



BAU TIP

BAHÇEŞEHİR UNIVERSITY SCHOOL OF MEDICINE

"scientia et amore vitae"



BAHÇEŞEHİR UNIVERSITY

SCHOOL OF MEDICINE

CLASS 1

ACADEMIC PROGRAMME

2025-2026

BAU TIP

BAHÇEŞEHİR ÜNİVERSİTESİ TIP FAKÜLTESİ

"scientia et amore vitae"

Dean	Merter Yalçinkaya, Prof.
Vice Dean	Timuçin Avşar, Assoc. Prof.
Vice Dean	Fadime Didem Trabulus, Assoc. Prof.
Head of Coordinator	Özlem Unay Demirel, Assoc. Prof.
Class 1 Coordinator	Merve Karayel Başar, Assist. Prof.

FIRST YEAR					
1. Semester					
CODE	COURSE	T	P	C	E
ENG1003	Communication Skills and Academic Reporting	2	2	3	4
MED1011	Philosophy and Ethics in Medicine I	2	2	3	2
TMED1000					
MED1001	Molecular basis of cell	3	2	4	6
MED1003	Cell, tissue and organ systems	3	2	4	6
MED1005	Musculoskeletal System	3	2	4	6
MED1006	Nervous System	3	2	4	6
		16	12	22	30
2. Semester					
CODE	COURSE	T	P	C	E
ENG1004	Communication Skills and Academic Reporting II	2	2	3	4
MED1012	Philosophy and Ethics in Medicine II	2	2	3	2
MED1008	Sensory Organs and Endocrine System	3	2	4	6
MED1007	Cardiovascular and Respiratory System	3	2	4	6
MED1002	Gastrointestinal System and Metabolism	3	2	4	6
MED1004	Urogenital System	3	2	4	6
		16	12	22	30

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	COURSE 1 MED1001		COURSE 2 MED1003		COURSE 3 MED1005		COURSE 4 MED1006		COURSE 5 MED1008		COURSE 6 MED1007		COURSE 7 MED1002		COURSE 8 MED1004		TOTAL
	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	
Anatomy	2	-	4	-	24	11	21	10	3	-	31	12	4	-	3	-	125
Behavioral Sciences	-	-	-	-	-	-	4	-	4	-	-	-	-	-	-	-	8
Biophysics	7	2	9	1	6	-	4	2	6	1	10	1	3	1	1	2	56
Biochemistry	12	2	11	2	10	-	4	-	4	-	-	-	18	-	15	-	78
Evidence Based Medicine and Statistics									5	-	3	-	4	-	-	-	12
Histology and Embryology	2	-	11	8	2	2	2	2	8	8	7	4	4	6	18	5	89
Medical Biology	16	-	14	-	5	-	-	-	-	-	-	-	-	-	-	-	35
Medical Microbiology	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Physiology	4	-	10	6	9	1	16	-	17	2	22	4	16	-	12	1	120
Clinical Skills	3	2	1	1	1	1	1	1	-	-	-	-	2	4	-	-	17
Communication Skills in Medicine	-						8								-		8
TOTAL	55		78		72		67		58		94		62		57		551
STUDY TIME	85		27		29		52		63		31		31		30		348
Philosophy and Ethics	9		10		10		10		18		8		16		2		83
Communication Skills and Academic Reporting	12		12		12		16		16		12		12		8		100

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BAHÇEŞEHİR UNIVERSITY SCHOOL OF MEDICINE
2025 – 2026 ACADEMIC CALENDAR FOR THE FIRST YEAR

2025 – 2026 ACADEMIC YEAR FALL SEMESTER

September 22 – 26, 2025, Monday – Friday	Orientation Program
September 22 – October 24, 2025	1 st Block – Molecular Basis of Cell
October 24, 2025, Friday	1 st Block Committee Exam
October 27 – November 21, 2025	2 nd Block- Cell, Tissue and Organ Systems
November 21, 2025, Friday	2 nd Block Committee Exam
November 22 – 30, 2025	Midterm Exams for Communication Skills and Academic Reporting & Philosophy and Ethics
November 24 – December 19, 2025	3 rd Block - Musculoskeletal System
December 19, 2025, Friday	3 rd Block Committee Exam
December 22, 2025 – January 23, 2026	4 th Block – Nervous System
January 23, 2026, Friday	4 th Block Committee Exam
January 19 – February 1, 2026	Final Exams for Communication Skills and Academic Reporting & Philosophy and Ethics
October 29, 2025, Wednesday	National Holiday (Republic Day)
January 01, 2026, Thursday	New Year Holiday
January 26 – February 06, 2026	Semester Break
February 09 – 13, 2026	Make-up Exams for Fall Committees
February 09 – 15, 2026	Make-up Exams for Communication Skills and Academic Reporting & Philosophy and Ethics

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2025 – 2026 ACADEMIC YEAR SPRING SEMESTER	
February 09 – March 13, 2026	5 th Block – Sensory Organs and Endocrine System
March 13, 2026, Friday	5 th Block Committee Exam
March 16 – April 17, 2026	6 th Block – Cardiovascular and Respiratory Systems
April 17, 2026, Friday	6 th Block Committee Exam
April 18 – 26, 2026, Friday	Midterm Exams for Communication Skills and Academic Reporting & Philosophy and Ethics
April 20 – May 22, 2026	7 th Block – Gastrointestinal System and Metabolism
May 22, 2026, Friday	7 th Block Committee Exam
May 25 – June 19, 2026	8 th Block – Urogenital System
June 19, 2026, Friday	8 th Block Committee Exam
June 22 – July 05, 2026	Final Exams for Communication Skills and Academic Reporting & Philosophy and Ethics
March 20 - 22, 2026, Friday-Sunday	Ramadan Feast Holiday
April 23, 2026, Thursday	National Sovereignty and Children's Day
May 01, 2026, Tuesday	Labor and Solidarity Day
May 19, 2026, Tuesday	Commemoration of Atatürk, Youth and Sports Day
May 27-30, 2026, Wednesday-Saturday	Feast of Sacrifice
June 29-July 03, 2026	Make-up Exams for Spring Committees
July 13, 2026, Monday	Final Exam
July 13 – 19, 2026	Make-up Exams for Communication Skills and Academic Reporting & Philosophy and Ethics
July 24, 2026, Friday	Resit Exam for the Final Exam

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BAHÇEŞEHİR UNIVERSITY SCHOOL OF MEDICINE PHASE I (2022-2023)										
		EXAM 1 (Theoretical Exam)		EXAM 2 (Practical Exam)		AVERAGE OF COMMITTEE GRADES	EXAM 3 (FINAL EXAM)		YEAREND GRADE	PASSING GRADE
	Committee Names	Method	%	Method	%		Method	%		
YEAR 1	Committee 1: Molecular Basis of Cell	MCQ (100 questions)	80 %	PRACTICAL EXAMS ¹	20%	$\frac{(C1 + C2+ C3+ C4+ C5+ C6+ C7+ C8)}{8}$	MCQ (200 question) (2sections)	100%	AVERAGE OF COMMITTEE GRADES (60%) + FINAL EXAM SCORE (40%)	YEAREND GRADE (85%) + CLINICAL SKILLS GRADE (10%) + COMMUNICATION SKILLS SCORE (5%)
	Committee 2: Cell, Tissue and Organ Systems	MCQ (100 questions)	80 %	PRACTICAL EXAMS ¹	20%					
	Committee 3: Musculoskeletal System	MCQ (100 questions)	80 %	PRACTICAL EXAMS ¹	20%					
	Committee 4: Nervous System	MCQ (100 questions)	80 %	PRACTICAL EXAMS ¹	20%					
	Committee 5: Sensory Organs and Endocrine System	MCQ (100 questions)	80 %	PRACTICAL EXAMS ¹	20%					
	Committee 6: Cardiovascular and Respiratory Systems	MCQ (100 questions)	80 %	PRACTICAL EXAMS ¹	20%					
	Committee 7: Gastrointestinal System and Metabolism	MCQ (100 questions)	80 %	PRACTICAL EXAMS ¹	20%					
	Committee 8: Urogenital System	MCQ (100 questions)	80 %	PRACTICAL EXAMS ¹	20%					
	Communication Skills ³	%100								
	Clinical Skills	OSCE	%50	Clinical Skills Evaulation ⁴	%50	%100				

¹Practical Exams include Anatomy, Histology, Physiology, Biochemistry, Medical Microbiology, and Biophysics courses and are graded as a total of 20% according to the hour weight of the practice in that committee.

³Communication Skills are evaluated according to APPENDIX 1.

⁴Clinical Skills are evaluated according to APPENDIX 2.

APPENDIX 1

COMMUNICATION SKILLS ASSESSMENT METHOD

There are 4 sessions. Evaluation will be performed out of **25 points after each session** according to the level of participation of the student.

Each student will have from **0.... to 5** for each of the items below:

	0	1	2	3	4	5
Joined in the discussion and commented						
Asked questions about the subject discussed						
Gave an example from his/her own life						
Did the exercises						
Did the homework						
TOTAL (0-25)						

Each student will receive a **score out of 100 after completion of all 4 sessions.**



APPENDIX 2

CLINICAL SKILLS EVALUATION FORM

	Satisfactory	Needs Improvement	Poor
A- Professionalism			
Always on time and has no unexcused tardiness/absence	2	1	0
Appearance is appropriate: respects dress code, wears name tag	2	1	0
Has team work ability	2	1	0
Shows effective time management	2	1	0
Obeys clinical skills laboratory rules	2	1	0
B- Medical Knowledge and Clinical Reasoning			
Demonstrates theoretical knowledge	2	1	0
Demonstrates analytical thinking	2	1	0
C-Interpersonal and Communication Skills			
Demonstrate the ability to communicate effectively with the lecturer and friends	2	1	0
D- Clinical Skills			
Performs steps of the clinical skill in the guideline appropriately	2	1	0
Applies standard precautions for infection prevention and control	2	1	0
TOTAL			

Total GRADE:/100

STUDENT NAME-SURNAME:	
CLASS:	BAHÇEŞEHİR ÜNİVERSİTESİ TIP FAKÜLTESİ
CLINICAL SKILL TOPIC:	"scientia et amore vitae"
DATE:	

CLASS 1

AIM: The purpose of the Class 1 Program is to provide knowledge about the normal structure and functions of the human body at the cell and tissue level, the history of medicine and universal ethical values, and the philosophy of science; get skills necessary for the most basic medical practices and effective communication techniques; and attitudes for being a medical doctor.

LEARNING OBJECTIVES:

At the end of this class, the students should be able to:

KNOWLEDGE:

1. Define the normal structure and functions of the human body at the cell and tissue level.
2. Explain the anatomical structure of bones, joints, and muscles.
3. Explain microorganisms and their interaction with the host.
4. List the basic communication techniques.
5. Define the prominent events in the history of medicine.
6. Define the rules of professional ethics and ethical behavior.
7. Explain the basic concepts of the philosophy of science.
8. Get knowledge about behavioral sciences.
9. Get knowledge about immunology.
10. Get knowledge about scientific method, research process, abstract, index databases, reviewing the literature, variables, and types of measurement scale.

SKILLS:

11. Perform the most basic medical practices (hand washing, sterile gloving, history taking, basic physical examination, preparing parenteral injections, taking vital signs, recovery position, basic life support, applying a cervical collar, insertion of an oropharyngeal airway).
12. Describe the structure and working principles of the light microscope and use it effectively.
13. Find and distinguish the locations of anatomic structures on models and cadavers.
14. Communicate effectively with the colleagues.
15. Understand the importance of effective communication between a patient and a doctor.

ATTITUDES:

16. Have the perception that medicine is a honorable and respected profession, reflect this on his/her behavior.
17. Observe the rules of professional ethics in his/her relations with the colleagues.
18. Realize the contribution of philosophy to analytical thinking in professional life.
19. Realize the importance of following the working principles and rules in multidisciplinary, anatomy, and clinical skills laboratories.
20. Realize the importance of hand hygiene in preventing diseases.
21. Emphasizing that the cadaver is the first patient of a medical student, adopt concepts such as empathy, respect, physician role, and responsibility.
22. Realize the importance of introducing himself/herself to the patient, giving information about the interventions to be made, and getting approval.
23. Gain the program evaluation culture.

COURSE 1 / MED 1001: MOLECULAR BASIS OF CELL				
Course Date	September 22 – October 24, 2025			
Exam Dates	Practical Exams: October 24, 2025 Theoretical Exam: October 24, 2025			
Course Coordinator:	MERVE KARAYEL BAŞAR			
Academic Unit	Academic Staff	Theoretical hours	Practical hours	Total
Anatomy	Ahmet Usta, Prof.	2	-	2
Biophysics	Serdar Durdağı, Prof. Bircan Dinç, Assist Prof Duygu Tarhan, Assist Prof	7	2	9
Biochemistry	Yeşim Neğiş, Assoc. Prof. Özlem Unay Demirel, Assoc. Prof. Merve Karayel Başar, Assist. Prof.	12	2	14
Histology and Embryology	Yasemin Ersoy Canıllıoğlu, Assoc. Prof. Merjem Purelku, Assist. Prof.	2	-	2
Medical Biology	Timuçin Avşar, Assoc. Prof.	16	-	16
Medical Microbiology	Güliden Çelik, Prof. Seyda İğnak Tarlığ, Assist. Prof.	3	-	3
Physiology	Yasemin Keskin Ergen, Assist. Prof.	4	-	4
Clinical Skills	Yasemin Keskin Ergen, Assist. Prof. Betül Şahin, Assist. Prof Yasemin Ersoy Canıllıoğlu, Assoc. Prof.	3	2	5
TOTAL		49	6	55
Philosophy and Ethics	Kadircan Keskinbora, Prof.	9	-	9
Communication Skills and Academic Reporting		12	-	12
STUDY TIME	85			

COURSE AIM:

The aim of this course is to:

- provide knowledge about the structural properties and basic functions of organic compounds and biomolecules; structure, function and evaluation of the cell, and bioenergetics, light and lenses; terminology of anatomy, normal structure and anatomy of appendicular skeleton and vertebral column; radiologic anatomy of the upper and lower extremities;
- provide knowledge about laboratory safety rules;
- get skills about hand washing;
- get skills about working as a part of a team.

LEARNING OUTCOMES:

At the end of this lesson, the student will be able to:		
KNOWLEDGE		
DEP.	TOPIC	LEARNING OUTCOMES
ANATOMY	Introduction to Modern Anatomy, Anatomical Theories and Systems (T-2)	1. Define anatomy and its subdivisions (gross, microscopic, developmental, clinical, topographic). 2. Explain the role of modern anatomy in medical education and clinical practice. 3. Recognize how anatomical systems (skeletal, muscular, nervous, cardiovascular, etc.) are interrelated in structure and function. 4. Compare traditional descriptive anatomy with integrated, system-based, and topographical approaches. 5. Discuss the evolution of anatomical study from dissection to modern imaging and digital technologies. 6. Identify ethical and professional aspects of working with cadavers and modern alternatives (plastination, 3D models, imaging). 7. Correlate anatomical theories with clinical applications (e.g., body cavities as functional “tubes,” segmentation in dermatome maps).

