	O1. Introducing basic understanding of theories and methodologies in computational biology O2. Making students well equipped with the necessary skills to contextualize biomedical problems in terms of computational models/tools.
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Get acquainted with Linux operating system and how to write small scripts to run specific workflows LO2. Apply available tools and their main functions in structural biology LO3. Design a small project to apply the rules and information they have learnt LO4. Recognize the biological molecules and their data representations and their visualizations

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1										
LO2	3	3								
LO3	3	3		3	5	5	4		3	3
LO4		4	3	3						

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to Linux OS and Scripting	LO1
Molecular Dynamics Simulations	L02,L04
Molecules in MD	L02,L04
Biological Databases and Sequencing	L02
Molecular Representations	L02,L04
Building MD Workflows	L01,L03

DERS BİLGİLERİ

Kodu	MBG 402
İsmi	Hesaplamalı Biyoloji
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans / 3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Bu ders atomik ölçekteki biyolojik sistemlerin yapısal ve dinamik yönleri hakkındaki hesaplamalı biyolojideki güncel kuram ve yöntemleri sunmayı amaçlamaktadır. Dersler sınıf dersleri ve bilgisayar uygulamalarından oluşmaktadır. Dersi başarıyla tamamlayan öğrenciler biyolojik sistemler üzerinde farklı hesaplamalı biyoloji analizleri gerçekleştirebilecektir.Ders konuları Temel seviye Linux, moleküler modelleme ve görüntüleme, moleküler dinamik, arama algoritmaları ve biyolojik verilen istatistiksel analizini kapsamaktadır.

COURSE RECORD

Code	MBG 403
Name	Human Genetic Disorders
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 3,4
Semester	Fall, Spring
Type	Elective
Prerequisites	
Description	There are at least 7000 diseases around the world, affecting 350 million people worldwide. Of these diseases, 80% are of genetic origin. In the lecture's series, a range of topics including whether the diseases are caused by mutations in a single gene, mutations in multiple genes, defects in chromosome or mitochondrial DNA will be discussed. A number of genetic diseases such as Parkinson's and anemia will be covered in the lectures. Information on the causes, mechanisms and history of diseases will be given.
Objectives	01. Providing the details of basic principles of different types of inheritance patterns of human diseases 02. Making the students familiar with the basic concepts of mendelian inheritance and multigenic inheritance of the diseases 03. Providing basic knowledge in the field of epigenetic and transgenerational inheritance 04. Giving students the main information behind the potential implications of personalized and genomic medicine
Learning Outcomes	LO1. Compare and contrast different types of inheritance patterns of human disease LO2. Identify a Mendelian inheritance pattern and a multigenic inheritance pattern LO3. Explain the basics of epigenetic and transgenerational inheritance LO4. Explain the potential benefits and risks of genomic medicine LO5. Interpret and analyze data from primary literature in genetics and genomics

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	3	5	2	3	3	3	3
LO2	5	5	5	3	5	2	3	3	3	3
LO3	5	5	5	3	5	2	3	3	3	3
LO4	5	5	5	3	5	2	3	3	3	3
LO5	5	5	5	5	5	2	3	3	4	4

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to genetic diseases and basic principles of different types of inheritance patterns of human diseases	LO1, LO2, LO3,
Epigenetic and transgenerational inheritance	LO1, LO2, LO3, LO4
Mendelian disease I: Overview of complex trait inheritance, including epigenetic and environmental effects, modifiers of Mendelian disease	LO1, LO2, LO4, LO5

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Complex diseases- I: cancer genetics, infectious disease genetics	LO1, LO2, LO4, LO5
Personalized Medicine and Personal Genomics I: What are personalized medicine and personal genomics?	LO1, LO2,LO3, LO5

DERS BİLGİLERİ

Kodu	MBG 403
İsmi	İnsan Genetik Hastalıkları
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans /3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Şeçmeli
Ön Şart	
İçerik	Dünya genelinde 350 milyon insanı etkileyen en az 7000 hastalık bulunmaktadır. Bu hastalıkların % 80'i genetik kaynaklıdır. Bu ders kapsamında, hastalıkların tekli gen mutasyonlarıyla mı, çoklu sebeplerle mi, kromozomal ya da mitokondriyal mı olduğu konuları işlenecektir. Parkinson, anemi gibi genetik hastalıklar tek tek tartışılacaktır. Hastalıkların oluşma nedeni, mekanizması, tarihçesi hakkında bilgiler verilecektir.

COURSE RECORD

Code	MBG 405
Name	Molecular Evolution
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 3,4
Semester	Fall, Spring
Type	Elective
Prerequisites	
Description	In this course, the principles of evolution, molecular evolution and phylogenetic issues will be covered. The lecture also covers specific topics including DNA polymorphisms, molecular evolutionary trees, molecular clocks, gene count and genome size, organelle and nuclear genetic markers, genetic mutations and selection, evolution of multiple gene families, gene duplications, transpositions, and gene transpositions.
Objectives	O1. Defining the basics concepts and approaches to examine molecular evolution. O2. Analysing variety and organization of genomes in a phylogenetic perspective.
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Demonstrate basic knowledge of the evolutionary processes at the molecular genetic level LO2. Interpret molecular data to examine phylogenetic connections between species or lineages. LO3. Critically evaluate different methodologies to confirm or reject the evolutionary patterns and processes. LO4. Discuss case studies in evolutionary research

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	4	4	3	3	3	3	3
LO2	5	5	5	5	4	3	3	4	3	3
LO3	4	4	5	5	4	5	4	5	5	3
LO4	5	5	5	5	4	4	4	5	4	4

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to Molecular Evolution: mutations, evolution, natural selection, phylogeny	LO1
Structure of gene and genome organization	LO1
Evolution of genes in populations: Hardy-Weinberg equilibrium, Genetic Drift	LO1, LO2
Patterns of nucleotide substitution: DNA polymorphisms and SNPs	LO1, LO2
Evolution of mutation rates and DNA sequences	LO1, LO2, LO3
The neutral and nearly-neutral theories of molecular evolution	LO1, LO2, LO3
The molecular clocks	LO1, LO2, LO3
Molecular evolutionary trees	LO1, LO2, LO3
Positive/negative selection and evolutionary adaptation	LO1, LO2, LO3
Genomic evolution: nuclear genome, gene count, genome size	LO1, LO2, LO3
Evolution by transposition	LO1, LO2, LO3
Gene duplications/loss and multi-gene families.	LO1, LO2
Evolution of gene functions	LO1, LO2, LO3
Molecular Evolution: Case studies	

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LO1, LO2, LO3,
LO4

DERS BİLGİLERİ

Kodu	MBG 405
İsmi	Moleküler Evrim
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/ 3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Bu derste evrimin ilkeleri, moleküler evrim ve filogenetik konuları öğretilenektir. Bu ders kapsamında ayrıca, DNA polimorfizmleri, moleküler evrim ağaçları, moleküler saatler, gen sayısı ve genom boyutu, organel ve nüklear genetik markerler, genetik mutasyonlar ve seçilim, çoklu gen ailelerinin evrimi, gen duplikasyonları, transpozisyonlar ve gen transpozisyonları gibi konulara da yer verilecektir.

COURSE RECORD

Code	MBG 406
Name	Molecular Medicine
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3,4
Semester	Fall, Spring
Type	Elective
Prerequisites	
Description	This course will introduce a new interdisciplinary area of study named “molecular medicine” that explores revolutionary developments in disease diagnosis, therapy and prevention, which is allowed by bio-molecular research. It shows how basic science is translated from ‘theory to the clinic.’ It covers advances in genomics that allowed the understanding of the disease mechanisms at cellular level, opening up new ways to treat major illnesses. The course’s main focus includes cancer, neuroscience, genetics, microbiology and immunology. This course allows students to have a perspective on the advances of science and importance of basic and clinical research in future drug discoveries.
Objectives	O1. Covering consequences of mutations and polymorphisms, and impacts of genes and environment on major common diseases, such as cancer, immunology, neurodegenerative diseases, metabolic diseases. O2. Presenting research results in peer-reviewed publications and discussing case studies. O3. Debating ethical issues, analyzing key moral concepts and principles, and discussing them productively with others.
Learning Outcomes	LO1. Recognize molecular mechanisms in the development of disease and how molecular/cellular biology may be used to characterize cellular processes LO2. Gain knowledge and explain the organizational requirements for the translation of biomedical therapeutics from bench to bedside. LO3. Debate the impact translational research has had on human health and disease. LO4. Articulate the significance and potential of molecular medical advances in biomedical research. LO5. Read and critically evaluate scientific literature.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5		5	4	5	5	5	4
LO2	5	5	5		4	4	5	5	4	4
LO3	5	5	5		4	4	5	4	4	4
LO4	5	5	5		5	4	5	5	4	4
LO5	5	5	5		4	4	5	5	5	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

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COURSE CONTENT DETAILS

Topic	Outcomes
Molecular Oncology	LO1, LO2, LO3
Immunity	LO1, LO2, LO3
Metabolic disorders and Aging related chronic diseases	LO1, LO2, LO3
Muscular disorders	LO1, LO2, LO3
Neurological disorders	LO1, LO2, LO3
Regenerative medicine and Stem cell research	LO1, LO2, LO4
Pharmacogenetics/Pharmacogenomics	LO1, LO2, LO4, LO5
Recombinant protein drugs	LO5
Personalized Medicine and Precision Medicine	LO1, LO4, LO5
Ethical, Legal and Social Issues in Molecular Medicine	LO1, LO5

DERS BİLGİLERİ

Kodu	MBG 406
İsmi	Moleküler Tıp
Haftalık Saati	3 (3+ 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Bu ders, biyomoleküler araştırmaların izin verdiği hastalık teşhisi, tedavisi ve önlenmesindeki devrim niteliğindeki gelişmeleri araştıran “moleküler tıp” adlı yeni disiplinler arası bir çalışma alanını tanıttacaktır. Temel bilimin "teoriden kliniğe" nasıl çevrildiğini gösterir. Hücresel düzeyde hastalık mekanizmalarının anlaşılmasına olanak tanıyan ve büyük hastalıkları tedavi etmek için yeni yollar açan genomikteki ilerlemeleri kapsar. Dersin ana odak noktası kanser, sinirbilim, genetik, mikrobiyoloji ve immünolojidir. Bu ders, öğrencilerin gelecekteki ilaç keşiflerinde bilimdeki ilerlemeler ve temel ve klinik araştırmaların önemi hakkında bir bakış açısına sahip olmalarını sağlar.