At the end of this lesson, the student will be able to:		
KNOWLEDGE		
DEP.	TOPIC	LEARNING OUTCOMES
BIOPHYSICS	Introduction to Biophysics: Biophysics as Interdisciplinary Field (T-2)	1. Describe the scopes of biophysics 2. Discuss the leading scientists in the field of biophysics in 20th century 3. Discuss the field of biophysics as an interdisciplinary science 4. Describe the “system” term 5. Describe the branches of biophysics 6. Discuss substances and energy transport routes and laws in living bodies.
	Basic Concepts of Molecular Biophysics: (T-1)	1. Explain the importance of simplifying models in biophysics 2. Name four great classes of macromolecules from which organisms constructed 3. Describe the atomic-level structural representation of macromolecules 4. Distinguish between intra- and inter-molecular interactions 5. Discuss the significance of intermolecular interactions

	The Laws of Thermodynamics in Biological Systems (T-1)	1. Define how energy is stored and used for different types of works in living bodies 2. Define the concepts of system and its surroundings 3. Explain the zeroth and first law of thermodynamics 4. Discuss the differences happening under specific conditions such as under constant pressure, temperature, volume. 5. Distinguish between energy and enthalpy 6. Define the concept of entropy and link it with energy term
	Gibbs free energy and equilibrium coefficient (T-1)	1. Discuss the Gibbs free energy 2. Use the third law of thermodynamics 3. Calculate Gibbs energy from equilibrium coefficient, and calculate equilibrium from Gibbs free energy.
	Heat Capacities and the Boltzmann Distribution (T-1)	1. Illustrate the relation between internal energy, temperature and the heat capacity 2. Compare the difference between isobaric and isochoric heat capacity. 3. Explain the relation between heat capacity and protein denaturation and stability. 4. Describe the statistical definition of entropy 5. Describe the relation of maximizing entropy and the derivation of the Boltzmann distribution. 6. Discuss the relation between Boltzmann distribution and the energy needed to keep the system out of entropic equilibrium
	Light and lenses (T-1)	1. Define the basics light sources and light propagation 2. Explain basic properties of light 3. Describe the optical lenses 4. Define the optical instruments. 5. Distinguish of microscopes and calculate magnification
SKILLS		
	Biophysics Lab: Measurement, Light and Lenses (P-2)	1. Measure the dimensions of irregularly shaped using a scientific instrument called calipers. 2. Be able to calculate the volume of the irregular objects through measured dimensions of shapes of object and volume formulas 3. Determine the volume of the object using overflow experiment 4. Determine the two positions of a thin lens where a sharp image is formed. 5. Determine the focal length of a thin lens.

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP.	TOPIC	LEARNING OUTCOMES
BIOCHEMISTRY	Introduction to Biochemistry: Biomolecules (T-1)	1. Explain the fundamental scientific areas of biochemistry, the structure of atoms, and the biologically important elements. 2. Describe and compare different types of chemical bonds and interactions, including covalent and non-covalent forces, as well as concepts of electronegativity and partial charges. 3. Identify and classify biologically important chemical functional groups and recognize their occurrence in carbon-containing compounds. 4. Discuss the significance of carbon-carbon bonding in biomolecules. 5. Differentiate and illustrate types of isomerism, including stereoisomers, geometric and optical isomerism, and enantiomers. 6. Describe the general structure of amino acids, proteins, lipids, and carbohydrates. 7. Classify the four major complex biomolecules found in living cells.

Biochemical properties of water (T-1)	1. Describe the structural, physical, and chemical properties of water 2. Explain the superior properties of water over other liquids 3. Explain the solvent properties of water and its importance for living organisms 4. Describe the interaction of water molecules with other hydrophilic and hydrophobic molecules 5. Discuss the importance of hydrogen bonds between water molecules
Ionization of water and pH (T-1)	1. Define ionization of water molecule and express the equilibrium constant 2. Define pH and explain the chemical basis of pH and pOH 3. Explain the importance of pH for the structure and activity of molecules 4. Explain the pH scale
Acids, Bases and Buffers (T-1)	1. Define acids and bases and tell the differences between strong acids/bases and weak acids/bases. 2. Explain pKa and tell the difference between pH and pKa 3. Define buffers and explain how they are related to biological systems 4. Draws titration curve of weak acids and relates pH, pKa, and buffer concentration
The Structure and Properties of Amino Acids (T-2)	1. Recognize the 20 common and rare amino acids in proteins 2. Explain stereochemistry and acid–base properties of amino acids 3. Classify amino acids by their side chain properties and describe their structural formulas and important chemical properties. 4. Identify rare and recently discovered amino acids in proteins and explain their incorporation during translation 5. Describe the structure and properties of peptide bonds 6. Discuss chemical reactivity and post-translational modifications of amino acids 7. Explain the acid–base behavior of amino acids, including ionization, zwitterion formation. 8. Interpret titration behavior and the concept of isoelectric point
Protein Structure and Functions (T-2)	1. Describe the different levels of protein structure and their interdependence 2. Explain how steric limitations determine secondary structure in polypeptides 3. Describe, using examples, the relationship between protein structure and function 4. Understand the significance of domains in protein function and how they have arisen.
Structure and Function of Carbohydrates (T-2)	1. Tell the classification and functional role of carbohydrates 2. Define structural and chemical properties of monosaccharides, disaccharides and oligosaccharides 3. Explain glucose and its derivatives 4. Classify the glycoconjugates
Polysaccharides (T-2)	1. Tell the classification and functional role of polysaccharides 2. Define structural and chemical properties of polysaccharides and glycoconjugates 3. Describe proteoglycan structure and its functional role in the organism 4. Define glycosaminoglycan structure and its functional role in the organism 5. Define the glycoprotein structure and its functional role in the organism
SKILLS	
Introduction to Biochemistry laboratory, Buffers and pH (P-2)	1. Define the rules of safe working in the laboratory 2. Describe the properties of various glass materials commonly used in biochemistry laboratories and tell the purpose of use 3. Tell the materials and equipment commonly used in biochemistry laboratories

		4. Explain the use of volumetric and automatic pipettes in a practical way 5. Explain the use of pH strips and pH meter to measure the pH of solutions
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At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
HISTOLOGY AND EMBRYOLOGY	Introduction to Histology (T-1)	1. Define the concept and etymology of <i>histology</i>. 2. Classify histology as a discipline within medical sciences. 3. Define the four main tissue types. 4. Describe the essential steps of tissue preparation and staining for light microscopy.
	Introduction to Embryology (T-1)	1. Define the etymology of embryology term 2. Classify the embryonic and fetal periods 3. Explain the terms of general embryology

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
MEDICAL BIOLOGY	Introduction to Medical Biology (T-1)	1. Define the scope and importance of medical biology in the context of modern medicine. 2. Explain the structural and functional organization of prokaryotic and eukaryotic cells. 3. Describe fundamental biological molecules (DNA, RNA, proteins, lipids, carbohydrates) and their roles in cellular processes. 4. Compare the hierarchical levels of biological organization (molecules, organelles, cells, tissues, organs, systems). 5. Discuss the relevance of medical biology concepts to clinical practice and biomedical research.
	Introduction to Genetics (T-1)	1. Define genetics and explain its role in understanding inheritance and disease mechanisms. 2. Describe the structure and function of DNA, genes, and chromosomes. 3. Explain the principles of Mendelian inheritance with simple examples. 4. Recognize the difference between genotype and phenotype, and provide examples from human health. 5. Discuss the clinical significance of genetics in diagnosis, personalized medicine, and prevention of hereditary disorders.
	The universal features of cells (T-2)	1. Define the common and shared features of living organisms. 2. Define the central dogma and its characteristics. 3. Define the characteristics of DNA and gene. 4. Explain the biodiversity and classification of organisms based on different features. 5. Explain the 3 major division of living world 6. Explain the ribosomal gene structure and characteristics 7. List the modes of genetic innovation 8. Explain the model organisms and their importance in biology
	DNA structure and organization (T-2)	1. Compare the eukaryotic and prokaryotic DNA and structure. 2. Explain the properties of gene structure and function. 3. Define the properties of exons and introns. 4. Define histones and nucleosome structure. 5. Explain functions of histones with the perspective of heterochromatin and euchromatin formation. 6. Explain the repetitive and unique DNA sequences 7. Define the structure and function of chromosome 8. Explain the chromosomal organization

	Chromosomes and Genomes (T-2)	1. Define chromosome, chromatin and chromatid structures and their elements. 2. Define heterochromatin and euchromatin structures and their importance. 3. Explain the terms of gene and chromosome by also considering their attendance to specific cell functions. 4. Explain the differences on chromosomes in different stages of the cell cycle via also including the cellular changes. 5. Define human karyotyping and its importance.
	DNA Replication (T-2)	1. Explain the DNA replication with respect to order of events 2. List the main enzymes having role during DNA replication 3. Define the replication machine and tell all components' function individually 4. Describe how DNA replication is initiated and define the characteristics of ori sites 5. Explain the function of telomerases and how DNA replication is terminated
	DNA repair and recombination (T-1)	1. Describe mutations, DNA damage and compare them 2. Count factors that cause DNA damage 3. Groups DNA damages according to their formation mechanism 4. Explain mechanisms used by cells to correct replication errors 5. Explain the strand directed mismatch repair systems 6. Describe base excision repair and nucleotide excision repair systems 7. Explain the key features of homologous recombination and non-homologous end joining mechanisms as repair systems
	Transcription (T-3)	1. Define RNA structure, major elements and compare it with DNA structure 2. Describe the major steps of transcription on prokaryotes and eukaryotes 3. Compare the DNA and RNA polymerase with respect to its structure and function 4. Describe the characteristics of promoter sequences and other regulatory elements of the transcription machinery. Explain the transcription factors and their roles in transcription 5. Define regulatory sequences (TATA box etc.). Explain post-transcriptional modification of RNA and its importance
	Translation (T-2)	1. Explain the codon system, codon usage and alternate codons in translation 2. Describe the major steps of translation on prokaryotes 3. Describe the major steps of translation on eukaryotes 4. Describe the structure and role of RNA types during translation 5. Explain post-translational processing with its importance 6. Compare prokaryotes and eukaryotes in terms of initiation, elongation and termination steps of translation

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
MEDICAL MICROBIOLOGY	Introduction to Microbiology and History (T-2)	1. Define science of microbiology 2. Define basic concepts in microbiology 3. Define basic terminology in microbiology 4. Classify microorganisms 5. List important properties of microorganisms 6. List landmark contributions in microbiology history
	Sterilization & Disinfection (T-1)	1. Define the terms sterilization, disinfection, decontamination, antisepsis 2. Describe the microorganisms that are most resistant and least resistant according to control measures by chemical and biological tools 3. Define four categories of cellular targets for physical and chemical agents 4. Define the four biosafety levels

At the end of this lesson, the student will be able to:

KNOWLEDGE		
DEP	TOPIC	LEARNING OUTCOMES
PHYSIOLOGY	Introduction to physiology (T-2)	1. Define medical physiology and its importance as part of medical education 2. Discuss the relationship between structure and function 3. Outline the level of organization from the cellular level to the system level in a hierarchy
	Homeostasis and control systems (T-2)	1. Describe how homeostasis is the maintenance of a nearly constant internal environment in the body 2. Distinguish extracellular fluid and intracellular fluid compartments 3. Explain the role of the control systems in regulation of homeostasis 4. Explain the difference between negative and positive feedback control systems by giving examples 5. Outline the mechanism of negative feedback by citing the roles of sensor, set point, control center, and effector. 6. Explain how effective homeostasis produces a healthy human body 7. Estimate the possible results of disruption of homeostasis

At the end of this lesson, the student will be able to:

SKILLS		
DEP	TOPIC	LEARNING OUTCOMES
CLINICAL SKILLS	Clinical Skills Lab (CSL) Rules (T-1)	1. List CSL Rules 2. Explain how to work in CSL 3. Get knowledge about the assessment method
	Hand Washing Techniques (T-1) (P-1)	1. Describe why hand washing is important 2. Describe when hands should be washed 3. Explain how to wash hands properly 4. Get skills about working as a part of a team.
	Sterile Gloving (T-1) (P-1)	1. Demonstrates how to put on and take off sterile gloves 2. Get skills about working as a part of a team

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At the end of this lesson, the student will be able to:

KNOWLEDGE		
DEP	TOPIC	LEARNING OUTCOMES
PHILOSOPHY AND ETHICS	Introduction to the class (T-2)	1. Comprehend the distinction between science and philosophy. 2. Explain Plato's allegory of the cave. 3. Distinguish methodological doubt from mere suspicion 4. Explain Hume's skepticism
	Why should we teach and learn the history of medicine? (T-2)	1. Comprehend the importance of learning the history of medicine. 2. Comprehend the significance of ancient Chinese, Indian, Egyptian, Greek and Roman medicine.
	Introduction to philosophy of science I - Induction (T-2)	1. Comprehend Aristotelian method of deduction 2. Comprehend Francis Bacon's inductive method 3. Distinguish between induction and deduction

		4. Define validity and soundness
Medicine in prehistorical time (T-2)		1. Focus on the historical and anthropological aspects of early human healthcare 2. Rely on archaeological evidence, analysis of human remains, and anthropological studies of modern indigenous groups 3. Appreciate the Social and Cultural Context
Important scientists of history of medicine (T-1)		1. Comprehend the significant historical figures and scholars from the east and west world in medicine. 2. Learn and distinguish between expertise of these figures.
Introduction to philosophy of science II Problems with induction (T-2)		1. Explain Hume's criticism of cause and effect. 2. Comprehend Hume's understanding of what metaphysics is. 3. Define Occam's razor 4. Explain Hume's skepticism



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COURSE 2 / MED 1003: CELL, TISSUE AND ORGAN SYSTEMS				
Course Date	October 27 – November 21, 2025			
Exam Dates	Practical Exams: November 21, 2025 Theoretical Exam: November 21, 2025			
Academic Unit	Academic Staff	Theoretical hours	Practical hours	Total
Anatomy	Ahmet Usta, Prof. Uğur Baran Kasırğa, Assist. Prof.	4	-	4
Biophysics	Serdar Durdağı, Prof. Bircan Dinç, Assist. Prof. Duygu Tarhan, Assist. Prof.	9	1	10
Biochemistry	Yeşim Neğiş, Assoc. Prof. Özlem Unay Demirel, Assoc. Prof. Merve Karayel Başar, Assist. Prof.	11	2	13
Histology and Embryology	Yasemin Ersoy Canıllıoğlu, Assoc. Prof. Merjem Purelku, Assist. Prof.	11	8	19
Medical Biology	Betül Şahin, Assist. Prof.	14	-	14
Physiology	Yasemin Keskin Ergen, Assist. Prof. Betilay Topkara Arslan, Assist. Prof. Elif Bahadır, Assist. Prof.	10	6	16
Clinical Skills	Bircan Dinç, Assist. Prof.	1	1	2
Communication Skills in Medicine (Group 1)	Figen Dağlı, Prof.	-	8	8
TOTAL		60	26	86
Philosophy and Ethics	Kadircan Keskinbora, Prof.	10	-	10
Communication Skills and Academic Reporting		12	-	12
STUDY TIME				27

COURSE AIM:

The aim of this course is to:

- provide knowledge about the structure and function of cells at molecular level, cell cycles, the types of transmission between cells; the structure, function and clinical importance of vitamins, lipids, enzymes, and hormones; membrane physiology, cellular transport, action potential; normal structure and anatomy of cranium and joints of the human body; radiologic anatomy of musculoskeletal system; oogenesis, spermatogenesis and neurulation and general concepts in microbiology;
- get skills about sterile gloving.
- get skills about working as a part of a team.
- get communication skills.

LEARNING OUTCOMES

At the end of this lesson, the student will be able to:		
KNOWLEDGE		
DEP.	TOPIC	LEARNING OUTCOMES
ANATOMY	Anatomical Terminology; Position, Planes, Relationship, Comparison, Movements (T-4)	1. Define anatomical position and explain its importance as a universal reference point. 2. Identify and describe standard anatomical planes (sagittal, coronal, transverse, oblique) and axes of movement. 3. Use directional terms (anterior/posterior, superior/inferior, medial/lateral, proximal/distal, superficial/deep etc.) correctly in anatomical context. 4. Explain relational terminology (ipsilateral, contralateral, unilateral, bilateral, intermediate etc.) with examples. 5. Compare symmetric and asymmetric features of the human body and discuss functional implications. 6. Define and classify basic movements (flexion, extension, abduction, adduction, rotation, circumduction, pronation, supination, inversion, eversion, opposition). 7. Correlate anatomical planes and directional terms with diagnostic imaging (CT, MRI, ultrasound) and surgical approaches.

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At the end of this lesson, the student will be able to:		
KNOWLEDGE		
DEP.	TOPIC	LEARNING OUTCOMES
BIOCHEMISTRY	Structure of Nucleotides (T-1)	1. Define nucleotide, nucleoside and nucleic acid 2. Explain the chemical properties of nucleotides 3. Explain the functions of nucleotides 4. Classify and define the nucleotide derivatives 5. Explain the functional role of nucleotide derivatives in biochemistry
	Water soluble vitamins (T-2)	1. Describe the functions and metabolism of the water soluble vitamins. 2. Explain the biochemical structure. 3. Describe the effects of the excessive levels. 4. Describe the effects of the insufficiency/deficiency.
	Fat soluble vitamins (T-1)	1. Describe the functions and metabolism of the fat soluble vitamins. 2. Explain the biochemical structure. 3. Describe the effects of the excessive levels of the fat soluble vitamins. 4. Describe the effects of the insufficiency/deficiency of the fat soluble vitamins.

Introduction to Lipids: Structure and Function (T-1)	1. Classify the main types of lipids and fatty acids found in the human body 2. Describe the structure and properties of fatty acids, including saturation, cis/trans isomerism, and physical characteristics 3. Explain fatty acid nomenclature (delta and omega) and identify omega-3 and omega-6 fatty acids 4. Describe the structure and biological roles of simple and complex lipids (triglycerides, phospholipids, glycolipids, sphingolipids, cholesterol) 5. Classify phospholipids, glycolipids, and sphingolipids based on their head groups 6. Explain the chemical reactions and functional importance of lipid biomolecules
Lipids of Physiological Significance (T-1)	1. Explain the major biological functions of lipids, including energy storage and membrane structure 2. Compare the effects of saturated, unsaturated, and trans fatty acids on membranes and human health 3. Identify essential fatty acids and describe the roles of omega-3 and omega-6 fatty acids 4. Describe the distribution of lipids in biological membranes 5. Explain the roles of triglycerides, phospholipids, sphingolipids, and cholesterol in the body
Minerals and trace elements (T-2)	1. Define minerals and trace elements 2. Classify microminerals and macrominerals 3. Explain the biological functions of minerals and trace elements 4. Explain the properties of minerals and trace elements 5. Define the distribution of minerals and trace elements in the organism 6. Explain the clinically important deficiency and toxicity states of the minerals and trace elements
Introduction to hormones (T-1)	1. Define endocrinology and hormones 2. Define general characteristics of the hormones 3. Explain the mechanism of action of hormones
Classification of hormones (T-1)	1. Classify hormones according to their structure 2. Classify hormones according to the source of origin 3. Define their transport in blood as well as synthesis and storage 4. Explain their half-life and their receptor location inside the cell
Mechanism of Hormone action (T-1)	1. Classify the mechanisms of hormone action 2. Define the different type of receptors used for hormone action according to location in the cell 3. Explain the factors affecting target cell response upon hormone exposure 4. Tell the hormones that use cell membrane, nuclear and cytoplasmic receptors 5. Explain the functional role of second messengers in the mechanism of hormone action 6. Name the hormones and a their counterparts as the second messengers
SKILLS	
LAB- Spectrophotometry (P-2)	1. Explain the principles of absorption spectrophotometry and the structure of a spectrophotometer 2. Define absorbance and transmittance, and describe their relationship 3. Explain Lambert–Beer’s Law and its applications in concentration determination 4. Describe how maximum absorbance of a compound is determined and how blank solutions are used 5. Explain the preparation of standard solutions and the use of standard curves in spectrophotometric measurements 6. Apply spectrophotometric methods to calculate the concentration of unknown solutions

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP.	TOPIC	LEARNING OUTCOMES
BIOPHYSICS	Voltages and Free Energy: Oxidation-Reduction reactions in biology (T-1)	1. Describe oxidation-reduction (redox) reactions 2. Recognize biologically important redox-active compounds 3. Discuss the generation of ATP using redox-active compounds 4. Define electrochemical cell and reduction potential 5. Relate standard reduction potentials to standard free-energy change of the redox reaction
	Diffusion and Osmosis in Membranes (T-2)	1. Discuss the microscopic (concentration free) derivation of relation between diffusion constant, mean distance traveled and the time 2. Use the relation between diffusion constant, mean distance traveled and the time 3. Illustrate and use the potential energy of diffusion related to Boltzmann distribution. 4. Discuss the macroscopic derivation of the diffusion equation: Fick's first and second law. 5. Illustrate the amount of flux through a cell membrane by the Fick's first law 6. Discuss the similarities between the microscopic and the macroscopic diffusion process. 7. Describe the active transport 8. Discuss the osmosis
	Permeation through the cell membrane and membrane potential (T-1)	1. Analyze the effect of physical properties of the membrane on speed of passive spread. 2. Explain the time constant of a membrane and its effect on resting potential 3. Justify the effect of R_m, R_{ax} and C on saltatory conduction 4. Analyze the difference of permeability to various ions.
	Cell membranes act as electrical capacitors (T-1)	1. Explain the membrane as a capacitor 2. Use the capacitance of membrane to calculate number of ions moving in to the axon for a single action potential 3. Remember the physical contributors of passive spread: R_m, R_{ax}, C 4. Analyze the effect of physical properties of the membrane on speed of passive spread 5. Remember the cable equation 6. Derive and use the membrane potential formula from the cable equation for a membrane in steady state.
	Ion channels, Selectivity in Ion Channels (T-2)	1. Define Na and K channels in terms of their topology 2. Explain how ions can permeate very rapidly as well as with high specificity within the selectivity filter 3. Explain pore domain and voltage sensing domains in a channel and describe their roles in ion permeation
	Sodium-Potassium Pumps (T-1)	1. Explain how neurons transmit information 2. Describe action potential and how it moves along the axon 3. Define membrane potential and how it is measured as well as resting potential 4. Depict the structure of sodium-potassium pump, i.e. the domains it contains and their functions 5. Explain directions of movements of ions Na^+ and K^+ as well as the number of ions moved through a sodium-potassium pump 6. Discuss how cell membranes behave as capacitors
	Basics of Voltage Clamp, Patch Clamp (T-1)	1. Understand the basic components of voltage-clamp and patch-clamp technique 2. Explain the basic principles of two-electrode voltage-clamp electrophysiology, electrodes, glass micropipettes 3. Describe the types of voltage-clamp configurations, patch-clamp configurations and how they can be used to characterize ion channel function. 4. Define how ion selectivity can be determined for voltage-activated ion channels. 5. Distinguish the difference between patch-clamp and voltage clamp.
SKILLS		

	Lab: First law of thermodynamics (P-1)	1. Measure the temperature of the aluminum body as a function of the number of rotations against the friction cord. 2. Explore the proportionality between the temperature change and the frictional work 3. Determine the specific heat capacity of aluminum. 4. Deduce from the experimental findings and thereby verify the first law of thermodynamics.
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At the end of this lesson, the student will be able to:

KNOWLEDGE		
DEP	TOPIC	LEARNING OUTCOMES
HISTOLOGY AND EMBRYOLOGY	Histology of Lining and Glandular Epithelium (T-2)	1. Define the origin of the lining and glandular epithelium 2. Classify the lining epithelium 3. Classify the glandular epithelium 4. Explain histological features and functions of the lining and glandular epithelium
	Epithelium and Surface Differentiations (T-2)	1. List the four major types of tissue in the body and explain the main role of each tissue 2. Explain the characteristics, functions, and specializations of epithelia 3. Describe the structure and function of junctions. 4. Define the structure of apical specializations and their functions.
	Histology of Connective Tissue (T-2)	1. Describe the histological features of the connective tissue 2. List the names of the connective tissue cells and describe their histological features 3. Make correlations between their functions 4. Define fibers of the connective tissue 5. Identify the histological features of the ground substance 6. Define the connective tissue types and their histological features
	Histology of Cartilage (T-2)	1. Define the origin of the cartilage tissue 2. Classify the main types of cartilage tissue. 3. Describe the histological characteristics and explain the functions of each type of cartilage.
	Histological Structure of Bone Tissue (T-2)	1. Identify general features of bone tissue 2. Identify the major parts of the bones 3. Describe the cells found in bone tissue and describe their histological features 4. Identify the organic and inorganic components of the bone tissue 5. Define the bone tissue types according to the different criteria 6. Define the features of the mature and immature bone 7. Describe the structure and function of compact and spongy bone tissue. 8. Describe the components of an osteon
	Osteogenesis (T-1)	1. List the steps of intramembranous ossification 2. List the steps of endochondral ossification 3. Differentiate intramembranous ossification from enchondral ossification in embryonic development 4. Explain the growth activity at the epiphyseal plate 5. Explain the growth in thickness of bone
	SKILLS	
	Use of Microscope and Epithelial Tissue (P-2)	1. Learn to use the light microscope effectively for histological observation. 2. Classify epithelial tissues into lining and glandular types, and describe their key histological features. 3. Identify lining epithelium on slides from the esophagus, small intestine, kidney, urinary bladder, trachea, and skin. 4. Identify glandular epithelium on slides from the parotid and submandibular glands.
	Histology of Connective tissue (P-2)	1. Classify the main types of connective tissue. 2. Describe the key histological features of connective tissue using the light microscope. 3. Identify and distinguish connective tissue on slides from mesothelium, skin, tendon, umbilical cord, and adipose tissue.

	Histology of Cartilage (P-2)	1. Classify the main types of cartilage tissue. 2. Describe the key histological features of cartilage tissue using the light microscope. 3. Identify and distinguish cartilage tissue on slides from the trachea, pinna, and annulus fibrosus.
	Histological Structure of Bone Tissue & Osteogenesis (P-2)	1. Classify the bone tissue 2. Define bone tissue types and their features by light microscope 3. Explain bone formation as intramembranous and endochondral ossification 4. Identify zones of epiphyseal growth plate in endochondral ossification

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
MEDICAL BIOLOGY	The Cell Structure and Function (T-2)	1. Recognize the basic structure and function of the cells 2. Explain the prokaryotes in terms of organelles, genetic material, cell division 3. Explain the eukaryotes organizations in terms of organelles, genetic material, cell division 4. Explain the differences between prokaryotic and eukaryotic cells 5. Explain the differentiation of cells according to internal organization and functions 6. Count the basic cell types with examples 7. Define stem cell concept 8. Define epigenetics concept 9. Explain cell differentiation in terms of genetic material and epigenetic effect
	Cell membrane and Lipid Bilayer (T-1)	1. Count the components that form the cytosol 2. Explain the structure of plasma membrane 3. Explain the importance of phospholipid layer through the concepts of hydrophilic and hydrophobic features 4. Explain the functions of plasma membrane 5. Define the concept of liquid mosaic model 6. Explain the structure and function of glycocalyx 7. Explain integral and peripheral proteins of the cell membrane 8. Define the structure and function of channel and carrier proteins 9. Explain the concepts of diffusion, active and passive transport 10. Count types of gated channels and explain their working principles (voltage gated, ligand gated, mechanically gated, G-protein gated channels) 11. Explain working principles of ungated channels 12. Explain the structure of ion channels and aquaporins
	Cell-cell junctions and cell surface differentiations (T-2)	1. Describe apical surface differentiations of cell surface 2. Explain the structure and function of microvilli 3. Explain the structure and function of cilia and flagella 4. Count basolateral cell differentiation with their structural organization 5. Explain the structure and function of tight junction 6. Explain the structure and function of anchoring junction 7. Explain the structure and function of desmosome 8. Explain the structure and function of gap junction 9. Explain the structure and function of cell-extracellular matrix junctional units (hemidesmosome, focal adhesions) 10. Describe basolateral cell differentiations by comparing the structural protein, cytoskeleton filaments and their function 11. Explain the structure and function of cell-extracellular matrix junctional units (hemidesmosome and focal adhesion)

	Microscopy (T-1)	1. Count the structure and basic components of the microscopes 2. Define the types and working principles of light microscope 3. Explain the concept of resolution in microscopes, compare the resolution power of light and electron microscopes through working principles 4. Explain the structure of light microscope and count the basic components 5. Explain how to calculate the magnification power of microscopes 6. Explain the working principles of light microscopes (bright- field, dark field, phase-contrast, fluorescence microscopes) 7. Compare different type of light microscopes in terms of sample preparation, and areas of use 8. Define the types and working principles of electron microscope 9. Compare the images obtained with different light and electron microscopes
	The cytoskeleton (T-3)	1. Define the cell skeleton and explain its importance 2. Count 3 basic protein filaments that make up the cell skeleton 3. Describe 3 main cytoskeletal protein filaments with their placement , functions and importance in terms of medicine 4. Explain the size, structural organization and function of intermediate filaments 5. Counts the types of intermediate filaments together with their regions and their importance 6. Explain the size, structural organization and function of microtubule filaments 7. Describe the concept and importance of dynamic instability in microtubule formation 8. Explain the concepts of major microtubule organization center, centriol, centrosome through cell division mechanism 9. Count microtubule related motor proteins and explain their functions 10. Explain the structure of cilia, flagella, mitotic spindle, centrosome through cytoskeletal filaments 11. Explain structural organization and function of actin filaments 12. Count actin-driven motor proteins 13. Describe the basic mechanics of muscle contraction through actin-myosin interaction 14. Give examples of diseases that may be seen due to defects of cytoskeletal filaments
	Organelle I (T-1)	1. Count prokaryotic and eukaryotic cell organelles with their functions 2. Explain the concept of endomembrane related and non- organelles and group organelles through this concept 3. Describe the structure and function of the nucleus and nuclear membrane. 4. Describe the structure and function of the ribosome. 5. Describe the structure and function of the golgi apparatus. 6. Describe the structure and function of the endoplasmic reticulum. 7. Explain the cell organelles and synthesis pathway involved in protein synthesis through cell organelles (proteins to be used inside the cell or secreted outside the cell)
	Organelle II (T-1)	1. Explain the structure and function of mitochondria 2. Describe endocytosis and exocytosis. 3. Explain different varieties of import, including phagocytosis, pinocytosis, and receptor-mediated endocytosis. 4. Describe the structure and function of lysosome and peroxisome 5. Describe the structure and function of proteosomes 6. Explain the concept of inclusions 7. Describes the most common inclusions in the cell