COURSE RECORD

Code	MBG 407
Name	Stem Cell
Hour per week	3 (3+ 0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3,4
Semester	Fall or Spring
Type	Elective
Prerequisites	
Description	This course is designed to teach basic concepts of stem cells including functions and their characterization. Contents of the lectures include somatic stem, embryonic stem cells, pluripotent stem. In addition to an overview of stem cell tissue and organ development and also their applications for based therapeutic approaches and their limitations is given.
Objectives	O1. Understanding the concept of basic stem cells O2. Understanding the role of stem cells in tissue and organ development O3. Understanding the applications of stem cells. O4. Understanding the regulation and Ethics.
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Explain the specific characteristics of stem cells. LO2. Describe stem cell niche. LO3. Describe role of stem cells in tissue and organ development. LO4. Define differentiation of specialized cells. LO5. Describe applications of stem cells for treatment of diseases. LO6. Describe current limitations of stem cell biology applications and regulation and Ethics.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	2	2	2	2	2	2	2	2
LO2	0	5	5	5	5	5	0	0	0	0
LO3	0	0	0	0	0	5	5	5	5	0
LO4	0	0	0	0	0	0	0	0	0	5
LO5	0	0	0	0	0	0	0	0	5	5
LO6	0	0	0	0	2	2	2	2	2	3

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to Stem Cell, Basic Biology and Mechanisms	LO1, LO2
-Stem cell niches	
-Mechanism of Stem Cell Self-Renewal	
-Cell cycle Regulators in Stem Cell	
Tissue and Organ Development	LO2
-Differentiation in Early Development	
-Stem Cell Derived from amniotic Fluid	
-Stem and Progenitor Isolated from Cord Blood	
-The Nervous System	
Tissue and Organ Development	LO2
-Differentiation in Early Development	

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-Stem Cell Derived from amniotic Fluid
-Stem and Progenitor Isolated from Cord Blood
-The Nervous System

Methods	LO3, LO4
Applications	LO4, LO5, LO6
Regulation and Ethics	LO5, LO6

DERS BİLGİLERİ

Kodu	MBG 407
İsmi	Kök Hücre
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Bu ders, kök hücrenin temel kavramlarını, işlevleri ve karakterizasyonlarını öğretmek için tasarlanmıştır. Derste somatik kök, embriyonik kök hücreler, pluripotent kök hücreler ele alınacaktır. Kök hücrenin doku ve organ gelişiminde önemi yanında kök hücrenin tedavi amaçlı kullanımı, bunların terapötik yaklaşımlar için uygulamaları anlatılacaktır. Ayrıca kök hücre çalışmalarındaki regulasyonlardan ve kök hücre kullanımı etik yönünden ele alınacaktır.

COURSE RECORD

Code	MBG 408
Name	Biomolecules
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 2,3,4
Semester	Fall, Spring
Type	Elective
Prerequisites	
Description	This course will cover the description, classification, characteristic properties, structures, and the functions of biomolecules that participate in the metabolic processes of living organisms to maintain life. The scope of the course includes physicochemical and structural properties of the most essential organic molecules such as proteins, nucleic acids, lipids, and carbohydrates. This course allows students to distinguish the disorders that can be caused by deficiency or abundance of certain biomolecules. Upon completing this course, students will develop a mechanical knowledge of the biochemical reactions in life processes. Basic physics and biochemistry knowledge is recommended.
Objectives	O1. Recognizing the concept of chemical principles in life processes. O2. Describing the fundamental relationship between the structure and cellular function of biomolecules including nucleic acids, lipids, carbohydrates, and proteins. O3. Introducing useful techniques to analyze biomolecular interactions.
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Define the chemical nomenclature of organic molecules and recognize chemical bonds. LO2. Relate the connection between molecular properties and biological responses of small and macromolecules. LO3. Explain the unique properties of biomolecules that contribute to the structure and function of cells. LO4. Distinguish different functions of certain biomolecules, including storing and/or transmitting the genetic codes, cell signaling, functional organization of organelles, and cellular metabolism. LO5. Examine the different methods and technologies for the analysis of biomolecules.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	3	3	3	3	4	3	3
LO2	5	5	5	3	3	3	3	4	3	3
LO3	5	5	5	4	4	3	3	4	3	3
LO4	5	5	5	4	4	3	3	4	3	3
LO5	5	5	5	5	5	5	5	5	4	4

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to biomolecules: Chemistry of life	LO1, LO2, LO3
Amino acids: biosynthesis and metabolism	LO1, LO2, LO3
	LO2, LO3, LO4
Peptides and proteins	LO2, LO3, LO4
Enzymes: Characteristics and Kinetics regulation	LO2, LO3, LO4
Role of Protein Structure in Health and Disease	LO3, LO4
Methods of protein analysis	LO5
Structure and functions of Carbohydrates	LO2, LO3, LO4
Disorders of Carbohydrate Metabolism	LO3, LO4
Methods of carbohydrate analysis	LO5
Structure and functions of lipids	LO2, LO3, LO4
Lipid metabolism disorders	LO3, LO4
Structure and functions of nucleic acids	LO2, LO3, LO4
Methods of nucleic acid analysis	LO5

DERS BİLGİLERİ

Kodu	MBG 408
İsmi	Biyomoleküller
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/ 3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Bu ders, tüm canlı organizmaların yaşamlarını sürdürebilmek için gerekli olan metabolik süreçlerde görev alan biyomoleküllerin, tanımlanması sınıflandırılması, karakteristik özellikleri, yapıları ve işlevlerini kapsayacaktır. Dersin kapsamı, proteinler, nükleik asitler, lipidler ve karbonhidratlar gibi en temel organik moleküllerin fizikokimyasal ve yapısal özelliklerini içermektedir. Öğrenciler, bu derste öğrendikleri konular doğrultusunda, belirli biyomoleküllerin eksikliği veya fazlalığından kaynaklanabilecek bozuklukları ayırt edebileceklerdir. Bu dersi tamamlayan öğrenciler, yaşam süreçlerindeki biyokimyasal reaksiyonlar hakkında mekanik bilgi geliştireceklerdir. Öğrencilerin temel fizik ve biyokimya bilgisine sahip olmaları önerilmektedir.

COURSE RECORD

Code	MBG 409
Name	Cancer Biology
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 3,4
Semester	Fall, Spring
Type	Elective
Prerequisites	
Description	This course will emphasize the steps of carcinogenesis at the molecular level by specifically focusing on the hallmarks of cancer cells. Oncogenes, tumor suppressor genes, cell cycle regulation, angiogenesis, metastasis and invasion, tumor environment, multi drug resistance mechanisms, cancer stem cell and targeting of all steps of carcinogenesis for therapeutic purposes will be covered through the lecture.
Objectives	O1. Providing the details of basic principles of cancer development at the level of molecular and cell biology O2. Making the students familiar with the basic concepts applied to cancer diagnosis and treatment O3. Providing basic knowledge in the field in order to follow current literature O4. Giving students main knowledge behind the difficulties in the treatment of cancer
Learning Outcomes	LO1. Define the differences between normal and cancer cells LO2. Define the factors causing cancer LO3. Define the mechanisms involved in cancer development LO4. Have knowledge of molecular approaches used in cancer treatment LO5. Have knowledge of scientific databases and sources, project writing and presentation skills for students

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	3	5	3	3	4	2	3	5	3	3
LO2	3	5	5	4	4	2	4	5	3	4
LO3	3	5	5	4	4	2	4	5	3	4
LO4	3	5	5	4	4	2	4	5	3	4
LO5	5	5	5	5	5	5	5	5	4	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Hallmarks of Cancer	LO1, LO2, LO3, LO5
Carcinogenesis	LO1, LO2, LO3, LO5
Tumor suppressor genes and oncogenes	LO1, LO2, LO3, LO5
Cell cycle and cancer	LO1, LO2, LO3, LO5
Cell death mechanisms	LO1, LO2, LO3, LO4, LO5
Multi Drug resistance in cancer	LO1, LO2, LO3, LO4, LO5
Invasion and Metastasis	LO1, LO2, LO3, LO4, LO5
Angiogenesis	LO1, LO2, LO3, LO4, LO5
Epigenetics in cancer	LO1, LO2, LO3, LO4, LO5
Tumor microenvironment	LO1, LO2, LO3, LO4, LO5
Cancer Stem cell	LO1, LO2, LO3, LO4, LO5

DERS BİLGİLERİ

Kodu	MBG 409
İsmi	Kanser Biyolojisi
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Şeçmeli
Ön Şart	
İçerik	Bu ders kanser gelişiminin hücrel ve moleküler seviyedeki temelleri hakkında genel bir bilgi birikimi sağlamayı amaçlamaktadır. Karsinogenez sürecinde karşılaşılan, hücre çoğalmasında meydana gelen bozukluklar, hücre ölümünden kaçma, anjiyogenez, metastaz ve invazyon gibi çeşitli genetik ve moleküler değişimleri içeren süreçler tartışılacaktır. Ayrıca, kanser gelişiminde rol alan faktörler, tumor ve çevresi arasındaki ilişkiler, kanserin önlenmesi ve tedavi yaklaşımları dersin konuları arasındadır.