	Extracellular matrix and cell adhesion molecules (T-2)	1. Describe the concept of extracellular matrix (ECM) 2. Count the functions of the extracellular matrix 3. Count the extracellular matrix proteins into 3 main groups 4. Describe the structural organization and functions of collagen and elastin from structural proteins 5. Describe the structural organization and function of proteoglycan 6. Explain the structural organization and functions of fibronectin and laminin from adhesive glycoproteins 7. Explain the concept of cell adhesion with its importance for the organism 8. Count cell adhesion proteins (cadherin, selectin, integrin) with their structure and working principles
	Membrane transport and cell signaling (T-1)	1. Explain the concept of signal transduction 2. Explain the signaling types according to signal transmission pathways 3. Categorize signal molecules according to their properties and mechanism of action 4. Compare the basic structure of extracellular and intracellular signaling molecules with their mechanism of action 5. Explain cell surface receptors in terms of structure and function 6. Count the types of cell surface receptors (G-protein related, enzyme related, ion channel related) 7. Describes adenylyl cyclase and phospholipase C pathways together with secondary precursors in G-protein related signal transduction system 8. Explain the function and transmission mechanism of tyrosine kinases in enzyme related signal transduction system 9. Explain the ion gated receptors in terms of working principle

At the end of this lesson, the student will be able to:

KNOWLEDGE		
DEP	TOPIC	LEARNING OUTCOMES
PHYSIOLOGY	Cell Physiology (T-2)	1. Describe the functional organization of the cell 2. Describe the structure and the functions of the cell membrane 3. List the functions of the membrane proteins 4. Name the cellular organelles and state their functions in the cell 5. Describe the relationship between organelles of the cell 6. Describe the cellular cytoskeleton and their contribution to cell structure and function 7. Give examples for distinct types of cell with their characteristic structure and functions.
	Membrane Physiology & Cellular Transport (T-2)	1. Describe the characteristics of the semipermeable cell membrane 2. Describe and compare different types of membrane transport 3. Name the factors that affect substance transport through the cell membrane 4. Explain the types of active transport through the membrane by giving examples 5. Explain the differences between the diffusion and the active transport of substances through the cell membrane 6. Explain the role of ion channels in selective permeability of the membrane 7. Explain how water is transported through the membrane 8. Describe how endocytosis and exocytosis occur and explain their role in substance transport through the membrane

Compartments and compositions of body fluids (T-1)	1. Explain the features and the volumes of the different body fluid compartments (i.e. extracellular, intracellular, interstitial, and transcellular fluids) 2. Describe how the body fluid compartments differ with regard to their composition by explaining underlying mechanisms. 3. Explain the meaning of osmole, osmolality, osmotic equilibrium, osmosis, and osmotic pressure terms. 4. Explain how cells regulate their volume in isotonic, hypotonic, and hypertonic environments. 5. Explain the regulation of fluid exchange and osmotic equilibrium between intracellular and extracellular fluids 6. Explain how the volume of the body fluid compartments can be calculated.
Cellular Communication and Signal transduction Pathways (T-2)	1. Describe how do cells communicate with each other 2. Defines the terms target cell, receptor and physiological signals 3. Describe the classes of receptors and the intracellular signal transduction pathways associated with them
Membrane Potentials (T-1)	1. Describe the distribution of ions in the extracellular and intracellular fluid compartments 2. Explain the origin of the resting membrane potential 3. Define what equilibrium potential of an ion represents by giving examples 4. Compare membrane permeability for different ions 5. Analyze Goldman-Hodgkin-Katz equation that can be used to calculate membrane potential
Excitable Cells and Action Potential (T-2)	1. Outline the general features of the excitable cells by comparing with non-excitable cells 2. Explain how the movement of the ions across the membrane leads to a reversible change in the membrane potential 3. Describe the stages of an action potential by naming related ion channels with ionic flows 4. Define absolute and relative refractory periods with underlying reasons 5. Explain the difference between propagation of action potential in a myelinated and unmyelinated axon 6. Name the factors that are effecting conduction velocity of a neuron 7. Predict the possible effects of the blockage of particular ion channels on generation of action potential
SKILLS	
Lab: Simulating osmotic pressure (P-2)	1. Define the principles of osmosis 2. Explain how tonicity of a solution affects the volume of the cells based on the experiments that they conducted in the simulation platform 3. Define osmotic pressure 4. Discuss the conditions that affect osmotic pressure based on the results of their experiments that they conducted in the simulation platform
Lab: Membrane potential measurement in a simulation platform (P-2)	1. At the end of the lecture students will be able to 2. Define the term resting membrane potential 3. Measure and observe resting membrane potential from different parts of a neuron 4. Describe the ion channels and ionic flows that are creating membrane potential 5. Discuss the effect of ionic concentration changes on membrane potential based on the results of their experiments that they conducted in the simulation platform 6. Interpret how the resting membrane potential depends on the concentrations of potassium and sodium ions. 7. Discuss the effect of changes in the permeability (conductance) of the membrane for particular ions on membrane potential
Lab: Action potential measurement in a simulation platform (P-2)	1. Describe how the movement of the ions across the membrane leads to an action potential 2. Describe the stages of an action potential and its propagation

		- Describe the term of threshold for an excitable cell - Discuss the underlying mechanisms that create the absolute and the relative refractory periods based on the experimental results that they collect during lab - Explain how the threshold is changing during relative refractory period based on the experiments that they conducted in a simulation platform - Discuss the relationship between the intensity and the duration of stimulation and the generation of action potentials by a neuron
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At the end of this lesson, the student will be able to:

SKILLS

DEP	TOPIC	LEARNING OUTCOMES
CLINICAL SKILLS	Injections I: Preparing Medications from Ampules and Vials (T-1) (P-1)	- Describe the types of the parenteral drug administration routes - List the equipment necessary for the parenteral drug administration - Define the needs for safe and effective administration - Prepare medications from ampules - Prepare medications from vials

At the end of this lesson, the student will be able to:

SKILLS

DEP	TOPIC	LEARNING OUTCOMES
COMMUNICATION SKILLS	Introduction to Communication Skills (P-2)	- Discuss why communication skills in medicine are important - Clarify the feelings that drive human actions - Define aggressive, passive and assertive types of behavior - Discover that human beings react differently in a given situation depending on their own levels of acceptance - Distinguish the necessary action to be taken (listening / self-expression) during communication
	Active Listening and self-expression (P-2)	- Define the steps of active listening - Appraise importance of body language in communication - List the sentences that may act as barriers in communication - Demonstrates active listening skills when talking to a person in problem - Distinguish different forms of self-expression - Identify negative effect of judgmental self-expression in interpersonal relationship - Describe three steps of self-expression using "I language" - Demonstrate correct self-expression method in role plays
	Self-expression; Conflict Resolution (P-2)	- Distinguish different forms of self-expression - Identify negative effect of judgmental self-expression in interpersonal relationship - Describe three steps of self-expression using "I language" - Demonstrate correct self-expression method in role plays - Define two different types of conflicts - Explain different methods of resolution in necessity based conflicts - Comprehends reasons of conflicts in people who has different values - Discuss the ways of conflict resolution in people with different values
	Using the basic communication skills in doctor-patient relationship (P-2)	- Adapts basic communication skills to doctor- patient interaction - Uses techniques to build up and maintain rapport with the patient - Uses techniques of active listening while talking to the patient - Evaluates emotions of the patient and responds in accordance with the emotion - Encourages the patient to express his/her concerns

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
PHILOSOPHY AND ETHICS	Medicine in Civilizations of Antiquity: China and India (T-2)	1. Define the prominent features of Chinese and Indian life and civilization. 2. Define the medical treatment methods of these civilizations. 3. Define the tools used for the diagnosis and prognosis of diseases. 4. Outline the legacy of the level of these civilizations
	Introduction to philosophy of science III - Appearance and reality (T-2)	1. Distinguish between philosophical understandings of appearance and reality. 2. Distinguish between primary and secondary qualities. 3. Explain the mechanical view of the world. 4. Comprehend direct realism, idea-ism, idealism, and causal realism.
	Medicine in Civilizations of Antiquity: Mesopotamia and Egypt (T-2)	1. Define the prominent features of Mesopotamian and Egyptian life and civilization. 2. Define the medical treatment methods. 3. Define the tools used for the diagnosis and prognosis of diseases. 4. Outline the legacy of the level of these civilizations
	Introduction to philosophy of science IV - Scientific realism (T-2)	1. Comprehend the correspondence theory of truth. 2. Distinguish between coherence and correspondence theories of truth. 3. Explain scientific realism.
	Mind and body I – Descartes (T-2)	1. Comprehend the Cartesian dualism. 2. Explain Cartesian methodological doubt.

BAU TIP
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COURSE 3 / MED 1005: MUSCULOSKELETAL SYSTEM				
Course Date	November 24 - December 19, 2025			
Exam Dates	Practical Exams: December 19, 2025 Theoretical Exam: December 19, 2025			
Academic Unit	Academic Staff	Theoretical hours	Practical hours	Total
Anatomy	Ahmet Usta, Prof. Uğur Baran Kasırğa, Assist. Prof.	24	11	35
Biophysics	Serdar Durdağı, Prof. Bircan Dinç, Assist. Prof. Duygu Tarhan, Assist. Prof.	6	-	6
Biochemistry	Yeşim Neğiş, Assoc. Prof. Özlem Unay Demirel, Assoc. Prof. Merve Karayel Başar, Assist. Prof.	10	-	10
Histology and Embryology	Yasemin Canıllıoğlu, Assoc. Prof. Merjem Purelku, Assist. Prof.	2	2	4
Medical Biology	Betül Şahin, Assist. Prof.	5	-	5
Physiology	Yasemin Keskin Ergen, Assist. Prof. Betilay Topkara Arslan, Assist. Prof. Faize Elif Bahadır, Assist. Prof.	9	1	10
Clinical Skills	Faize Elif Bahadır, Assist. Prof.	1	1	2
Communication Skills in Medicine	Figen Dağlı, Prof.	Other groups		
TOTAL		57	15	68
Philosophy and Ethics	Kadircan Keskinbora, Prof.	10	-	10
Communication Skills and Academic Reporting		12	-	12
STUDY TIME				29

COURSE AIM:

The aim of this course is to:

- provide knowledge about the structures of all tissues, skin and attachments that make up the organism and their biochemical, biophysical, and physiological properties;
- provide detailed knowledge about anatomy of the muscular system in terms of functions, relationships, innervation and vascular supply; provide a basis for interpretation of functions of muscles and associate the defects in the normal structure and function of the musculoskeletal system with common disorders and clinical cases;
- provide knowledge about muscle contraction, forces and body movement;
- provide knowledge about the structures and general characteristics of microbiological pathogens;
- get communication skills in medicine;
- get skills about how to prepare parenteral medications and make intradermal, subcutaneous, and intramuscular injections;
- get skills about working as a part of a team.

LEARNING OUTCOMES

At the end of this lesson, the student will be able to:

KNOWLEDGE		
DEP.	TOPIC	LEARNING OUTCOMES
ANATOMY	General Information about Bones (T-1)	1. Define bone as a specialized connective tissue and explain its main functions (support, protection, movement, mineral storage, hematopoiesis). 2. Classify bones by shape (long, short, flat, irregular, sesamoid) with examples. 3. Describe the gross anatomy of a long bone (diaphysis, epiphysis, metaphysis, medullary cavity). 4. Explain microscopic bone structure (compact vs. spongy bone, osteons, trabeculae). 5. Discuss bone development processes (intramembranous vs. endochondral ossification).
	Upper Limb Bones: Scapula, Clavicula, Humerus, Radius, Ulna, Skeleton of the Hand (T-2)	1. Identify osteological landmarks of scapula and clavicle and relate them to muscular attachments and joint formation. 2. Describe features of the humerus (head, tubercles, condyles, grooves) and correlate with clinical fractures. 3. Explain anatomical details of radius and ulna including articulations, interosseous membrane. 4. Identify carpal bones, metacarpals, and phalanges and explain their articulations. 5. Discuss ossification centers and growth patterns of upper limb bones. 6. Correlate anatomical features of upper limb bones with radiographic interpretation.
	Lower Limb Bones: Coxal Bone and Femur (T-1)	1. Describe the parts and landmarks of the coxal bone (ilium, ischium, pubis) and their articulations. 2. Explain the acetabulum and obturator foramen in relation to hip stability and muscular attachments. 3. Identify main features of the femur (head, neck, trochanters, condyles, linea aspera) . 4. Discuss ossification and growth patterns of femur and hip bone.

Lower Limb Bones: Tibia, Fibula, Patella, Skeleton of the Foot (T-1)	1. Identify major landmarks of tibia (tibial tuberosity, condyles, malleolus) and fibula (head, shaft, lateral malleolus). 2. Describe the patella's morphology and role in knee biomechanics. 3. Classify and identify tarsal, metatarsal, and phalangeal bones of the foot. 4. Explain the anatomical basis of longitudinal and transverse arches of the foot. 5. Discuss ossification centers of tibia, fibula, patella, and foot bones. 6. Interpret radiographs of ankle and foot bones.
Vertebral Column, Sacral Bone, Coccygeal Bone, Sternum, Ribs (T-3)	1. Classify vertebrae (cervical, thoracic, lumbar, sacral, coccygeal) and describe their typical features. 2. Identify landmarks of individual vertebrae and relate them to spinal cord levels. 3. Describe structure of sacrum and coccyx, including articulations and clinical importance. 4. Explain morphology of sternum and ribs, including types of ribs and costal cartilages. 5. Interpret radiological imaging of spine and thoracic cage.
Frontal, Occipital, Parietal, Temporal Bones (T-1)	1. Describe osteological landmarks of frontal, occipital, parietal, and temporal bones. 2. Explain their roles in forming cranial fossae and sutures. 3. Identify foramina and canals of these bones and the structures passing through them. 4. Discuss muscular attachments related to these bones. 5. Correlate fractures of cranial vault and base. 6. Interpret radiographs and CT scans of cranial bones. 7. Explain developmental and ossification aspects (fontanelles, sutural fusion).
Sphenoid, Palatine, Vomer, Ethmoid, Hyoid Bones (T-1)	1. Identify major parts of the sphenoid bone (body, wings, pterygoid processes) and their foramina. 2. Describe the ethmoid bone, including cribriform plate and perpendicular plate, and their clinical relevance. 3. Explain anatomy of the vomer and palatine bones in forming nasal septum and palate. 4. Identify the hyoid bone and its role in swallowing and muscle attachment. 5. Discuss ossification and developmental anomalies (cleft palate, ethmoidal defects). 6. Correlate clinical conditions such as pituitary surgery (sphenoid sinus) and trauma to ethmoid (CSF rhinorrhea). 7. Interpret radiological features of central cranial base bones.
Maxilla, Mandible, Zygomatic, Lacrimal, Nasal Bones (T-1)	1. Describe the morphology of maxilla, including alveolar process, maxillary sinus, and articulations. 2. Identify features of mandible (body, ramus, condylar process) and discuss clinical relevance of fractures. 3. Explain role of zygomatic, lacrimal, and nasal bones in forming facial skeleton. 4. Discuss ossification centers of facial bones and developmental anomalies (cleft lip/palate, micrognathia). 5. Correlate facial bone fractures (Le Fort fractures, nasal fractures, blow-out fractures) with anatomy. 6. Interpret radiographs and CT imaging of facial skeleton.
Cranium as a Whole, Overview of Skull, Base of Cranium (T-2)	1. Describe general organization of the skull (neurocranium vs viscerocranium). 2. Explain cranial fossae (anterior, middle, posterior) and their boundaries. 3. Identify major foramina at skull base and structures transmitted through them. 4. Discuss sutures, fontanelles, and age-related changes of skull. 5. Correlate fractures of cranial base with clinical signs (CSF leakage, cranial nerve palsy). 6. Interpret radiographs and CT/MRI imaging of the skull base.