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COURSE RECORD

Code	MBG 411
Name	Model Organism
Hour per week	3 (3+ 0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3,4
Semester	Fall or Spring
Type	Elective
Prerequisites	
Description	In this course, model organisms will be introduced intensively in molecular and biological studies. Mice, frogs, zebrafish, <i>drosophila</i> , <i>Caenorhabditis elegans</i> and cell culture are the main model organisms to focus in this course. The model organisms have advantages and disadvantages according to different studies which will also be covered in the course.
Objectives	O1. Understanding model organisms in science O2. Defining advantages and disadvantages of model organism.
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. explain why and when model organisms are used, LO2. critically asks questions in lectures on model organisms, LO3. suggest a model that is suited to address specific research questions LO4. obtain specific information from genomic databases on model organisms, including, <i>Caenorhabditis elegans</i> , <i>Drosophila melanogaster</i> , <i>Danio rerio</i> and <i>Mus musculus</i> . LO5. apply model organisms in future research

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	2	4	2	3	4	5	3	4	3
LO2	5	2	4	2	3	4	5	3	4	3
LO3	5	2	4	2	3	4	5	3	4	3
LO4	5	2	4	2	3	4	5	3	4	3
LO5	5	2	4	2	3	4	5	3	4	3

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to Genetics of Model Organisms, <i>Drosophila</i> as Model Organism	LO1,
Zebrafish as Model Organism	LO1,
Mouse as a genetic model system, Mouse genetic screens. Mouse dosage compensation in mammals	LO1, LO2
Yeast Genetics	LO3, LO4
Introduction to <i>C. elegans</i> as a Model System	LO4
RNAi: discovery, function and its use as a genetic tool in <i>C. elegans</i> , Genomic Editing, Genetic screen	LO4, LO5

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DERS BİLGİLERİ

Kodu	MBG 411
İsmi	Model Organizmalar
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans
Dönem	Güz veya Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Bu derste, moleküler biyolojik ve genetik çalışmalarında kullanılan model organizmalar tanıtılacaktır. Fareler, kurbağalar, zebra balığı, drosophila, Caenorhabditis elegans ve hücre kültürü, bu derste odaklanılacak ana model organizmalardır. Model organizmaların araştırılacak konulara göre avantajları ve dezavantajları bu derste tartışılacaktır.

COURSE RECORD

Code	MBG 412
Name	Immunology
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3,4
Semester	Fall, Spring
Type	Elective
Prerequisites	
Description	This course covers very basic knowledge of immunology which covers development of different hematopoietic cells, innate immunity, adaptive immunity, structure and function of lymphoid organs, synthesis, function of antibody and immunologically important proteins such as Fc-receptors, cytokines, cytokine receptors, major histocompatibility complex molecules. In addition, special attention will be given on the basic immunological mechanisms of allergy and autoimmunity.
Objectives	O1. Making students appreciate and apply the concepts in immunology in daily life O2. Making students to understand the complexity of immunology O3. Underlining the importance of thinking in molecular level in science O4. Explaining how immune system contributes to pathology of autoimmune diseases.
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. State basic concepts in immunology LO2. Describe the arms of immune system; adaptive and innate. LO3. Distinguish the mechanistic differences between adaptive and innate immune system. LO4. Analyze how innate and adaptive immune synchronize their efforts. LO5. Demonstrate the understanding of how immune system contributes to pathology of autoimmune diseases.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	4	4	2	4	3	3	4	4	5
LO2	5	4	4	2	4	3	3	4	4	5
LO3	5	4	4	3	4	3	3	4	4	5
LO4	5	4	4	3	4	3	3	4	4	5
LO5	5	4	4	3	5	3	3	4	5	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
An Overview of immune system	LO1
The Innate Immune System	LO1, LO2
B Cells and Antibodies	LO1, LO2, LO3, LO4, LO5
The Magic of Antigen Presentation	LO1, LO2, LO3
T Cell Activation and T Cells at Work	LO1, LO2, LO5
Secondary Lymphoid Organs and Lymphocyte Trafficking	LO1, LO2
Restraining the Immune System	LO1, LO3, LO4, LO5
Self-Tolerance and MHC Restriction	LO1, LO2, LO3, LO4, LO5
Immunological Memory	LO1, LO2

DERS BİLGİLERİ

Kodu	MBG 412
İsmi	İmmünoloji
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Bu ders, farklı hematopoietik hücrelerin gelişimi, doğuştan gelen bağışıklık, adaptif bağışıklık, lenfoid organların yapısı ve işlevi, antikorların sentezi ve işlevi ile Fc-reseptörleri, sitokinler, sitokin reseptörleri, major histo-uyumluluk karmaşık molekülleri kapsamaktadır. Ayrıca alerji ve otoimmünite gibi temel immünolojik mekanizmalarına özel önem verilecektir

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COURSE RECORD

Code	MBG 413
Name	Biotechnology
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3,4
Semester	Fall, Spring
Type	Elective
Prerequisites	
Description	The course deals with the major elements of biotechnology and its global significance, the categories of biotechnological processes and products, and a comparison between "traditional" vs "modern" biotechnology processes. In addition, following topics will be covered: the key developments in the history of biotechnology specifically – fermentation, genetic engineering and cloning of animals, growing animal cells, tissues and meat, genetic engineering of plants genome editing and regulations, and bacteriophages.
Objectives	O1. Identifying traditional vs modern fermentation techniques, comprehend key developments in biotechnology specifically on fermentation O2. Understanding genetic engineering, cloning of animals and how to grow animal cells, tissues and artificial meat O3. Understanding genetic engineering of plants, genome editing and regulations and learn bacteriophage -from foe to friend O4. Presenting a biotechnology topic in teams
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Compare traditional vs modern fermentation techniques and describe key developments in biotechnology industry specifically on fermentation LO2. Define technics used for genetic engineering and cloning of animals and describe how to grow animal cells, tissues and artificial meat LO3. Define mechanisms of genetic engineering of plants, genome editing and regulations and identify bacteriophages from foe to friend. LO4. Present a biotechnology related topic as a team.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	3	4	3	3	4	3	3	4	5	4
LO2	3	4	4	3	4	3	3	4	5	4
LO3	3	4	4	3	4	3	3	4	5	4
LO4	4	5	4	5	5	5	5	4	5	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
From "wild" to controlled fermentations	LO1
Cocoa fermentation	LO1
Growing animal cells, tissues and meat	LO2
Genetic engineering and cloning of animals	LO2
Genetic engineering of plants – the basic techniques	LO3
Genome editing and regulations	LO3
Bacteriophage--foe and friend	LO3

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DERS BİLGİLERİ

Kodu	MBG 413
İsmi	Biyoteknoloji
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Bu ders, temel biyoteknoloji elementleri ve bunların küresel önemi, biyoteknolojik prosesler ve ürün kategorileri ile birlikte geleneksel ve modern biyoteknoloji süreçlerinin karşılaştırılmasını içerir. Ek olarak: biyoteknoloji tarihindeki önemli gelişmeler özellikle fermantasyon genetik mühendislik ve hayvan klonlama, hayvan hücrelerini geliştirme, doku ve yapay et üretme bitkilerin genetik mühendisliği, genom biçimleme ve yasal düzenlemeler, bakteriyofajlar konuları işlenecektir.

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COURSE RECORD

Code	MBG 414
Name	Biomaterials
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3,4
Semester	Fall, Spring
Type	Elective
Prerequisites	
Description	This course covers biomaterials definition, material types, characterization techniques, biocompatibility, blood compatibility, tissue response and wound healing process, biocompatibility testing methods, and application examples.
Objectives	O1. Describing biomaterial, preparation methods and material characterization techniques. O2. Comprehending biocompatibility and understanding the strategies to improve. O3. Comprehending the idea of the design in biomaterials science.
Learning Outcomes	By the end of the course, the student will be able to LO1. Describe biomaterial and categorize material types used as biomaterial. LO2. Acquire knowledge about the techniques for biomaterial characterization. LO3. Explain and evaluate tissue and blood response upon a biomaterial-implant application in the body. LO4. Design a biomaterial system consisting of a specific material for a specific application to solve a problem in the human body.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	3	2	1	4	2	5	4	5	5	5
LO2	3	2	1	4	2	5	4	5	5	5
LO3	3	2	1	5	2	5	5	5	5	5
LO4	3	2	1	5	2	5	5	5	5	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topics	Outcomes
Definition of Material Properties and Characterization	LO1, LO2
Types of Biomaterials (Metals, Ceramics, Polymers, Composites)	LO1, LO2, LO3, LO4
Tissue response and Biocompatibility	LO3, LO4

DERS BİLGİLERİ

Kodu	MBG 414
İsmi	Biyomalzemeler
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Bu ders biyomalzeme tanımı, malzeme türleri, karakterizasyon teknikleri, biyoyumluluk, kan uyumluluğu, doku yanıtı ve yara iyileşme süreci, biyoyumluluk test yöntemleri ve uygulama örneklerini kapsar.