Introduction to Joints (T-1)	1. Define a joint and classify joints by structure (fibrous, cartilaginous, synovial) and function. 2. Describe general features of synovial joints (articular cartilage, capsule, synovial membrane, cavity, ligaments). 3. Explain biomechanical principles of joint stability and movement. 4. Identify basic movements (flexion, extension, abduction, adduction, rotation, circumduction, gliding). 5. Correlate types of joints with examples from the human body. 6. Discuss clinical conditions affecting joints (arthritis, dislocation, hypermobility).
Shoulder and Elbow Joints (T-1)	1. Describe anatomy of the shoulder joint (articulating surfaces, capsule, ligaments, bursae). 2. Explain movements of the shoulder and their muscular control. 3. Identify key features of the elbow joint (humeroulnar, humeroradial, proximal radioulnar articulations). 4. Discuss stabilizing structures of shoulder and elbow joints. 5. Correlate clinical conditions: shoulder dislocation, rotator cuff injury, elbow dislocation. 6. Recognize radiographic features of shoulder and elbow.
Radioulnar, Wrist, and Finger Joints (T-1)	1. Describe proximal and distal radioulnar articulations and their role in pronation–supination. 2. Explain anatomy of the wrist joint (radiocarpal) and intercarpal joints. 3. Identify joints of the hand (metacarpophalangeal, interphalangeal) and their movements. 4. Discuss stabilizing ligaments and articular discs (triangular fibrocartilage complex). 5. Recognize radiographic anatomy of wrist and hand joints.
Hip, Knee, and Pelvis Joints (T-2)	1. Describe articulating surfaces, capsule, and ligaments of the hip joint. 2. Explain blood supply and nerve supply of the hip and its clinical significance (avascular necrosis). 3. Identify anatomical features of the knee joint, including menisci, cruciate and collateral ligaments. 4. Discuss biomechanics of hip and knee movements, including gait cycle correlation. 5. Explain pelvic articulations (sacroiliac joint, pubic symphysis) and their functions. 6. Describe pelvic diameters and their clinical relevance in obstetrics. 7. Recognize radiological features of hip, knee, and pelvic joints.
Ankle and Foot Joints (T-1)	1. Describe anatomy of the ankle joint (talocrural articulation) and its stabilizing ligaments. 2. Explain subtalar and transverse tarsal joints and their role in inversion–eversion. 3. Identify intertarsal, tarsometatarsal, metatarsophalangeal, and interphalangeal joints. 4. Discuss biomechanics of foot joints in standing, walking, and running. 5. Explain role of plantar fascia and arches in foot stability. 6. Recognize radiographic features of ankle and foot joints.
Temporomandibular Joint (T-1)	1. Describe articulating surfaces, capsule, and articular disc of the TMJ. 2. Explain movements of the TMJ (hinge, gliding, protrusion, retrusion, lateral). 3. Identify muscles controlling TMJ movements and their innervation. 4. Discuss vascular and nervous supply of the TMJ.
Joints of the Spine (T-2)	1. Describe intervertebral discs (anulus fibrosus, nucleus pulposus) and their biomechanical role. 2. Explain anatomy of zygapophysial (facet) joints and their variations along cervical, thoracic, and lumbar regions. 3. Identify uncovertebral joints (of Luschka) and their clinical importance. 4. Discuss ligamentous support of the spine (anterior/posterior longitudinal, ligamentum flavum, supraspinous, interspinous). 5. Explain movements permitted at different spinal regions and their functional implications. 6. Interpret radiological features of spinal joints (X-ray, CT, MRI).

Joints of the Thoracic Cage (T-2)	1. Describe costovertebral and costotransverse joints and their role in rib movement. 2. Explain sternocostal joints (synchondroses vs synovial) and variations. 3. Identify manubriosternal and xiphisternal joints and their clinical relevance. 4. Discuss costochondral junctions and their significance in respiratory mechanics. 5. Correlate thoracic joint anatomy with mechanics of breathing. 6. Recognize clinical conditions: costovertebral arthritis, Tietze syndrome, slipping rib syndrome, costochondritis.
SKILLS	
Scapula, Clavicula, Humerus, Radius, Ulna, Hand bones & articulations (P-2)	1. Identify major landmarks of scapula, clavicle, humerus, radius, ulna, and hand bones on osteological models. 2. Orient each bone in anatomical position using models and articulated skeletons. 3. Locate foramina and grooves transmitting neurovascular structures (e.g., suprascapular notch for suprascapular nerve, radial groove for radial nerve). 4. Verify bony landmarks and joint relations on cadaveric specimens. 5. Correlate palpated surface landmarks (clavicle, olecranon, styloid processes) with their deeper anatomical structures.
Pelvis, Coxal Bone, Femur, Tibia, Fibula, Patella, Foot bones & articulations (P-2)	1. Identify key features of pelvic and lower limb bones (acetabulum, femoral condyles, tibial plateau, malleoli, calcaneus) on osteological models. 2. Orient pelvic and lower limb bones anatomically and reconstruct articulations using skeletal models. 3. Recognize foramina and canals transmitting nerves/vessels (e.g., obturator canal, greater and lesser sciatic foramina, nutrient foramina of femur and tibia). 4. Confirm anatomical landmarks and joint orientation with cadaver dissection. 5. Demonstrate palpation of surface landmarks (ASIS, tibial tuberosity, medial malleolus) and relate them to underlying structures.
Vertebral Column, Sacrum, Coccyx, Sternum, Ribs (P-2)	1. Distinguish cervical, thoracic, and lumbar vertebrae on osteological models by characteristic features. 2. Identify sacrum, coccyx, sternum, and ribs, noting articulations and surface anatomy relations. 3. Locate foramina and canals (vertebral foramina, intervertebral foramina transmitting spinal nerves, sacral hiatus for caudal anesthesia). 4. Demonstrate vertebral curvatures and costovertebral articulations using articulated skeletons. 5. Relate features to surface anatomy landmarks (spinous processes, sternal angle).
Cranium as a whole and mandible (P-2)	1. Identify major cranial bones and sutures on skull models and cadaver. 2. Demonstrate landmarks of the mandible (condyle, coronoid, mental foramen) and correlate them with nerves/vessels (inferior alveolar nerve, mental nerve). 3. Locate cranial gateways such as the foramen magnum, jugular foramen, and stylomastoid foramen, relating them to structures transmitted. 4. Demonstrate TMJ anatomy and movements using models and verify relations on cadaver. 5. Correlate external cranial features with surface anatomy (orbit, nasal cavity, zygomatic arch).
Bones of cranium (P-2)	1. Identify frontal, parietal, occipital, temporal, sphenoid, and ethmoid bones and their landmarks on osteological models. 2. Recognize sutures and junctions (bregma, lambda, pterion, asterion) on dry skulls. 3. Locate and describe foramina and canals transmitting critical neurovascular structures (optic canal, superior orbital fissure, foramen rotundum/ovale/spinosum, carotid canal, hypoglossal canal). 4. Orient cranial bones in anatomical position and confirm internal vs. external features on cadaver skulls. 5. Relate foramina and grooves to the cranial nerves and vessels passing

		through them.
	Pelvis: Structure, articulations and diameter (P-1)	1. Identify the bony pelvis 2. Demonstrate sacroiliac and pubic symphysis articulations on models/cadaver. 3. Measure anteroposterior and transverse pelvic diameters. 4. Correlate diameters with obstetric significance. 5. Recognize anatomical variants (narrow vs wide pelvis).

At the end of this lesson, the student will be able to:		
DEP.	TOPIC	LEARNING OUTCOMES
BIOPHYSICS	Actin-Myosin Interactions (T-1)	1. Identify the structures that make up skeletal muscle 2. Define the major proteins that play a role in muscle 3. Describe the structure of thick filament – myosin 4. Describe the structure of thin filament – actin and proteins found along the actin, tropomyosin and troponin 5. Describe the interactions of actin-myosin and other proteins found on actin filament 6. Discuss the sliding filament model of muscle contraction
	Stimulation of muscle contraction (T- 1)	1. Define terms such as motor unit, synapse, motor end plate, neurotransmitters, synaptic cleft 2. Describe the excitation-contraction coupling mechanism 3. Illustrate the major events observed during the muscle contraction 4. Distinguish between isotonic and isometric contractions 5. Describe the phases of muscle twitch 6. Describe how muscle contraction recorded
	Contraction heat, relaxation (T-1)	1. Describe the phases of heat production and release in muscle 2. Explain the relationship between force and velocity for muscle 3. Define and derive Hill's equation 4. Discuss how Hill's equation relates energetics of muscle contraction to the chemistry of the contractile process
	Mechanical Properties of Muscle (T- 1)	1. Define different types of skeletal muscle 2. Calculate the mechanical power of muscle as well as the efficiency of muscle contraction 3. Describe the relationship between tension and length of muscle 4. Discuss the ideal length of sarcomere to produce maximal tension 5. Explain how muscle length controlled automatically 6. Define the feedback mechanism for muscle length control 7. Discuss skeletal servomechanism
	Molecular Motors (T-1)	1. Define basic matters of molecular motors 2. Discuss characteristic properties of molecular motors observed due to the nano scale 3. Distinguish coupling of molecular motor protein functions to ATP 4. Calculate the fluid frictional force and power dissipated due to environment motor proteins functions 5. Discuss the ranges of forces exerted by DNA manipulating proteins and the reasons for the differences in force magnitude
	Forces and body movement (T-1)	1. Explain the mechanical method of muscle action analysis, biomechanics of muscle actions, sports medicine 2. Explain the response of tissues to the forces; stress, strain, stiffness and mechanical strength and viscoelasticity 3. Define biomechanics of bone and ligaments 4. Explain muscle angle of pull, contact forces, and segmental interaction principle 5. Define applications of biomechanics in sports medicine and rehabilitation

At the end of this lesson, the student will be able to:

DEP.	TOPIC	LEARNING OUTCOMES
BIOCHEMISTRY	Biochemical properties of the enzymes (T-1)	1. Define enzyme structure and general properties 2. Compare enzymes with chemical catalysts and interpret reaction coordinate diagrams 3. Explain enzyme nomenclature and classification with examples of the six major classes 4. Define cofactors and coenzymes, and describe their roles in enzyme function 5. Identify important coenzymes, their functions, and the groups they transfer 6. Define enzyme-related terms such as prosthetic group, apoenzyme, and holoenzyme
	Mechanisms of Enzyme Catalysis (T-1)	1. Explain the characteristics of enzyme active sites and enzyme specificity 2. Define activation energy, transition state, and describe how enzymes lower activation energy 3. Discuss why enzymes do not alter the equilibrium of reactions 4. Explain how enzymes increase reaction rates and the mechanisms of enzyme catalysis 5. Compare the lock-and-key and induced-fit models of enzyme action 6. Describe the factors that affect enzyme activity
	Enzyme Kinetics (T-1)	1. Explain the importance of enzyme kinetics in understanding enzyme function 2. Define initial velocity and describe the effect of substrate concentration on enzyme velocity 3. Define Michaelis–Menten kinetics, the steady state assumption, and their key conclusions 4. Describe the significance of K_m and K_{cat} values in metabolic systems 5. Explain how reaction rates are analyzed using the Lineweaver–Burke plot and other kinetic approaches 6. Discuss how enzymes affect reaction rates and catalytic efficiency
	Inhibition of Enzyme Activity (T-1)	1. Explain what enzyme inhibitors are and how they interact with enzymes 2. Describe the main types of enzyme inhibition 3. Explain the use of Lineweaver–Burke plots in evaluating inhibition 4. Discuss how inhibitors affect enzyme kinetic parameters (K_m and V_{max}) 5. Explain the concept of suicide (mechanism-based) inhibition
	Introduction to Extracellular matrix biochemistry (T-2)	1. Define the components of extracellular matrix 2. Classify the major classes of biomolecules found in the extracellular matrix 3. Tell the biochemical functions of extracellular matrix 4. Define collagen, fibrillin and elastin 5. Tell the functional role of collagen, fibrillin and elastin 6. Explain the biosynthesis of collagen and elastin in the cell 7. Define fibronectin, laminin and integrins 8. Tell the functional role of fibronectin, laminin and integrins 9. Explain the structure of fibronectin, laminin and integrins
	Biochemistry and Regulation of Muscle Contraction (T-2)	1. Describe the molecular structure of muscle and classify the major muscle proteins. 2. Explain the sliding filament theory and the actin–myosin interactions in striated, smooth, and cardiac muscle. 3. Explain the sequential steps of muscle contraction with emphasis on ATP utilization and energy sources. 4. Discuss the role of calcium ions in the regulation of muscle contraction. 5. Compare and contrast the structural and functional features of striated, smooth, and cardiac muscle.

		6. Describe the biological properties and significance of nitric oxide in muscle physiology.
	Lipoproteins (T-2)	1. Define lipoproteins and explain the rationale of their formation in blood. 2. List different types of plasma lipoproteins and describe their composition and features. 3. Explain the metabolism of individual lipoproteins. 4. Describe the biochemical sequence of events that lead to hyperlipidemic state.

At the end of this lesson, the student will be able to:

KNOWLEDGE

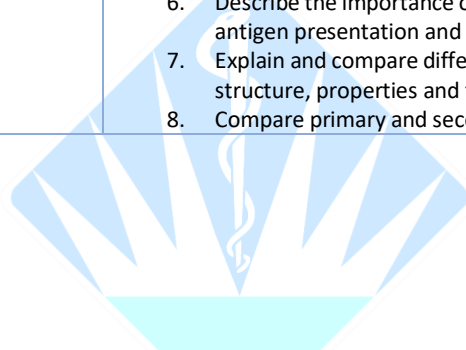
DEP	TOPIC	LEARNING OUTCOMES
HISTOLOGY AND EMBRYOLOGY	Histology of Muscle (T-2)	1. Describe the general structural and functional characteristics of muscle tissue. 2. Classify the major types of muscle tissue including their regenerative capacities. 3. Identify the three types of muscle highlighting their distinctive features
	Histology of Muscle Tissue (P-2)	1. Classify the main types of muscle tissue. 2. Describe the key histological characteristics of muscle tissue observed under the light microscope. 3. Identify the structural organization of muscle, including its connective tissue layers. 4. Compare and contrast the structural and functional differences among muscle tissue types under the light microscope.