COURSE RECORD

Code	MBG 416
Name	Developmental Biology
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 3,4
Semester	Fall, Spring
Type	Elective
Prerequisites	MBG 111, MBG 112
Description	The developmental biology explores how living things are shaped, how their lives are formed, how this complex structure develops and differentiates. The course covers topics such as the stages of development in different organisms in the early period, how fertilization, meiosis, organogenesis and environmental factors affect the organism's development. It also links the content of the course to the context of modern and old experiments used in the study of developmental biology.
Objectives	O1. Introducing students to the molecular and cellular mechanisms that underlie the early development of organisms O2. Making students familiar with the main regulators involved in differentiation, morphogenesis and growth
Learning Outcomes	LO1. Describe the common stages of development in most multicellular organisms. LO2. Describe the main anatomical changes during development LO3. Differentiate the cellular behaviors involved in morphological change during development. LO4. Explain how gene activation plays a role in differentiation and development. LO5. Define the development disorders arise from errors during development

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	3	5	2	3	3	3	3
LO2	5	5	5	3	5	2	3	3	3	3
LO3	5	5	5	3	5	2	3	3	3	3
LO4	5	5	5	3	5	2	3	3	3	3
LO5	5	5	5	5	5	2	3	3	3	3

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Fertilization	LO1, LO3
Differential Gene Expression in Development	LO4
Early Development and Gastrulation	LO1, LO2, LO3
Axis Formation	LO2, LO3, LO4
Sex Determination	LO2, LO3, LO4
Germline Development	LO2, LO3, LO4
Neural Development	LO2, LO3, LO4
Neural Crest	LO2, LO3, LO4
Organ Development	LO2, LO3, LO4
Development and Disease	LO1, LO2, LO3, LO4, LO5
Environmental Influences on Development	LO1, LO2, LO3, LO4, LO5

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DERS BİLGİLERİ

Kodu	MBG 416
İsmi	Gelişim Biyolojisi
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Şeçmeli
Ön Şart	MBG111, MBG112
İçerik	Gelişim biyolojisi canlıların nasıl meydana geldiğini, hayatlarının nasıl oluştuğunu , bu kompleks yapının nasıl gelişip farklılaştığını araştırır. Ders erken dönemde farklı organizmalardaki gelişim basamaklarını, döllenme, mayoz, organogenez ve çevresel faktörlerin organizma gelişimini nasıl etkilediği gibi konuları kapsar. Ayrıca gelişim biyolojisinin çalışılması sırasında kullanılan eski deneylerle ve modern teknikler konusunda dersin içeriğine dahildir.

COURSE RECORD

Code	MBG 417
Name	Basic of Neuroscience
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3,4
Semester	Spring
Type	Elective
Prerequisites	
Description	The main aim of this course is to provide an insight into neuroscience at the molecular and cellular level. The course will introduce the mammalian nervous system to the students. Neurons are highly specialized cells that relay the information to other neurons through chemical and electrical signals. Chemical synaptic transmission and the neurotransmitters will be discussed in the lectures.
Objectives	O1. Gain knowledge of human neuroanatomy, existence of the different types of Neurons (Cells of the Nervous System), Neuron structure and Glia, the neuronal chemicals and ion channels and O2. Identifying and describing axon, dendrite and membrane Potential and the Passive Electrical, Properties of the Neuron, and Propagated Signaling: The Action Potentials
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1 Define Human Neuroanatomy Describe the different types of Neurons (Cells of the Nervous System), Neuron structure and Glia, Describe the chemicals and ion channels LO2 Identify and describe axon, dendrite and membrane Potential and the Passive Electrical, Properties of the Neuron, and Propagated Signaling: The Action Potentials Describe synaptic transmission and Signaling at the Nerve-Muscle Synapse: Directly Gated Transmission, Transmitter Release and Neurotransmitters • LO3 Describe the organization of the central nervous system, The Organization of Cognition and Cognitive Functions of the Premotor Systems Describe Sensory Coding, The Somatosensory System: Receptors and Central Pathways, Touch and Pain LO4 Describe smell and Taste: The Chemical Senses, describe movement, Voluntary Movement: The Primary Motor Cortex, describe Genetic Mechanisms in Degenerative Diseases of the Nervous System. Describe Learning and Memory and Cellular Mechanisms of Implicit Memory Storage and the Biological Basis of Individuality and Describe Patterning the Nervous System, Differentiation and Survival of Nerve Cells and Describe the cerebellum, and the basal ganglia

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	5	5	3	5	0	0	0
LO2	5	5	5	5	5	3	5	3	3	3
LO3	0	0	0	0	0	5	5	5	5	5
LO4	0	0	0	0	0	5	5	5	5	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

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COURSE CONTENT DETAILS

Topic	Outcomes
Human Neuroanatomy The different types of Neurons (Cells of the Nervous System), Neuron structure and Glia The chemicals and ion channels	LO1
Axon, dendrite and membrane Potential and the Passive Electrical, Properties of the Neuron, and Propagated Signaling: The Action Potential	LO2
The synaptic transmission and Signaling at the Nerve-Muscle Synapse: Directly Gated Transmission, Transmitter Release and Neurotransmitters The organization of the central nervous system, The Organization of Cognition and Cognitive Functions of the Premotor Systems Sensory Coding, The Somatosensory System: Receptors and Central Pathways, Touch and Pain.	LO3
Smell and Taste: The Chemical Senses	LO4
Movement, Voluntary Movement: The Primary Motor Cortex	LO4
The cerebellum, and the basal ganglia. Genetic Mechanisms in Degenerative Diseases of the Nervous System Learning and Memory and Cellular Mechanisms of Implicit Memory Storage and the Biological Basis of Individuality	LO4

DERS BİLGİLERİ

Kodu	MBG 417
İsmi	Sinir biliminin temelleri
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Bu dersin temel amacı, moleküler ve hücresel düzeyde sinirbilim hakkında bir fikir vermektir. Ders, öğrencilere temel sinir sistemini tanıttacaktır. Nöronlar, bilgiyi kimyasal ve elektriksel sinyaller yoluyla diğer nöronlara ileten oldukça özelleşmiş hücrelerdir. Derslerde kimyasal sinaptik iletim ve nörotransmitterler tartışılacaktır.

COURSE RECORD

Code	MBG 419
Name	Functional Genomics
Hour per week	3 (3+ 0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3,4
Semester	Fall, Spring
Type	Elective
Prerequisites	
Description	This course aims to give the fundamental principles within functional genomics, emphasizing the transcriptome and proteome to the students. The course also covers the contribution of functional genomics to systems biology and systems medicine, socio-ethical aspects of functional genomics in biomedicine and biotechnology, including perspectives on genetic risk information.
Objectives	O1. Teaching basic knowledge on genomics and studies on gene functions. O2. Explaining theoretical and practical knowledge on experimental and computational techniques used in functional genomics. O3. Making students appreciate the importance of model organisms and their application. O4 Explaining basic knowledge on functional genomics and systems biology in mammals and model organisms.
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Explain the structure and function of the human genome LO2. Define the basics of transcriptomics, proteomics and metabolomics concepts LO3. Describe biological networks and systems LO4. Explain the importance of model organisms in functional genomics and their specificities LO5. Think critically about the issues and importance of legal and ethical aspects of the post-genome era

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	4	4	2	4	3	3	4	4	5
LO2	5	4	4	2	4	3	3	4	4	5
LO3	5	4	4	3	4	3	3	4	4	5
LO4	5	4	4	3	4	3	3	4	4	5
LO5	5	4	4	3	5	3	3	4	5	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Genome: An Overview of human genome project	LO1
Transcriptome: ways of genomic expression, transcriptome measuring techniques	LO1, LO2
Proteome: protein-protein and protein-DNA interactions; high performance techniques for protein characterization and their interactions.	LO1, LO2, LO3
Metabolome: system studies of chemical fingerprints of metabolic processes in a cell (metabolic profiling), separation and identification methods.	LO1, LO2, LO3
Phenome: methods for determining different phenotypes at the genome level of model microorganisms.	LO1, LO2
Fundamentals of systems biology: theory of systems in biology, graph theory in systems biology, fundamentals of modelling biological networks, bioinformatics tools used in functional genomics and systems biology.	LO1, LO2, LO3, LO4, LO5
Model organisms in systems biology and functional genomics: historical background of systems biology, <i>S. cerevisiae</i> yeast, <i>C. elegans</i> nematode.	LO1, LO2
Functional genomics and the society – data protection, legal and ethical aspects, patenting.	LO1, LO2
Genome editing – use of new methods for genome editing (e.g. CRISPR-Cas9) in functional genomics.	LO1, LO2

DERS BİLGİLERİ

Kodu	MBG 419
İsmi	Fonksiyonel Genomik
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Bu ders, öğrencilere transkriptomu ve proteomu vurgulayarak fonksiyonel genomik içindeki temel ilkeleri vermeyi amaçlar. Ders ayrıca fonksiyonel genomikğin sistem biyolojisi ve sistem tıbbına katkısını, biyotıp ve biyoteknolojide fonksiyonel genomikğin sosyo-etik yönlerini ve genetik risk bilgilerine ilişkin perspektifleri de kapsar.