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
MEDICAL BIOLOGY	Cell cycle-Division (T-2)	1. Explain the function of cell division in reproduction, growth, regeneration and repair 2. Explain the difference between a somatic cell and gamet through cell division 3. Describe the phases of meiosis and mitosis and explain the differences of both cell division 4. Explain cytokinesis 5. Count the cell skeleton structures in the cell division steps 6. Explain the importance of recombination in cell division and the concept of homologous chromosomes
	Cell Death (T-1)	1. Explain the definitions of programmed and unscheduled cell division, counts the difference 2. Explain the contribution of cell death to natural physiological processes such as morphogenesis, immunity and tissue remodelling 3. Explain the importance and basic steps of apoptosis control 4. Explain intrinsic and extrinsic pathways in apoptosis process 5. Count the basic groups of diseases that may be seen due to apoptotic defects 6. Count the general changes in the cell during necrosis 7. Explain basic changes in autophagic cell death 8. Explain the concepts of apoptosis and necrosis, counts the differences

	Molecular basis of immunology-I (T-1)	1. Describe the protective functions of blood via white blood cells 2. Count the cells of immun system with their main functions 3. Define innate and adaptive immune system with their cells 4. Explain the importance of surface membrane barriers, phagocytosis and natural killer cells in innate body defense. 5. Describe the organ components of the immune system- primary and secondary 6. Explain the function and importance of lymphatic system with its subunits 7. Explain the main functions of different types of T cells, B cells 8. Compare and contrast the origin, maturation process, and general function of B and T lymphocytes.
	Molecular basis of immunology-II (T-1)	1. Explain the concept of memory of immun system at the cellular level 2. Explain the principles of self-tolerance and autoimmunity 3. Explain basic principles of antigen antibody interaction 4. Explain the concept of CD marker (CD4+, CD8+) 5. Describe antigen presentation mechanism and count antigen presenting cells 6. Describe the importance of major histocompatibility complex in antigen presentation and self-nonself discrimination 7. Explain and compare different types of antibodies in terms of their structure, properties and functions 8. Compare primary and secondary immune response



At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
PHYSIOLOGY	Overview of nervous system (T-1)	1. Describe the organization of the nervous system by naming subdivisions with their general functions 2. Name the various cell types in the nervous system with their functions 3. Classify neurons as motor, sensory and interneurons based on their functions 4. Distinguish between chemical and electrical synapses 5. Describe ionotropic and metabotropic neurotransmitter receptors with their possible effects on post synaptic neuron 6. Describe the excitatory and the inhibitory postsynaptic potentials with underlying ionic fluxes 7. Explain in which ways the neurotransmitter action terminates
	Molecular mechanism of skeletal muscle contraction (T-1)	1. Categorize muscles based on their structures and functions 2. Define elements of the sarcomere that underlie striated muscle contraction 3. Orders the series of events that takes place during muscle contraction 4. Explain the role of calcium in the contraction of a skeletal muscle 5. List the steps for the skeletal muscle relaxation
	Neuromuscular Junction, Excitation and contraction coupling in skeletal muscle (T-1)	1. Describe the properties of the neuromuscular junction 2. Discuss the possible effects of agents that block different steps of neuromuscular transmission 3. Define the steps of excitation & contraction coupling 4. Describe periods of a muscle twitch 5. Explain the underlying reason of the latent period
	Whole muscle contraction (T-2)	1. Define the components of a motor unit 2. Explain the motor unit recruitment process 3. Explain how wave summation occurs 4. Differentiate isometric and isotonic muscle contractions 5. Explain the active and the passive forces that are generated under different muscle lengths 6. Explain factors that are affecting force generated by the muscle

	Skeletal Muscle Energy Metabolism and muscle fatigue (T-2)	1. List the chemical process related with the energy production by different metabolic process. 2. List exercise depended ATP usage. 3. Explain the concept of muscle fatigue underlying the depletion of energy stores, accumulation of metabolic by products, and the central nervous system contribution on it. 4. Know about local, general and chronic fatigue effects on body. 5. Explain the time needed for recovery, with the onset of energy depletion.
	Smooth muscle (T-2)	1. Define the organization and types of smooth muscles. 2. Describe the stimulation mechanism of smooth muscle and also explain the effect of different stimulation pathways on different types of smooth muscle. 3. Explain the role of calcium ion concentration in smooth muscle contraction and relaxation, define the regulation of calcium ion concentration and the source of calcium ion. 4. Explains the structural properties of contraction proteins of smooth muscle and knows the importance of these properties in terms of their functions. 5. Describe the difference between single-unit and multi-unit smooth muscle. 6. Describe the microanatomy of a smooth muscle cell. 7. Explain the process of smooth muscle contraction. 8. Explain the difference between single-unit and multi-unit smooth muscle 9. Explain the differences between the structure and contractile mechanism between striated muscle and smooth muscle.
SKILLS		
	Lab: Measurements from skeletal muscle in a simulation platform) (P-1)	1. Describe the effects of an increasing stimulus frequency on the force developed by an isolated skeletal muscle 2. Define how wave summation occurs in a skeletal muscle 3. Discuss differences between treppe and wave summation 4. Describe the effect of initial muscle length on tension developed by the skeletal muscle based on series of experiments that they conducted on isolated muscle in a simulation platform 5. Explain the differences between the active force, the passive force and the total force generated by muscle 6. Explain the molecular basis of the skeletal muscle length-tension relationship

At the end of this lesson, the student will be able to:		
SKILLS		
DEP	TOPIC	LEARNING OUTCOMES
CLINICAL SKILLS	Injections II: Intradermal, subcutaneous and intramuscular injections (T-1, P-1)	1. Define the anatomy relevant to intradermal, subcutaneous, and intramuscular injection techniques 2. Describe the procedure for each injection technique 3. Explain the safety issues relating to giving injections

At the end of this lesson, the student will be able to:

SKILLS

DEP	TOPIC	LEARNING OUTCOMES
COMMUNICATION SKILLS IN MEDICINE	Introduction to Communication Skills	1. Discuss why communication skills in medicine are important 2. Clarify the feelings that drive human actions 3. Define aggressive, passive and assertive types of behavior 4. Discover that human beings react differently in a given situation depending on their own levels of acceptance 5. Distinguish the necessary action to be taken (listening / self-expression) during communication
	Active Listening	1. Define the steps of active listening 2. Appraise importance of body language in communication 3. List the sentences that may act as barriers in communication 4. Demonstrates active listening skills when talking to a person in problem
	Self-expression; Conflict Resolution	1. Distinguish different forms of self-expression 2. Identify negative effect of judgmental self-expression in interpersonal relationship 3. Describe three steps of self-expression using "I language" 4. Demonstrate correct self-expression method in role plays 5. Define two different types of conflicts 6. Explain different methods of resolution in necessity based conflicts 7. Comprehends reasons of conflicts in people who has different values 8. Discuss the ways of conflict resolution in people with different values
	Using the basic communication skills in doctor-patient relationship	1. Adapts basic communication skills to doctor- patient interaction 2. Uses techniques to build up and maintain rapport with the patient 3. Uses techniques of active listening while talking to the patient 4. Evaluates emotions of the patient and responds in accordance with the emotion 5. Encourages the patient to Express his/her concerns

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
PHILOSOPHY AND ETHICS	Medicine in Civilizations of Antiquity: Antique Greek and Rome (T-2)	1. Define the prominent features of Greek and Roman life and civilization. 2. Define the medical treatment methods. 3. Define the tools used for the diagnosis and prognosis of diseases. 4. Outline the legacy of the level of these civilizations.
	Mind and body II – Mental States (T-2)	1. Distinguish between behaviorism, brain-state theory, and functionalism. 2. Explains the problems of these theories. 3. Comprehend the idea of a mental state.
	Bad Medicine-Bad Pharma (T-1)	
	Medicine of Dark Ages (T-1)	1. Explain the Comprehension of the significance of Dark Ages changing the scientific mentality, regression of science and medicine.
	Mind and body III – Mind and Computers (T-2)	1. Distinguish between the computational theory of mind and other theories. 2. Explain the Chinese-room thought experiment.

	What is ETHICS? (T-1)	1. Explain the dynamics between ethics and the law. 2. Explain how to implement contemporary ethical principles by examining the difference between ideas (duties). 3. Explain actions (consequences) as they pertain to the principles and principles of ethics. 4. Explain why ethics may differ among different cultures and why this knowledge is important. 5. Explain the importance of ethics in modern medicine in today's culturally diverse health care environment. 6.
	Anatolian Civilizations and Medicine (T-1)	1. The course would likely focus on the Hittites' medico-magical approach, 2. Beneath, the Luwians, Urartu, Pergamon, and the Lydian Kingdom will be taught. 3. Illness was often seen as a divine punishment rather than a natural phenomenon. 4. Rituals and Magic, Herbal Remedies, External Influences 5. Hittites, who had a relatively undeveloped medical system of their own, often relied on foreign experts, particularly Egyptian and Babylonian physicians

COURSE 4 / MED 1006: NERVOUS SYSTEM				
Course Date	December 22, 2025 – January 23, 2026			
Exam Dates	Practical Exams: January 23, 2026 Theoretical Exam: January 23, 2026			
Academic Unit	Academic Staff	Theoretical hours	Practical hours	Total
Anatomy	Ahmet Usta, Prof. Uğur Baran Kasırga, Assist. Prof.	21	10	31
Behavioral Science	İnanç Sümbüloğlu	4	2	6
Biophysics	Serdar Durdağı, Prof. Bircan Dinç, Assist. Prof. Duygu Tarhan, Assist. Prof.	4	2	6
Biochemistry	Yeşim Neğiş, Assoc. Prof. Özlem Unay Demirel, Assoc. Prof.	4	-	4
Histology and Embryology	Yasemin Ersoy Canıllıoğlu, Assoc. Prof. Merjem Purelku, Assist. Prof.	2	2	4
Physiology	Yasemin Keskin Ergen, Assist. Prof. Betilay Topkara Arslan, Assist. Prof. Elif Bahadır, Assist. Prof.	16	-	16
Clinical Skills	Betilay Topkara Arslan, Assist. Prof.	1	1	2
Communication Skills in Medicine	Figen Dağlı, Prof.	Other groups		
TOTAL		52	17	69
Philosophy and Ethics	Kadircan Keskinbora, Prof.	10	-	10
Communication Skills and Academic Reporting		16	-	16
STUDY TIME				52

"scientia et amore vitae"

COURSE AIM:

The aim of this course is to:

- define the anatomy, radiologic anatomy, histology, physiology, and functional properties of organs forming nervous system;
- get knowledge about reviewing the literature, Abstract and Index Databases;
- get knowledge about behavioral sciences;
- get skills in application of cervical collar;
- get skills about working as a part of a team.

LEARNING OUTCOMES

At the end of this lesson, the student will be able to:		
KNOWLEDGE		
DEP.	TOPIC	LEARNING OUTCOMES
ANATOMY	General definitions – about muscles and tendons (T-1)	1. Define muscle tissue and classify muscles by structure and function. 2. Describe the types of muscle attachments (tendons, aponeuroses, direct attachment). 3. Differentiate between origin, insertion, and action of a muscle. 4. Classify skeletal muscles according to shape (fusiform, pennate, circular, etc.) with examples. 5. Explain the roles of prime movers, synergists, antagonists, and fixators in producing movement.
	General definitions about spinal cord – structures, formation and course of spinal nerves, cervical plexus (T-1)	1. Describe the gross anatomy of the spinal cord (enlargements, conus medullaris, cauda equina). 2. Explain spinal cord coverings (meninges) and their clinical significance. 3. Describe the formation of a spinal nerve from dorsal and ventral roots. 4. Classify spinal nerves by region (cervical, thoracic, lumbar, sacral, coccygeal). 5. Identify main branches of a spinal nerve (dorsal ramus, ventral ramus, meningeal branch, rami communicantes). 6. Explain the structure and branches of the cervical plexus and their areas of innervation.
	Brachial plexus (T-2)	1. Describe the formation of the brachial plexus from ventral rami of spinal nerves C5–T1. 2. Explain the organization of the plexus (roots, trunks, divisions, cords, branches). 3. Identify the main terminal branches (musculocutaneous, axillary, radial, median, ulnar) and their innervation. 4. Discuss the course and relations of major branches in the axilla and arm. 5. Correlate brachial plexus anatomy with clinical injuries (Erb–Duchenne palsy, Klumpke’s palsy, winged scapula). 6. Recognize the plexus in radiological and surgical perspectives.
	Superficial muscles of the back: spinohumeral muscles, spinocostal muscles (T-1)	1. Identify the spinohumeral muscles (trapezius, latissimus dorsi) and describe their attachments and actions. 2. Describe the spinocostal muscles (serratus posterior superior and inferior) and their roles in respiration. 3. Explain the innervation and blood supply of the superficial back muscles. 4. Correlate the movements of the scapula with the action of spinohumeral muscles. 5. Differentiate extrinsic back muscles from intrinsic back muscles.
	Deep muscles of the back, lateral and medial group (T-1)	1. Classify the intrinsic back muscles into superficial, intermediate, and deep layers. 2. Describe the erector spinae group (iliocostalis, longissimus, spinalis) and their role in posture and extension.

		3. Explain the transversospinales group (semispinalis, multifidus, rotatores) and their function in spinal stabilization. 4. Identify minor deep muscles (interspinales, intertransversarii, levatores costarum). 5. Discuss innervation of intrinsic back muscles via dorsal rami of spinal nerves. 6. Recognize imaging and surface anatomy landmarks related to intrinsic back muscles.
Superficial muscles of the neck (T-1)		1. Identify the platysma, sternocleidomastoid, and trapezius muscles and describe their attachments. 2. Explain the innervation of superficial neck muscles, including the accessory nerve (CN XI). 3. Correlate the actions of sternocleidomastoid with head and neck movements. 4. Describe the relationship of superficial neck muscles with key anatomical triangles. 5. Discuss clinical conditions: torticollis, accessory nerve injury, surgical landmarks in the neck.
Deep muscles of the neck (T-1)		1. Identify the prevertebral muscles (longus colli, longus capitis) and their actions. 2. Describe the scalene muscles (anterior, middle, posterior) and their role in respiration and neck movement. 3. Explain innervation of deep neck muscles via cervical spinal nerves. 4. Correlate anatomical relations of the scalene muscles with the brachial plexus and subclavian vessels. 5. Apply anatomical knowledge to radiological imaging of the deep neck.
Muscles of the shoulder, fossa axillaris; associated nerves and vessels; muscles of the pectoral region (T-1)		1. Identify the deltoid and rotator cuff muscles (supraspinatus, infraspinatus, teres minor, subscapularis) and their actions. 2. Describe the boundaries and contents of the axilla, including the brachial plexus cords and axillary vessels. 3. Explain the anatomy of pectoralis major and minor, and their clinical relevance. 4. Correlate shoulder muscle anatomy with movements of the glenohumeral joint. 5. Interpret surface and imaging anatomy of the axillary region.
Anterior compartment of the arm – associated nerves and vessels (T-1)		1. Identify the muscles of the anterior arm compartment (biceps brachii, brachialis, coracobrachialis) and their functions. 2. Describe the course of the musculocutaneous nerve and its motor and sensory distribution. 3. Explain arterial supply of the arm (brachial artery) and venous drainage patterns. 4. Correlate functional anatomy of anterior arm muscles with elbow and shoulder movements. 5. Apply anatomical knowledge to procedures: venipuncture, brachial artery pulse, blood pressure measurement.
Anterior compartment of the forearm: superficial and deep muscles, associated nerves and vessels, palmar aspect of the hand (T-2)		1. Identify the superficial flexor muscles (pronator teres, flexor carpi radialis, palmaris longus, flexor carpi ulnaris, flexor digitorum superficialis) and their actions. 2. Describe the deep flexor muscles (flexor digitorum profundus, flexor pollicis longus, pronator quadratus) and their innervation. 3. Explain the course and branches of the median and ulnar nerves in the forearm and hand. 4. Discuss the arterial supply (radial and ulnar arteries) and venous return of the anterior compartment. 5. Describe the anatomy of the palmar aponeurosis and palmar arches. 6. Interpret imaging and surface anatomy landmarks of forearm flexors and palmar structures.