COURSE RECORD

Code	MBG 421
Name	RNA Biology
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3,4
Semester	Fall, Spring
Type	Elective
Prerequisites	
Description	The course covers types and roles of RNAs, RNA structure and non-coding RNAs in post-transcriptional gene regulation. The main topics of the course include RNA splicing, editing, localization, regulation and translation.
Objectives	O1. Explaining types of RNAs O2. Distinguishing structures and functions of RNAs O3. Explaining the mechanisms and principles of how transcription occurs O4. Showing the role of RNAs in gene regulation
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1 compare different types of RNA molecules and their functions LO2 identify the importance of RNA structure LO3 discuss non-coding RNA types and their involvement in cellular processes and disease phenotypes LO4 explain RNA splicing mechanisms LO5 explain how RNA transport occurs

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	4	5	5	5	4	4	5
LO2	5	5	5	4	5	5	5	4	4	5
LO3	5	5	5	4	5	5	5	4	4	5
LO4	5	5	5	4	5	5	5	4	4	5
LO5	5	5	5	4	5	5	5	4	4	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Basics of RNA	LO1, LO2
Coding RNA	LO2, LO4; LO5
Non-coding RNAs	LO1, LO2, LO3
RNA in bacteria	LO1
RNA viruses	LO1
RNA decay/processing, control of translation	LO1, LO2, LO3, LO4

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DERS BİLGİLERİ

Kodu	MBG 421
İsmi	RNA Biyoloji
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Ders, transkripsiyon sonrası gen düzenlemesinde RNA'ların türlerini ve rollerini, RNA yapısını ve kodlamayan RNA'ları kapsar. Dersin ana konuları arasında RNA uçbirleştirme, düzeltme, lokalizasyon, düzenleme ve translasyon bulunmaktadır.

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COURSE RECORD

Code	MBG 425
Name	Population Genetics
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3,4
Semester	Fall, Spring
Type	Elective
Prerequisites	
Description	This course will cover the topics of genetic and phenotypic variations, organization of genetic variation, genetic drift, mutations, recombination, Darwinian selection, inbreeding, migration, molecular population genetics, quantitative genetics, population genomics. This course also comprises methods of measuring genetic variation and frequency using mathematical approach in theory of population genetics. The aim of the course is to introduce students' knowledge at an advanced level which gives students fundamental principle of population genetics.
Objectives	O1. Teaching fundamentals of population genetics O2. Expressing genotype-phenotype relationships, quantitative traits, and heritability
Learning Outcomes	By the end of the course, the student will be able to LO1. Describe quantitative genetics, molecular evolution, population genomics. LO2. Define genetic and phenotypic variations. LO3. Criticize population genetics questions including evolution, natural selection, genetic drift, adaptation, inbreeding, gene flow etc. LO4. Discuss and deliberate unanswered questions in evolutionary processes.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	4	4	3	4	4	4	4
LO2	5	5	5	4	4	4	4	4	4	5
LO3	5	5	5	5	5	5	4	4	4	4
LO4	5	4	4	4	5	5	4	4	4	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Genetic and Phenotypic Variation	LO1, LO2
Organization of Genetic Variation	LO1, LO2
Random Genetic Drift	LO1, LO2
Mutation and The Neutral Theory	LO1, LO2
Darwinian Selection	LO1, LO2, LO3
Inbreeding, Population Subdivision, And Migration	LO1, LO2, LO3
Molecular Population Genetics	LO1, LO2, LO3
Evolutionary Quantitative Genetics	LO1, LO2, LO3, LO4
Population Genomics	LO1, LO2, LO3, LO4
Human Population Genetics	LO1, LO2, LO3, LO4

DERS BİLGİLERİ

Kodu	MBG 425
İsmi	Populasyon Genetiği
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Bu ders, genetik ve fenotipik varyasyonlar, genetik varyasyonun organizasyonu, genetik sürüklenme, mutasyonlar, rekombinasyonlar, darwin seçilimi, akrabalı yetiştirme, göç, moleküler populasyon genetiği, kantitatif genetik, populasyon genomu konularını kapsayacaktır. Bu ders ayrıca populasyon genetiği teorisinde matematiksel yaklaşım kullanılarak genetik varyasyon ve frekansın ölçülmesi yöntemlerini içerir. Dersin amacı, öğrencilere populasyon genetiğinin temel ilkelerini veren ileri düzeydeki bilgileri vermektir.

COURSE RECORD

Code	MBG 426
Name	Histology of Tumors
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3,4
Semester	Fall, Spring
Type	Elective
Prerequisites	
Description	The course will cover the histopathology of tumors, classification of tumors, introduction to histological methods, cytohistological features of malignant tumors, markers used in immunohistochemistry of tumors.
Objectives	O1. Introducing tumor histology, procedure of histological preparation, immunohistochemistry, O2. Introducing information about new methods, like tissue microarray, microdissection, used in histology of tumors
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Define and describe the characteristics of tissues of the body (Epithelium, connective, muscle, nerve) and their relationships in the various organ systems of the human body. LO2. Develop the ability to recognize histological changes in organs from tumor patients LO3. Develop the ability to differentiate malignant and non-malignant tumors LO4. Interpret tumor advance based on its histology

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5		4				3	2
LO2	4	4	5		4	3	4		4	4
LO3	5	5	5		5	3	4		4	4
LO4	5	5	5		5	4	4		4	4

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to histopathology; Differences between malignant and non- malignant tumors	LO1, LO2, LO3
Histological classification of tumors	LO2, LO3
Histology of human organs and its changes in tumors	LO2, LO3
Histological methods	LO1, LO4
Preparation methods in tumor histology	LO3
Cytohistological features of malignant tumors	LO3, LO4
Tumor stroma	LO1, LO2
Tumor dormancy and autophagy – the actual problem with tumor ability to reoccurrence	LO2
Recognition and interpretation of histological preparations	LO2, LO3
Preparations of photos with microscopic camera	LO3
Markers used in immunohistochemistry of tumors	LO3
Examination of photos of preparates	LO2, LO3

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DERS BİLGİLERİ

Kodu	MBG 426
İsmi	Tümör histolojisi
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Ders, tümörlerin histopatolojisi, tümörlerin sınıflandırılması, histolojik yöntemlere giriş, malign tümörlerin sitohistolojik özellikleri, tümörlerin immünohistokimyasında kullanılan belirteçleri kapsayacaktır.

COURSE RECORD

Code	MBG 428
Name	Epigenetics
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3,4
Semester	Fall, Spring,
Type	Elective
Prerequisites	
Description	Epigenetic mechanisms alter gene expression which results in short and long-term functional consequences. The course covers epigenetic mechanisms; histone modifications, DNA methylation, and expression of small RNAs. The role of epigenetics in stem cell differentiation, aging and cancer with emphasis on the most common research tools used to dissect epigenetic changes.
Objectives	O1. Teaching the mechanisms of epigenetics O2. Clarifying the differences between mendelian genetics and epigenetics O3. Improving students' critical thinking processes and proficiency in scientific reading
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Demonstrate epigenetics mechanisms LO2. Comprehend the importance of genetics in development and diseases LO3. Acquire broad range of experimental techniques used in epigenetics LO4. Read and interpret scientific articles in the field of epigenetics

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	4	4	3	4	4	4	4
LO2	5	5	5	4	4	4	4	4	4	5
LO3	5	5	5	5	5	5	4	4	4	4
LO4	5	4	4	4	5	5	4	4	4	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Genetics vs. Epigenetics	L01, L02
Chromatin Organization and gene regulation	L01, L02
DNA methylation	L01, L02, L04
RNAi mediated gene silencing	L01, L02, L04
Histone Modifications and Histone Code	L01, L02, L04
Epigenetics in development and stem cell differentiation	L01, L02, L04
Epigenetics in aging	L01, L02, L03, L04
Cancer Epigenetics	L01, L02, L03, L04
Epigenetic Drugs	L01, L02, L03, L04

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DERS BİLGİLERİ

Kodu	MBG 428
İsmi	Epigenetik
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Epigenetik mekanizmalar, kısa ve uzun vadeli gen ekspresyonunu etkileyen bir süreçtir. Ders epigenetik mekanizmaları, epigenetik değişiklikleri incelemek için kullanılan en yaygın deneysel yöntemleri ve epigenetiğin gelişimde, kanserde ve yaşlanmada rolünü kapsar.

COURSE RECORD

Code	MBG 430
Name	Virology
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3,4
Semester	Fall, Spring
Type	Elective
Prerequisites	
Description	This introductory virology course emphasizes the common reactions that must be completed by all viruses for successful reproduction within a host cell and survival and spread within a host population. The molecular basis of alternative reproductive cycles, the interactions of viruses with host organisms, and how these lead to disease are presented with examples drawn from a set of representative animal and human viruses. In addition to that, selected bacterial viruses will also be discussed.
Objectives	O1. Describing the basic structures and replication strategies of the major classes of viruses O2. Explaining the main differences between DNA and RNA viruses O3. Explaining general molecular biology mechanisms in viruses: virus uptake, replication of the genome, synthesis and processing of RNA, gene regulation, protein synthesis etc. O4. Describing emerging viruses
Learning Outcomes	LO1 Define basics of virus biology LO2 Explain different types of viruses LO3 Describe transcription, translation and regulation LO4 Identify emerging viruses

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	4	5	5	5	5	5	5
LO2	5	5	5	4	5	5	5	5	5	5
LO3	5	5	5	4	5	5	5	5	5	5
LO4	5	5	5	4	5	5	5	5	5	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Basics of virology	LO1, LO2, LO3
Attachment and Entry	LO1, LO2
Viral transcription	LO3
Replication of Viral DNA	LO3
Protein Synthesis	LO3
Assembly, Exit, and Maturation	LO1, LO3
Emerging Viruses	LO4

AGU Department of Molecular Biology and Genetics**DERS BİLGİLERİ**

Kodu	MBG 430
İsmi	Viroloji
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Bu giriş viroloji dersi, bir konakçı hücre içinde başarılı üreme ve bir konakçı popülasyonda hayatta kalma ve yayılma için tüm virüsler tarafından tamamlanması gereken ortak reaksiyonları vurgular. Alternatif üreme döngülerinin moleküler temeli, virüslerin konak organizmalarla etkileşimleri ve bunların hastalığa nasıl yol açtığı, bir dizi temsili hayvan ve insan virüsünden alınan örneklerle sunulmaktadır. Bunlara ek olarak seçilen bakteriyel virüsler de tartışılacaktır.