Posterior compartment of the arm (T-1)	1. Identify the triceps brachii and anconeus muscles and their functions. 2. Describe the course and branches of the radial nerve in the posterior arm. 3. Explain the arterial supply of the posterior compartment via profunda brachii artery. 4. Correlate anatomy of triceps with elbow extension and shoulder stabilization. 5. Discuss clinical conditions: radial nerve palsy, mid-shaft humerus fracture. 6. Interpret surface anatomy and radiological features of the posterior arm.
Posterior compartment of the forearm: superficial and deep muscles, dorsal structures of the hand; associated nerves and vessels (T-1)	1. Identify superficial extensor muscles (extensor carpi radialis longus/brevis, extensor digitorum, extensor digiti minimi, extensor carpi ulnaris, brachioradialis) and their actions. 2. Describe deep extensor muscles (supinator, abductor pollicis longus, extensor pollicis longus/brevis, extensor indicis) and their innervation. 3. Explain the course of the posterior interosseous nerve and its clinical significance. 4. Discuss arterial supply (posterior interosseous artery, radial artery) and venous drainage. 5. Interpret dorsal hand anatomy in imaging and clinical examination.
Lumbosacral plexus (T-1)	1. Describe the formation of the lumbar plexus (L1–L4) and sacral plexus (L4–S4). 2. Identify the major branches of the lumbar plexus (femoral, obturator, lateral femoral cutaneous, ilioinguinal, genitofemoral). 3. Identify the major branches of the sacral plexus (sciatic, superior/inferior gluteal, pudendal, posterior femoral cutaneous). 4. Explain the anatomical relationships of the lumbosacral plexus to psoas major and pelvic structures. 5. Interpret imaging and surgical relevance of the lumbosacral plexus.
Gluteal region muscles and obturator canal (T-1)	1. Identify the gluteal muscles (gluteus maximus, medius, minimus, tensor fasciae latae) and their actions. 2. Describe the lateral rotators of the hip (piriformis, obturator internus, superior/inferior gemelli, quadratus femoris). 3. Explain the anatomy of the obturator canal and the passage of the obturator nerve and vessels. 4. Discuss the innervation and blood supply of the gluteal muscles. 5. Correlate gluteal region anatomy with intramuscular injections (safe upper lateral quadrant). 6. Discuss clinical conditions: Trendelenburg gait, piriformis syndrome. 7. Apply anatomical knowledge to surgical approaches to the hip and pelvis.
Muscles of the thigh: posterior compartment, associated nerves and vessels (T-1)	1. Identify the hamstring muscles (biceps femoris, semitendinosus, semimembranosus) and their functions. 2. Describe the course of the sciatic nerve and its branches in the posterior thigh. 3. Explain arterial supply (profunda femoris and perforating branches) and venous drainage. 4. Correlate hamstring anatomy with gait cycle and hip–knee biomechanics. 5. Interpret surface anatomy and imaging of the posterior thigh.

Muscles of the thigh: anterior and medial compartment muscles; adductor canal, femoral triangle (T-1)	1. Identify the muscles of the anterior thigh (quadriceps femoris, sartorius, iliopsoas) and their functions. 2. Describe the muscles of the medial thigh (adductor group, gracilis, obturator externus) and their actions. 3. Explain the anatomical boundaries and contents of the femoral triangle. 4. Describe the adductor canal and its neurovascular structures. 5. Interpret imaging and surface landmarks of the anterior and medial thigh.
Muscles of the leg: posterior compartment, associated nerves and vessels, plantar muscles of the foot (T-1)	1. Identify the superficial posterior compartment muscles (gastrocnemius, soleus, plantaris) and their role in plantarflexion. 2. Describe the deep posterior compartment muscles (tibialis posterior, flexor digitorum longus, flexor hallucis longus, popliteus) and their functions. 3. Explain the tibial nerve and posterior tibial artery course through the posterior leg and tarsal tunnel. 4. Identify the layers of plantar muscles of the foot and their functional significance. 5. Correlate clinical conditions: tarsal tunnel syndrome, plantar fasciitis. 6. Interpret imaging and surface anatomy of posterior leg and plantar region.
Muscles of the leg: anterior and lateral compartment muscles, dorsal muscles of the foot (T-1)	1. Identify the anterior compartment muscles (tibialis anterior, extensor digitorum longus, extensor hallucis longus, fibularis tertius) and their actions. 2. Describe the lateral compartment muscles (fibularis longus, fibularis brevis) and their functions in eversion. 3. Explain the innervation (deep fibular and superficial fibular nerves) and arterial supply of anterior/lateral compartments. 4. Identify the dorsal foot muscles (extensor digitorum brevis, extensor hallucis brevis). 5. Correlate clinical conditions: foot drop, compartment syndrome, fibular nerve palsy. 6. Interpret radiological and surface anatomy of anterior/lateral leg and dorsum of foot.
Intrinsic muscles of the foot (T-1)	1. Identify the intrinsic muscles of the plantar surface organized into four layers. 2. Describe the functional role of plantar muscles in maintaining arches and supporting locomotion. 3. Explain the innervation of intrinsic foot muscles by the medial and lateral plantar nerves. 4. Discuss the vascular supply of the foot, including the plantar arterial arch. 5. Interpret imaging and surface anatomy landmarks of the sole and dorsal intrinsic muscles.
SKILLS	
Superficial & Deep Muscles of the Back, Neck; Atlantoaxial & Atlantooccipital articulations (P-2)	1. Identify superficial back muscles (trapezius, latissimus dorsi, rhomboids, levator scapulae) on cadaver. 2. Recognize spinohumeral and spinocostal muscle groups and their attachments. 3. Dissect and demonstrate deep intrinsic back muscles (erector spinae, transversospinalis) and distinguish lateral vs. medial groups. 4. Identify superficial and deep neck muscles on cadaver (sternocleidomastoid, infrahyoids, scaleni, prevertebral muscles). 5. Demonstrate the atlantooccipital and atlantoaxial joints on models/cadaver, explaining movements allowed. 6. Correlate muscular and joint anatomy with posture, head movement, and clinical conditions (torticollis, whiplash).

	Muscles of the Shoulder, Axilla, Pectoral Region; Brachial Plexus (P-2)	1. Identify the deltoid, rotator cuff muscles, and their attachments on cadaver. 2. Explore the axillary region, demonstrating its boundaries, contents, and applied importance. 3. Dissect and identify the pectoralis major, pectoralis minor, and subclavius muscles. 4. Trace the cords and major branches of the brachial plexus in relation to axillary structures. 5. Correlate muscle actions with shoulder joint stability and movements. 6. Recognize clinical conditions: axillary nerve injury, brachial plexus trauma, thoracic outlet syndrome.
	Arm & Forearm Compartments, Hand Muscles (P-2)	1. Identify anterior and posterior compartments of the arm and their main muscles (biceps, triceps, brachialis, anconeus). 2. Demonstrate flexor and extensor groups of the forearm, superficial and deep layers. 3. Identify palmar and dorsal muscles of the hand (thenar, hypothenar, lumbricals, interossei). 4. Trace the course of associated nerves and vessels (median, ulnar, radial nerves; brachial and radial arteries). 5. Demonstrate functional correlations: grip strength, pronation/supination, fine motor control. 6. Relate cadaveric dissection to clinical syndromes (carpal tunnel, epicondylitis, nerve entrapment).
	Gluteal Region, Thigh Compartments, Obturator Canal, Lumbosacral Plexus (P-2)	1. Identify gluteal muscles (gluteus maximus, medius, minimus, piriformis) and their relations to sciatic nerve. 2. Dissect posterior thigh muscles (hamstrings) and trace their neurovascular supply. 3. Identify anterior and medial thigh compartments (quadriceps, adductors) and key landmarks (adductor canal, femoral triangle). 4. Locate the obturator canal and structures passing through. 5. Trace the major nerves of the lumbosacral plexus in relation to muscles (sciatic, femoral, obturator). 6. Correlate anatomy with common clinical conditions: femoral hernia, hip injections, sciatica.
	Muscles of the Leg and Foot (P-2)	1. Identify superficial and deep posterior compartment leg muscles (gastrocnemius, soleus, tibialis posterior, flexors). 2. Recognize anterior and lateral leg muscles (tibialis anterior, fibularis longus/brevis, extensor digitorum longus). 3. Dissect plantar muscles of the foot across four layers, and dorsal muscles (extensor digitorum brevis). 4. Trace tibial, deep fibular, and superficial fibular nerves with their muscular branches. 5. Relate compartmental anatomy to vascular supply (anterior tibial, posterior tibial, fibular arteries). 6. Correlate dissection findings with clinical syndromes: foot drop, tarsal tunnel, compartment syndrome.

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP.	TOPIC	LEARNING OUTCOMES
BEHAVIORAL	Introduction to behavioral sciences: Basic principles and concepts; Phylogenetic and ontogenetic markers of behavior, Gene-environment interaction (T-1)	1. Explain the basic principles and concepts of behavioral sciences

Neurobiological foundations of behavior: neuroanatomical and neurochemical structure of the brain (T-1)	1. Define the neurobiological foundations of behavior
Introduction to Cognitive Development in Childhood and Adolescence (T-1)	- Describe the cognitive abilities infants, young children and adolescents possess - List the stages in Piaget's cognitive theory and define and use key terms correctly - Understand the interdependence between the physical, cognitive and social domains of development - Critically evaluate Piaget's understanding of cognitive theories
Introduction to Executive Functioning (T-1)	- Explain what is executive functioning - Describe which functions are executive functions - Explain mechanisms underlying healthy executive functioning - Recognize the problems of poor executive functions

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP.	TOPIC	LEARNING OUTCOMES
BIOPHYSICS	Electrical and Chemical Synapses and Synaptic transmission; Neurotransmitter (T-1)	- Describe synapse, presynaptic and postsynaptic terms - Discuss the differences between electrical and chemical synapses - Explain the role and importance of neurotransmitters - Describe the different types of receptors that neurotransmitters could bind and their effect of differences of receptors in signal transductions - Define synaptic potentials, excitatory postsynaptic potential (EPSP) and inhibitory postsynaptic potential (IPSP) - Describe the structures of muscle nerve junctions and how they function - Define and distinguish between end-plate potential (EPP), miniature end-plate potential (MEPP) and action potential
	Synaptic Transmission and Integration of Post-synaptic Potentials (T-1)	- Explain what graded potentials are and what they depend on - Define convergence and divergence of neurons in neuronal pools - Describe how graded potential summate - Distinguish between spatial and temporal summation - Describe transmitter receptor interactions - Discuss dose response relationships for neurotransmitters and drugs that target their receptors
	Biophysical principles of electroencephalogram (EEG) (T-1)	- Explain EEG electrodes, international 10-10, 10-20 system, - Demonstrate anterior-posterior bipolar montage, common average reference montage - Distinguish common EEG patterns, gamma, alpha, beta, theta, delta waves - Describe rhythmic patterns at characteristic frequencies - Describe basic components of EEG - Define position of electrodes and polarity - Explain diagnostic yield of EEG
	Information in Biological Systems (T-1)	- Explain information processing, signal and signal processing in biological systems - Explain storage of information and biomolecular information - Define signal transmissions and channel capacity in information transmission - Distinguish operations on biological signals - Information processing and channel capacity in the ear, eye and brain
	SKILLS	
	Biophysics Lab: Voltage Clamp-Patch Clamp Technique (P-2)	- Demonstrate measuring membrane potential - Measure the electrical changes of the cell membrane - Study and emulate the various modes of patch-clamp technique.

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP.	TOPIC	LEARNING OUTCOMES
BIOCHEMISTRY	Regulation of Enzyme Activity (T-2)	1. Explain factors affecting enzyme activity 2. Define and compare and contrast feed-back versus feed-forward regulation 3. Explain the role of post-translational modifications in regulating enzyme activity, including: proteolysis, and reversible phosphorylation 4. Define the properties of an allosteric enzyme and mechanism of allosterism 5. Explain the kinetic properties of allosteric enzymes 6. Explain the regulation of enzyme activity through reversible covalent modifications
	Clinical Use of Enzymes (T-2)	1. Classify enzymes in clinical use 2. Define and give examples for functional enzymes 3. Define and give examples for non-functional enzymes 4. Compare functional vs non-functional enzymes in terms of site of biosynthesis, concentration in plasma, function and net effect in disease states 5. Explain the conditions in which non-functional enzymes are increased 6. List the use of enzymes either in diagnosis or for therapeutic purposes 7. Explain the measurement of enzyme activity 8. Name the type of samples used for the quantification of enzymes 9. Explain the clinical significance of isoenzymes

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
HISTOLOGY AND EMBRYOLOGY	Histology of Nervous Tissue (T-2)	1. Define the basic components and functions of nervous tissue. 2. Classify the types of neurons and neuroglial cells based on structure and function. 3. Describe the organization of the central and peripheral nervous systems at the histological level. 4. Explain the structural and functional differences between myelinated and unmyelinated nerve fibers. 5. Discuss the role of supporting (glial) cells in neural tissue homeostasis and function. 6. Outline the histological features of synapses and their relevance to signal transmission. 7. Summarize common histological methods used in the examination of nervous tissue.
	Lab: Histology of Nervous Tissue (P-2)	1. Recognizes nervous tissue components on histological slides under a light microscope. 2. Identifies neurons, neuroglial cells, and nerve fibers in various regions of the nervous system. 3. Labels the structural features of nervous tissue on histological slides. 4. Applies knowledge of staining techniques to interpret microscopic findings.