COURSE RECORD

Code	MBG 431
Name	Human Physiology
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3,4
Semester	Fall, Spring
Type	Elective
Prerequisites	
Description	The course will be making the students familiar with principles of physiology by covering physiological systems. Students will learn multiple areas of biological organization, from tiny atoms to complex systems. Students will understand physiology, and pathology of each body system and how they relate to maintain homeostasis.
Objectives	O1. Explaining how the human body functions at the molecular, cellular, tissue, organ, and systemic levels. O2. Describing the function and processes of physiological systems
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1 recognize the terminology related to human physiology. LO2 define the principle and significance of homeostasis and feedback systems in the physiological processes. LO3 outline the functions of the major systems in the human body. LO4 describe the integration of and interrelationships between the physiological systems LO5 gain knowledge of the regulation of the functional mechanisms in the body and describe pathophysiology underlying common diseases.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	4	4	3	4	4	4	4
LO2	5	5	5	4	4	4	4	4	4	5
LO3	5	5	5	5	5	5	4	4	4	4
LO4	5	4	4	4	5	5	4	4	4	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction: Cells and Tissues, Communication, Integration and Homeostasis	LO1
Endocrine System	LO1, LO2, LO3, LO4
Central Nervous System	LO1, LO2, LO3, LO4
Autonomic & Somatic Motor Control, Muscles	LO1, LO2, LO3, LO4
Control of Body Movement	LO1, LO2, LO3, LO4
Cardiovascular Physiology, Blood Flow	LO1, LO2, LO3, LO4
Immune System	LO1, LO2, LO3, LO4
Respiratory Physiology	LO1, LO2, LO3, LO4
Renal Physiology and Urinary System	LO1, LO2, LO3, LO4
Fluid & Electrolyte Balance	LO1, LO2, LO3, LO4
Gastrointestinal System	LO1, LO2, LO3, LO4
Reproductive System	LO1, LO2, LO3, LO4

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DERS BİLGİLERİ

Kodu	MBG 431
İsmi	İnsan Fizyolojisi
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Bu Ders fizyolojik sistemleri işleyerek öğrencileri fizyolojinin prensipleriyle tanıştıracaktır. Öğrenciler, küçük atomlardan karmaşık sistemlere kadar biyolojik organizasyonun birçok alanını öğreneceklerdir. Öğrenciler, her bir vücut sisteminin fizyolojisini ve patolojisini ve bunların homeostazı sürdürmek için nasıl bir ilişki kurduklarını anlayacaklardır.

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COURSE RECORD

Code	MBG 435
Name	Disease and Genetics
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3,4
Semester	Fall or Spring
Type	Elective
Prerequisites	MBG 209
Description	This course will introduce a number of diseases to students. Students will learn about diseases and their molecular mechanism in detail. Diseases that we will touch are cancer, diabetes, obesity, neurodegenerative diseases including Prion and Creutzfeldt–Jakob disease, autoimmune diseases, Muscle Diseases, Lysosomal diseases, Mitochondrial Diseases. This course will focus on relationships between diseases and its genetic background which will help to understand molecular mechanism of those diseases.
Objectives	O1. providing an insight into the molecular mechanisms underlying human disease processes. O2. providing information on the development of targeted therapies and drugs
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. define genetics and biochemical processes leading to a range of diseases; LO2. describe the molecular details of protein folding diseases; LO3. identify the modeling human diseases; LO4. identify diseases caused by enzyme deficiency; LO5. express how the immune system works and autoimmune diseases

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	5	5	5	5	5	5	5
LO2	5	3	3	3	3	3	3	3	3	3
LO3	5	3	3	3	3	3	3	3	3	3
LO4	0	2	2	2	2	3	3	3	4	4
LO5	1	5	5	5	5	3	3	1	1	1

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Introduction to Cancer Diabetes and Obesity, Neurodegenerative Diseases; especially those related to protein misfoldings I: Alzheimer's and Parkinson's diseases	LO1, LO2, LO3, LO4
Neurodegenerative Diseases; especially those related to protein misfoldings II: Prion and Creutzfeldt-Jakob disease	LO1, LO2, LO3, LO4
Autoimmune Diseases I, Muscle Diseases: Duchenne Muscular Dystrophy and SMA	LO1, LO2, LO3, LO4, LO5
Lysosomal diseases	LO1, LO2, LO3, LO4, LO5
Mitochondrial Diseases	LO1, LO2, LO3, LO4,
Cystic Fibrosis	LO1, LO2, LO3, LO4,
Cilia and Ciliopathy	LO1, LO2, LO3, LO4,
Complex Genetic Diseases: Atherosclerosis	LO1, LO2, LO3, LO4,
Infectious Diseases: HIV, H. pylori	LO1, LO2, LO3, LO4, LO5
Genetic Disease Modeling, Gene Therapy and Gene Editing	LO1, LO2, LO3, LO4, LO5

DERS BİLGİLERİ

Kodu	MBG 435
İsmi	Hastalıklar ve Genetik
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	MBG209
İçerik	Bu ders öğrencilere çeşitli hastalıkları tanıttacaktır. Öğrenciler hastalıkları ve hastalıkların moleküler mekanizmasını detaylı olarak öğreneceklerdir. Değineceğimiz hastalıklar kanser, diyabet, obezite, Prion ve Creutzfeldt-Jakob hastalığı dahil nörodejeneratif hastalıklar, otoimmün hastalıklar, Kas Hastalıkları, Lizozomal hastalıklar, Mitokondriyal Hastalıklardır. Bu ders, hastalıklar ve bu hastalıkların moleküler mekanizmasını anlamaya yardımcı olacaktır.

COURSE RECORD

Code	MBG 438
Name	Cell Signaling
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/3,4
Semester	Fall, Spring
Type	Elective
Prerequisites	
Description	The course will focus primarily on the activation of cell surface receptors, interaction of signaling molecules with the activated receptors and the generation of secondary messengers and intracellular ionic currents. Students will learn the various cell signaling pathways and networks in health and disease.
Objectives	O1. Gaining insights in the basic concepts of cellular signal transduction O2. Describing the signal transduction mechanisms of different types of receptors O3. Learning how signal integration is accomplished in target cells O4. Learning the importance of cell signaling in gene regulation
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Defining the basic principles of signal transduction mechanisms LO2. Recognize different signaling pathways and their role in health and disease. LO3. Explain functional significance of major signaling pathways LO4. Describe the activation and signaling mechanisms of different types of receptors

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	4	4	3	4	4	4	4
LO2	5	5	5	4	4	4	4	4	4	5
LO3	5	5	5	5	5	5	4	4	4	4
LO4	5	4	4	4	5	5	4	4	4	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Basics of cell signaling	LO1, LO2, LO3
Structural properties of signaling proteins	LO1, LO2, LO3
Regulation and PTM of signaling proteins	LO1, LO2, LO3
Organization of Signaling	LO1, LO2, LO3
Membrane Receptors	LO1, LO2, LO3
G protein-Coupled Signal Transmission	LO1, LO2, LO3, LO4
Intracellular messenger substances: "Second Messengers"	LO1, LO2, LO3, LO4
Tyrosine Kinases	LO1, LO2, LO3, LO4
Serine-Threonine Kinases Receptors	LO1, LO2, LO3, LO4
MAPK	LO1, LO2, LO3, LO4
Signaling by nuclear receptor	LO1, LO2, LO3, LO4
Development of protein kinase inhibitors for Cancer Treatment	LO1, LO2, LO3, LO4

**AGU Department of Molecular Biology and
Genetics**



DERS BİLGİLERİ

Kodu	MBG 438
İsmi	Hücre Sinyalizasyonu
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans/3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Ders öncelikle hücre yüzeyi reseptörlerinin aktivasyonu, sinyal moleküllerinin aktive edilmiş reseptörler ile etkileşimi ve ikincil habercilerin ve hücre içi iyonik akımların üretimine odaklanacaktır. Öğrenci, hastalıkta ve sağlıkta çeşitli hücre sinyal yollarını ve ağlarını öğrenecektir.

AGU Department of Molecular Biology and Genetics



COURSE RECORD

Code	MBG 351
Name	Research Project
Hour per week	4 (0 + 4)
Credit	2
ECTS	5
Level/Year	Undergraduate/3,4
Semester	Fall, Spring
Type	Elective
Prerequisites	
Description	The course is designed for individual students to carry out their laboratory research projects under the supervision of a faculty member. Student must have a final presentation about his/her work by the end of the semester.
Objectives	O1. encouraging students to think critically O2. developing research skills
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. integrate their theoretical knowledge with their project LO2. apply what they have learned in their general education LO3. acknowledge an academic or professional pursuit LO4. consolidate learning in an integrative way

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	5	5	5	4	5			
LO2	5	5	3	5	4	4	5			
LO3	5	5		3			5	4	5	5
LO4	5	5		5		4	5			5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Conducting experiments	LO1, LO2, LO3, LO4

DERS BİLGİLERİ

Kodu	MBG 351
İsmi	Araştırma projesi
Haftalık Saati	4 (0+ 4)
Kredi	2
AKTS	5
Seviye/Yıl	Lisans/3,4
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Bu ders, öğrencilerin bireysel olarak bir öğretim üyesinin gözetiminde laboratuvar araştırma projelerini yürütmeleri için tasarlanmıştır. Öğrenci, dönem sonuna kadar çalışmalarıyla ilgili bir final sunumu yapmak zorundadır.

COURSE RECORD

Code	MBG 463
Name	Special Studies I
Hour per week	4 (0 + 4)
Credit	2
ECTS	7
Level/Year	Undergraduate/4
Semester	Fall
Type	Elective
Prerequisites	MBG351 and minimum 3.00 GPA
Description	This course intends to develop an experimental or theoretical based research project in an interdisciplinary environment, providing preliminary experience with focus on good scientific principles, value to society, and innovation. Students will undertake either an independent or team based research project under the supervision of a faculty advisor by using fundamental molecular biology and genetics principles, knowledge, and skills that they acquired during their undergraduate program. The project must include methods, results, evaluation, interpretation and discussion of the scientific data. The project will be presented at the end of the semester in a report written by the student.
Objectives	Making students experienced to design or perform a scientific project Encouraging students to work on the project individually or as a team member Learning how to optimize project related procedures
Learning Outcomes	<i>By the end of the course, the student will be able to</i> L01. Apply field specific knowledge to conduct appropriate experimentation, analyze and interpret data, and draw conclusions L02. Criticize prior knowledge, published research data and patents to address scientific problems L03. Plan project schedule and work assignments L04. Show personal professional growth in concert with project requirements and personal career goals.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
L01	2		2	5	5	5	4		5	4
L02	4		2	5	4	5	4		5	4
L03				5	4	5	3	2	5	4
L04				5	5	5		2	5	4

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topics	Outcomes
Literature search for project ideas	L02, L03, L04
Project writing	L02, L03
Performing experimental procedures	L01, L03, L04
Reporting data in a scientific report	L01, L02, L04

DERS BİLGİLERİ

Kodu	MBG 463
İsmi	Özel çalışmalar I
Haftalık Saati	4 (0+ 4)
Kredi	2

AKTS	7
Seviye/Yıl	Lisans/4
Dönem	Güz
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	MBG 351 ve en az 3.00 GPA
İçerik	Bu ders, disiplinler arası bir ortamda deneysel veya teorik temelli bir araştırma projesi geliştirmeyi, bilimsel ilkelere, toplumsal değere ve inovasyona odaklanan ön deneyim sağlamayı amaçlamaktadır. Öğrenciler, lisans programları boyunca edindikleri temel moleküler biyoloji ve genetik ilkelerini, bilgi ve becerilerini kullanarak bir fakülte danışmanının gözetiminde bağımsız veya takım halinde bir araştırma projesi üstleneceklerdir. Proje yöntemleri, sonuçları, bilimsel verilerin değerlendirilmesini, yorumlanmasını ve tartışılmasını içermelidir. Öğrencilerin projelerini yarıyıl sonunda bilimsel bir rapor ile sunmaları gerekir.

COURSE RECORD

Code	MBG464
Name	Special Studies II
Hour per week	4 (0 + 4)
Credit	2
ECTS	7
Level/Year	Undergraduate/4
Semester	Spring
Type	Elective
Prerequisites	MBG463
Description	This course provides an opportunity for students to engage in high-level inquiry focusing on an area of specialization within the scope of molecular biology and genetics. It could be a follow-up course of MBG463 with the continuation of the same project or a new individual or team based project could be developed under the supervision of a faculty member. Hypothesis, methods, results and discussion of the scientific data are expected to be included in a properly formatted and referenced scientific paper written by the student.
Objectives	Providing students with the experience of realization of a scientific project Making students being able to solve a complex scientific problem in an interdisciplinary environment Encouraging students to work individually or as a member of a scientific team
Learning Outcomes	<i>By the end of the course, the student will be able to</i> L01. Design a scientific research with an independent project involving experimentation, data analysis and interpretation L02. Evaluate prominent literature related to the project of interest L03. Build project timeline to perform the experiments on time L04. Develop skills for real-world experiences with focus on good scientific principles, value to society, and innovation.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
L01	2		2	5	5	5	4		5	4
L02	4		2	5	4	5	4		5	4
L03				5	4	5	3	2	5	4
L04				5	5	5		2	5	4

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topics	Outcomes
Literature review	L02, L04
Project proposal	L01, L02, L03
Experimental procedures	L01, L03, L04
Data presentation	L02, L04

DERS BİLGİLERİ

Kodu	MBG 464
İsmi	Özel çalışmalar II
Haftalık Saati	4 (0+ 4)
Kredi	2
AKTS	7
Seviye/Yıl	Lisans/4
Dönem	Bahar

Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	MBG 463
İçerik	Bu ders öğrencilere moleküler biyoloji ve genetik kapsamındaki bir uzmanlık alanına odaklanarak üst düzey sorgulama yapma fırsatı sağlar. Bu ders, MBG463 dersinin devamı niteliğinde aynı proje ile devam edebileceği gibi bir öğretim üyesinin danışmanlığında bireysel veya takım bazlı yeni bir proje de içerebilir. Öğrencinin yazacağı uygun şekilde biçimlendirilmiş ve referans verilmiş bilimsel raporda hipotezlerin, yöntemlerin, sonuçların ve bilimsel verilerin tartışılmasının yer alması beklenir.

COURSE RECORD

Ek-2

Code	MBG436
Name	Milestone Discoveries in Physiology and Medicine
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate
Type	Elective
Prerequisites	
Description	This course examines the collaborative efforts behind recent Nobel Prize-winning discoveries in "Physiology or Medicine", highlighting the innovative research processes and methodologies that drive scientific breakthroughs. It examines how novel ideas develop from initial observations and hypothesis generation to experimental design and paradigm-shifting conclusions. A key focus is on how Nobel laureates employed systematic problem-solving approaches to overcome complex challenges. This course fosters an appreciation for the profound impact of methodological research on scientific advancement.
Objectives	Demonstrating the foundational concepts that enables students to perceive and distinguish the targeted challenges and the innovative problem-solving approaches employed in Nobel-recognized research. Examining key studies of a scientific discovery in order to empower students to identify their underlying relationships and evaluate how these components synergistically contribute to scientific progress. Designing and delivering group presentations collaboratively supports students to communicate research findings on Nobel-winning discoveries in a clear and engaging manner.
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Critically evaluate prominent literature relevant to the Nobel Prizes. LO2. Develop basic understanding of the scientific research, including hypothesis generation, experimental design and innovative problem-solving approaches. LO3. Identify the adopted scientific methodology within the Nobel-winning research. LO4. Appraise the scientific implications of these discoveries and their impact on future research and medical practices. LO5. Assess the societal and ethical implications, and relate to their broader impact on cultural, legal, and/or moral frameworks.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
L01	5	5	3		4	5		2	4	4
L02	5	5	2		4	5		2	4	4
L03	5	5	2		4	5		2	5	4
L04	5	5	3		4	5		4	5	4
L05	3				3	3		3	5	4

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topics	Outcomes
Literature of novel discoveries	L01, L02, L03
Innovative research techniques leading to discoveries	L01, L03, L04
Ethical considerations in research	L04, L05

DERS BİLGİLERİ

Kodu	MBG436
İsmi	Fizyoloji ve Tıpta Dönüm Noktası Keşifler
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	
İçerik	Bu ders, son yıllarda "Fizyoloji veya Tıp" alanında verilen Nobel Ödülü'ne layık görülen keşiflerin ardındaki çeşitli çalışmaların nasıl bir bütün oluşturduğunu inceler ve bilimsel buluşları destekleyen araştırma süreçleri ile ilgili metodolojilerine vurgu yapar. Yenilikçi araştırma fikirlerinin, gözlem ve hipotez oluşturma aşamalarından deneysel tasarım ve paradigmayı değiştiren sonuçlara nasıl geliştiğini detaylı bir şekilde ele alır. Dersin diğer bir ana odak noktası, ilgili bilim insanlarının karmaşık zorlukları aşmak için uygulamış oldukları sistematik problem çözme yaklaşımlarının incelenmesidir. Ayrıca, bu ders, araştırmaların bilimsel ilerleme üzerindeki önemli etkisini anlamayı ve takdir etmeyi sağlar.

COURSE RECORD

Ek-2

Code	MBG465
Name	Molecular Endocrinology
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate
Type	Elective
Prerequisites	-
Description	This course explores the molecular foundations of hormone action, emphasizing how endocrine signals regulate cellular function, gene expression, and organismal homeostasis. Students examine hormone biosynthesis, secretion, and receptor-mediated signal transduction through selected examples such as pancreatic, thyroid, adrenal, and adipose systems. Integrating experimental and clinical perspectives, the course highlights how disruption of hormonal pathways contributes to disease and how these mechanisms inspire molecular and pharmacological research on endocrine targets.
Objectives	1. Exploring the molecular mechanisms of hormone synthesis, secretion, and action in animal and human systems. 2. Integrating cellular signaling pathways with physiological regulation of growth, metabolism, reproduction, and stress responses. 3. Developing a critical understanding of how endocrine signaling networks are investigated through molecular and biochemical research approaches, and how these models inform translational and drug-target studies.
Learning Outcomes	<i>By the end of the course, the student will be able to:</i> LO1. Define the biosynthesis, secretion, and regulation of major hormones at the molecular level. LO2. Compare signaling mechanisms among hormone receptor families and downstream pathways. LO3. Explain how alterations in hormonal signaling lead to selected endocrine disorders. LO4. Critically assess scientific data on hormone action and regulation. LO5. Relate endocrine mechanisms to potential molecular and pharmacological research applications.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	3	5	4	0	4	2	0	0	0	0
LO2	3	5	4	0	4	0	0	0	0	0
LO3	3	5	4	0	4	2	0	1	0	0
LO4	5	4	2	5	2	3	2	1	0	2
LO5	4	2	2	3	5	5	2	0	1	2

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

CONTRIBUTION TO INSTITUTIONAL LEARNING OUTCOMES*

	ILO1	ILO2	ILO3	ILO4	ILO5	ILO6	ILO7
LO1	3	1	0	0	1	0	0
LO2	0	1	0	0	1	0	0
LO3	0	1	0	0	1	0	0
LO4	5	5	1	0	2	2	2
LO5	5	4	1	0	0	1	0

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topics	Outcomes
Fundamentals of hormone biosynthesis and secretion	L01, L02
Hormone receptors and intracellular signaling mechanisms	L01, L02, L05
Molecular mechanisms of endocrine disorders	L03, L04
Experimental and analytical approaches in endocrine research	L04, L05

DERS BİLGİLERİ

Kodu	MBG465
İsmi	Moleküler Endokrinoloji
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	

İçerik

Bu ders, hormonların etkilerinin moleküler temellerini inceler ve endokrin sinyallerin hücresel fonksiyonları, gen ekspresyonunu ve organizmanın homeostazını nasıl düzenlediğinin üzerinde durur. Öğrenciler; pankreas, tiroid, adrenal ve adipoz sistemler gibi örnekler aracılığıyla hormon biyosentezini, salgılanmasını ve reseptör aracılı sinyal iletimini inceler. Deneysel ve klinik perspektiflerin de değerlendirildiği bu ders, hormonal yolların bozulmasının hastalıklara nasıl katkıda bulunduğunu ve bu mekanizmaların endokrin hedefler üzerine moleküler ve farmakolojik araştırmalara nasıl kaynak oluşturduğunu vurgular.

COURSE RECORD

Ek-1

Code	MBG466
Name	Neurobiology of Neurological and Psychiatric Disorders
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate
Type	Elective
Prerequisites	-
Description	This course explores the molecular, cellular, and genetic mechanisms underlying neurological and psychiatric disorders. Emphasizing the continuum between brain and behavior, it integrates topics across neurodevelopmental, neurodegenerative, and neuropsychiatric conditions. Through selected examples such as Alzheimer's disease, Parkinson's disease, epilepsy, schizophrenia, depression, and anxiety, students examine how disruptions in signaling pathways, altered gene expression, and synaptic dysfunction contribute to disease pathogenesis. Combining lecture discussions with analysis of primary literature, the course highlights how mechanistic discoveries drive experimental models and inform molecular pharmacology and therapeutic innovation in modern neuroscience.
Objectives	1.Exploring molecular and cellular bases of neurological and psychiatric disorders within an integrated neurobiological framework. 2.Examining shared mechanisms—including neuroinflammation, neurotransmission, and genetic regulation—linking diverse brain pathologies. 3.Developing critical and research-oriented skills through analysis of scientific literature, discussion, and student presentations.
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Define molecular and cellular processes governing normal brain function and how their disruption leads to disease. LO2. Compare mechanistic pathways underlying selected neurological and psychiatric disorders. LO3. Evaluate how genetic, environmental, and cellular factors interact to shape brain pathophysiology. LO4. Critically assess experimental data and primary literature addressing molecular mechanisms and potential therapeutic targets, and communicate findings effectively through written or oral formats.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	4	4	5	1	4	2	1	1	2	2
LO2	4	4	5	1	4	2	1	1	2	2
LO3	4	3	4	2	4	3	1	1	3	3
LO4	5	3	4	5	4	4	2	1	2	2

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

CONTRIBUTION TO INSTITUTIONAL LEARNING OUTCOMES*

	ILO1	ILO2	ILO3	ILO4	ILO5	ILO6	ILO7
LO1	4	2	1	0	1	1	0
LO2	4	3	1	0	2	2	0
LO3	4	4	2	1	3	2	1
LO4	3	4	2	0	3	4	2

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topics	Outcomes
Foundations of neurobiology: cells, circuits, and molecular signaling	L01, L02
Neurodevelopment and factors shaping brain pathophysiology	L01, L03
Molecular mechanisms of selected neurological and psychiatric disorders	L01, L02, L03
Experimental approaches, data interpretation, and communication of scientific findings	L03, L04

DERS BİLGİLERİ

Kodu	MBG466
İsmi	Nörolojik ve Psikiyatrik Bozuklukların Nörobiyolojisi
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Bu ders, nörolojik ve psikiyatrik bozuklukların altında yatan moleküler, hücresel ve genetik mekanizmaları inceler. Beyin ve davranış arasındaki sürekliliği tanıtan ders, nörogelişimsel, nörodejeneratif ve nöropsikiyatrik durumlarla ilgili konuları bir araya getirir. Alzheimer hastalığı, Parkinson hastalığı, epilepsi, şizofreni, depresyon ve anksiyete gibi seçilmiş örnekler aracılığıyla öğrenciler, sinyal yollarındaki bozulmaların, değişen gen ekspresyonunun ve sinaptik disfonksiyonun hastalık patogeneze nasıl katkıda bulunduğunu inceler. Dersteki tartışmalar ile literatür analizi ile birleştiren bu ders, mekanizmaya dair keşiflerin deneysel modelleri nasıl kaynak oluşturduğunu ve modern sinirbilimde moleküler farmakoloji ve terapötik yeniliklere nasıl katkı sağladığını vurgular.

COURSE RECORD

Ek-2

Code	MBG420
Name	Introduction to Clinical Trials
Hour per week	3 (3+ 0)
Credit	3
ECTS	5
Level/Year	Undergraduate
Type	Elective
Prerequisites	-
Description	This course introduces students to the fundamental principles of clinical trials, with applications in molecular biology and genetics. Students will learn how trials are designed, including ethical considerations, randomization, and blinding to minimize bias. The course emphasizes the importance of sample size and statistical power, enabling students to understand how studies are planned to detect meaningful effects reliably. Additionally, students will gain basic skills in analyzing trial data, interpreting continuous and binary outcomes, and evaluating evidence from systematic reviews and meta-analyses. By the end of the module, students will be able to critically assess the design and results of clinical trials in biomedical research.
Objectives	Introducing students to the fundamental principles of clinical trial design, conduct, and ethical considerations. Developing understanding of statistical concepts such as bias, randomization, sample size, and power in clinical research. Providing students with the ability to critically interpret and evaluate clinical trial results in the context of molecular biology and genetics.
Learning Outcomes	<i>By the end of the course, the student will be able to</i> LO1. Describe the main types, phases, and purposes of clinical trials LO2. Explain how randomization and blinding are used to minimize different types of bias in experiments LO3. Interpret basic analyses of clinical trial data, including continuous and binary outcomes LO4. Explain the importance of power and sample size calculations in clinical trials

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	3	4	3	3	4	2	2	2
LO2	2	4	2	3	2	4	1	5	4	4
LO3	4	5	3	4	3	4	4	1	2	1
LO4	4	4	3	5	1	5	5	4	5	4

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

CONTRIBUTION TO INSTITUTIONAL LEARNING OUTCOMES*

	ILO1	ILO2	ILO3	ILO4	ILO5	ILO6	ILO7
LO1	3	3	1	1	4	4	2
LO2	1	4	2	1	4	4	5
LO3	3	2	2	1	3	4	1
LO4	5	4	4	1	3	4	4

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topics	Outcomes
Introduction to Clinical Trials	LO1
Bias, Randomization, and Blinding	LO2
Analysis of Clinical Trial Data	LO3
Sample Size and Power Calculations	LO4
Systematic Reviews and Meta-Analysis	LO1, LO2, LO3

DERS BİLGİLERİ

Kodu	MBG420
İsmi	Klinik Denemelere Giriş
Haftalık Saati	3 (3 + 0)
Kredi	3
AKTS	5
Seviye/Yıl	Lisans
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Bu ders, moleküler biyoloji ve genetik alanlarında uygulamalı klinik araştırmaların temel prensiplerini tanıtmaktadır. Öğrenciler, araştırma tasarımı, etik ilkeleri, randomizasyon ve körleme yöntemlerini öğrenirken, örneklem büyüklüğü ve istatistiksel güç hesaplarının çalışmaların anlamlı etkilerini güvenilir şekilde tespit edebilmesi açısından önemini kavrayacaklardır. Ayrıca, öğrenciler temel veri analiz yöntemlerini, sürekli ve ikili sonuçların yorumlanmasını ve sistematik derleme ile meta-analizlerin değerlendirilmesini öğreneceklerdir. Ders sonunda, öğrenciler biyomedikal araştırmalarda klinik araştırma tasarımlarını ve sonuçlarını eleştirel olarak değerlendirebileceklerdir.