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
PHYSIOLOGY	General organization of nervous system (T-1)	1. Define the general organization of nervous system by explaining its subdivisions as central vs. peripheral; somatic vs. autonomic nervous system; motor vs. sensory divisions 2. Describe the location and constitution of the Central Nervous System (CNS) 3. Define the functions of the various cell types in the nervous system 4. Describe synaptic transmission by giving examples 5. Describe post-synaptic potentials by giving examples 6. Name the main neurotransmitters of the nervous system with their main functions 7. Explain in which ways the neurotransmitter action terminates
	Sensory receptors & receptor potentials (T-1)	1. Define somatic (general) and special senses 2. Describe common features of the sensory receptors 3. Classify sensory receptors based on anatomical position and based on their sensitivity to specific stimulus modalities 4. Describe the basic components of the sensory pathways 5. Explain receptor potential 6. Describe receptive field by giving examples 7. Explain adaptation to a sensory stimuli 8. Explain the differences between rapidly adapting and slowly adapting receptors with their functions 9. Explain the relationship between receptor potential and the number of action potential that sensory neuron is producing
	Sense of touch (T-1)	1. Describe the location, type, and function of receptors that mediate the sensations of touch 2. Describe the steps involved in sensory transduction and action potential generation in cutaneous mechanoreceptors. 3. Differentiate cutaneous receptors based on their location, receptive field, receptor sensitivity, and receptor adaptation. 4. Compare the pathways that mediates input from touch and vibratory senses to that mediating information from other sensory modalities. 5. Describe the two-point discrimination test by explaining how it is used
	Sensation of pain and thermoreception (T-1)	1. Describe the features of pain receptors 2. Explain the characteristics of the different pain pathways 3. Describe the intrinsic analgesia system of the body 4. Explain the role of the different parts of the cerebral cortex on the evaluation and perception of pain 5. Defines the characteristics of visceral pain 6. Explain the referred pain 7. Describe the features of thermal receptors 8. Describe the features of the thermal pathways 9. Explain the role of the different parts of the cerebral cortex on the evaluation and perception of thermal stimuli 10. Describe the number and distribution of the thermal receptors in the body 11. Define the effect of gradually or abruptly changing temperatures on warm and cold sensations
	Proprioception (T-1)	1. Define the roles of receptors in proprioception 2. Explain the organization of proprioception pathway 3. Describe the functional role of muscle spindle in proprioception 4. Explain the physiological importance of Golgi tendon organ in proprioception and inverse stretch reflex 5. State the role of joint capsule receptors in proprioception

		- Describe the neural pathways carrying proprioceptive information from periphery to the central nervous system - Define the role of cerebellum in proprioception - Explain the role of vestibular system in proprioception
	Cerebro-spinal-fluid and the blood-brain- barrier (T-2)	- Describe regulation of cerebral blood flow - Describe characteristics of cerebral microcirculation - Describe general properties of cerebrospinal fluid system - Describe the functions of anatomical structures that secrete, absorb containing cerebrospinal fluid - Describe formation, flow and absorption of cerebrospinal fluid - Define the composition of cerebrospinal fluid - Describe the characteristics of both blood-cerebrospinal fluid and blood-brain barriers - Name diseases that may be related to cerebrospinal fluid and cerebral circulation - Describe brain metabolic rate, use of oxygen and nutrients by the neurons
	Organization of Cerebral Cortex (T-1)	- Name the brain lobes - Describe white matter and grey matter - Describe the 6-layer organization of cerebral cortex by explaining their features and connections - Explain 5 major functional divisions of cerebral cortex - Localize primary sensory areas, primary motor area, unimodal association areas and multimodal association areas of the cerebral cortex - Describe general functions of primary areas, unimodal association areas and multimodal association areas of the cerebral cortex - Discuss possible methods that can be used to create functional map of cerebral cortex
	Functions of cerebellum and basal ganglia (T-2)	- Define the functional organization of cerebellum - Explain the neural connections of cerebellum with other central nervous system centers - Describe the physiological roles of deep cerebellar nuclei - Explain the functions of different cell types in cerebellar cortex - State the functional organization of basal ganglia - Describe the roles of neurons located in different parts of basal ganglia in terms of neurotransmitters - Define the role of putamen circuit in motor activities - Explain the role of caudate circuit in motor activities
	Control of body movements from reflex to complex motor control (T-2)	- Define the general principles of central organization of motor pathways - Explain the motor functions of spinal cord - Describe the roles of motor neurons located in the spinal cord - Explain the neural circuitry of stretch reflex and its clinical importance - State the neural circuitry of crossed extensor reflex - Describe the functional organization of motor cortex in voluntary motor actions - Define the roles of corticospinal and corticobulbar tracts in motor actions - Explain the function of red nucleus and corticorubrospinal pathway in motor activities - Describe the roles of cerebellum, basal ganglia and motor cortex in the execution of voluntary motor actions in an integrated manner
	Hypothalamus, Thalamus, brain stem and reticular formation (T-2)	- Define physiologic anatomy of the brain stem, the reticular activating system and the thalamus - Describe major effects of pontine reticular nuclei on spinal cord and cerebral cortex - Describe major effects of medullary reticular nuclei on spinal

		cord and cerebral cortex - Describe major effects of vestibular nuclei in modulation of the RAS - Name the brain stem nuclei that synthesise major excitatory / inhibitory neurohormones which are important for control of brain activities - Describe major physiological effects of neurohormones in different brain regions - Name functions of the thalamic nuclei
	Autonomic Nervous System and Central Organization of Visceral Functions (T-2)	- Describe the ways that the ANS contributes to homeostasis - Describe the hierarchy of the autonomic control - Explain the transmitter released from pre and postganglionic neurons. - Explain the types of receptors on autonomic ganglia and on target organs. - Explain the location of the cell bodies and axonal trajectories of preganglionic and postganglionic sympathetic and parasympathetic neurons. - Compare the overall functions of the parasympathetic and sympathetic nervous system on the regulation of the various organ systems. - Discuss the possible effects of the autonomic dysfunction

At the end of this lesson, the student will be able to:

SKILLS		
DEP	TOPIC	LEARNING OUTCOMES
CLINICAL SKILLS	Vital Signs I: Temperature Taking, Pulse Measurement (T-1), (P-1)	- Describe the normal ranges of temperature - List and explain the factors affecting the temperature - Describe the types of thermometers - Describe how to take an axillary, oral, skin and tympanic temperature safely - Describe the normal ranges of the heart rate - Describe the anatomical places of pulse - Describe how to take pulse from different anatomical places

At the end of this lesson, the student will be able to:

SKILLS		
DEP	TOPIC	LEARNING OUTCOMES
COMMUNICATION SKILLS IN MEDICINE	Introduction to Communication Skills	- Discuss why communication skills in medicine are important - Clarify the feelings that drive human actions - Define aggressive, passive and assertive types of behavior - Discover that human beings react differently in a given situation depending on their own levels of acceptance - Distinguish the necessary action to be taken (listening / self-expression) during communication
	Active Listening	- Define the steps of active listening - Appraise importance of body language in communication - List the sentences that may act as barriers in communication - Demonstrates active listening skills when talking to a person in problem

	Self-expression; Conflict Resolution	1. Distinguish different forms of self-expression 2. Identify negative effect of judgmental self-expression in interpersonal relationship 3. Describe three steps of self-expression using "I language" 4. Demonstrate correct self-expression method in role plays 5. Define two different types of conflicts 6. Explain different methods of resolution in necessity based conflicts 7. Comprehends reasons of conflicts in people who has different values 8. Discuss the ways of conflict resolution in people with different values
	Using the basic communication skills in doctor-patient relationship	1. Adapts basic communication skills to doctor- patient interaction 2. Uses techniques to build up and maintain rapport with the patient 3. Uses techniques of active listening while talking to the patient 4. Evaluates emotions of the patient and responds in accordance with the emotion 5. Encourages the patient to Express his/her concerns

At the end of this lesson, the student will be able to:

KNOWLEDGE		
DEP	TOPIC	LEARNING OUTCOMES
PHILOSOPHY AND ETHICS	Consciousness I - The concept of consciousness (T-2)	1. Comprehend what consciousness is. 2. Distinguish between consciousness and phenomenal consciousness. 3. Explain Thomas Nagel's views on consciousness.
	Medicine in Islamic Civilization Part I (T-2)	1. Define the prominent features of Medicine in Islamic Civilization 2. Define the medical treatment methods. 3. Define the tools used for the diagnosis and prognosis of diseases. 4. Outline the legacy of the level of this era in Islamic Civilization.
	Consciousness II - The concept of qualia (T-2)	1. Comprehend the details of the concept of qualia 2. Explain various arguments in favor of the existence of qualia
	Medicine in Islamic Civilization-Part II (T-2)	1. Explain the travel of the science from Antiquity to Eastern/Islamic World 2. Explain Islam Civilization (details in its periods) 3. Explain Islamic Medicine 4. Define Prominent Islam Scientist and Physicians 5. Explain Contributions of Islam to Medicine and Science 6. Explain the travel of the science from Eastern/Islamic World to Europe 7. Define and explain Contribution of Islamic Civilization into European Renaissance
	Consciousness III - Mind and neurobiological states (T-2)	1. Comprehend the idea that explains the mind solely in terms of neurobiological states. 2. Explain Patricia Churchland's objections to this view.

COURSE 5 / MED 1008: SENSORY ORGANS AND ENDOCRIN SYSTEM				
Course Date	February 9 – March 13, 2026			
Exam Dates	Practical Exams: March 13, 2026 Theoretical Exam: March 13, 2026			
Academic Unit	Academic Staff	Theoretical hours	Practical hours	Total
Anatomy	Ahmet Usta, Prof. Uğur Baran Kasırga, Assist. Prof.	3	-	3
Behavioral Sciences	İnanç Sümbüloğlu	4		4
Biochemistry	Özlem Unay Demirel, Assoc. Prof. Merve Karayel Başar, Assist Prof.	4	-	4
Biophysics	Serdar Durdağı, Prof. Bircan Dinç, Assist. Prof. Duygu Tarhan, Assist Prof	6	1	7
Evidence Based Medicine and Statistics	Hüseyin Tunç, Assist. Prof.	5	-	5
Histology and Embryology	Yasemin Ersoy Canıllıoğlu, Assoc. Prof. Merjem Purelku, Assist. Prof.	8	8	16
Physiology	Yasemin Keskin Ergen, Assist. Prof. Betilay Topkara Arslan, Assist. Prof. Elif Bahadır, Assist. Prof.	17	2	19
Communication Skills in Medicine	Figen Dağlı, Prof.	Other groups		
TOTAL		47	11	58
Philosophy and Ethics	Kadircan Keskinbora, Prof.	18	-	18
Communication Skills and Academic Reporting		16	-	16
STUDY TIME	63			

COURSE AIM:

The aim of this course is to:

- provide knowledge about the development, structure, and function of endocrine system and sensory organs with their normal radiologic images;
- provide knowledge about variables and types of measurement scale;
- get skills in oropharyngeal airway insertion;
- get skills about working as a part of a team.

LEARNING OUTCOMES

At the end of this lesson, the student will be able to:		
KNOWLEDGE		
DEP.	TOPIC	LEARNING OUTCOMES
ANATOMY	Skin, Breast, Nails (T-2)	1. Describe the structure and layers of the skin and their functions. 2. Explain the distribution and types of skin and their clinical relevance. 3. Identify skin appendages (hair, sebaceous glands, sweat glands, nails) and their functional roles. 4. Describe the anatomy of the female breast, including glandular tissue, ducts, stroma, and supporting ligaments. 5. Explain the vascular supply, lymphatic drainage, and innervation of the breast.
	Thymus (T-1)	1. Describe the anatomical location, gross structure, and relations of the thymus in the superior mediastinum. 2. Discuss the vascular supply, lymphatic drainage, and innervation of the thymus. 3. Explain the developmental changes of the thymus from infancy to involution in adulthood. 4. Discuss clinical aspects of Thymus.

At the end of this lesson, the student will be able to:		
KNOWLEDGE		
DEP.	TOPIC	LEARNING OUTCOMES
BEHAVIORAL SCIENCE	Introduction to Personality Development- 1 (T-1)	1. Define personality 2. Critically examine classic and contemporary theories of personality 3. Explain psychodynamic understanding of personality at an introductory level
	Introduction to Personality Development -2 (T-1)	1. Explain behavioral-cognitive tradition in understanding personality development at an introductory level 2. Explain trait theory at an introductory level
	Principles of patient-doctor relationship and psychiatric interview (T-1)	1. Discuss the goals of the psychiatric interview 2. Summarize the key components of a psychiatric interview
	Mental state examination: Symptoms and signs (T-1)	1. Describe the general purpose of the mental state examination 2. Define the structure and components of a mental state examination 3. Identify and differentiate signs and symptoms

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP.	TOPIC	LEARNING OUTCOMES
BIOCHEMISTRY	Female and male sex hormones and regulation (T-2)	1. List and identify the structures of male and female sex hormones. 2. Describe the hypothalamic–pituitary–gonadal (HPG) axis in males including the structure and roles of LH and FSH. 3. Discuss the feedback regulation of GnRH, LH, and FSH in males. 4. Explain the main effects and catabolism of testosterone, including its role together with anti-Müllerian hormone and PSA. 5. Describe the hypothalamic–pituitary–gonadal (HPG) axis in females, including the structure and roles of LH and FSH. 6. Discuss the feedback regulation of GnRH, LH, and FSH in females. 7. Explain the physiological menstrual cycle in terms of hormonal changes. 8. Describe and explain the main effects, biosynthesis, and catabolism of estrogens and progesterone. 9. Explain the two-cell theory of estrogen production in the ovary. 10. Compare and analyze the regulatory mechanisms of male and female sex hormones in reproduction and metabolism.
	Placenta, amnion fluid and cord blood's biochemistry (T-2)	1. List the placental hormones 2. Tell the properties of amniotic fluid 3. Tell the properties of cord blood by mentioning its clinical use 4. Discuss the functional role of alpha feto protein in pregnancy 5. Discuss the levels of human chorionic gonadotropin level in pregnancy 6. Explain the effects of human placental lactogen 7. Explain the functional role of estrogens and progesterone in pregnancy 8. Discuss the catabolism and excretion of progesterone, estrogen and human chorionic gonadotropin

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP.	TOPIC	LEARNING OUTCOMES
BIOPHYSICS	Understanding biological systems using physical chemistry. Signal transductions (T-1)	1. Define stimulus, receptor, sensation, perception 2. Explain sensory pathways, sensory organs 3. Describe sense types, location, intensity, effect, localization and acuity 4. Explain Stevens and Weber-Fechner laws 5. Describe chemo receptors 6. Explain skin receptors 7. Explain transduction, nerves and analog/digital transformation, axon terminal and synapse
	Olfactory System and sense of taste (T-1)	1. Explain the olfactory receptor, olfactory bulb, nasal epithelium, olfactory tract, olfactory cortex 2. Define odor coding mechanism 3. Illustrate biological mechanism of odorant detection 4. Describe different models based on molecular shape for odor detection 5. Describe the process of taste transduction 6. Define basic modalities of sense of taste such as salty, sour, sweet, bitter, and umami

	Vision and lenses (T-1)	1. Explain focal point and principal axis of the lenses 2. Calculate image height and magnification 3. Define and calculate visual acuity 4. Describe basic principles of vision 5. Define Myopia, hyperopia, astigmatism 6. Explain correction of refractive errors
	Biophysics of vision, rods and cones (T-1)	1. Describe the light and basic characteristics of vision, visual acuity and accommodation 2. Explain the refractive index, Snell's law, lenses 3. Distinguish the functions of cornea, iris, retina, lens and vitreous humor 4. Define formation of colors and Grassmann's laws 5. Explain the measurement of retinal activity, electroretinogram (ERG) 6. Explain structural and functional properties of rods, cones, fovea and blind spot
	Biophysics of hearing (T-2)	1. Explain sound, speech sound, high and low frequency sound, ultrasound 2. Describe the parts of outer ear, middle ear, inner ear 3. Explain functions of outer ear, middle ear, inner ear 4. Define the frequency and decibel discrimination, limits of hearing 5. Explain harmonics, Fourier analysis 6. Define binaural hearing 7. Explain semicircular canals, balance and hair cell relation.
	SKILLS	
	Biophysics Lab – Speed of Sound (P-1)	1. Measure the propagation time t of a sound pulse in air at room temperature as a function of the distance s between two microphone probes 2. Confirm the linear relationship between s and t 3. Measure the propagation time t of a sound pulse in air as a function of the temperature T over a fixed distance between two microphone probes 4. Determine the speed of sound as a function of temperature T 5. Compare the result with Laplace's derivation

At the end of this lesson, the student will be able to:		
SKILLS		
DEP	TOPIC	LEARNING OUTCOMES
EVIDENCE BASED MEDICINE AND STATISTICS	Introduction to Statistics (T-2)	1. Define key statistical terms like data, population, and sample. 2. Understand the process of statistical thinking in health sciences. 3. Classify data types including qualitative, quantitative, discrete, continuous, and levels of measurement. 4. Differentiate between observational studies and experiments. 5. Explore sampling methods such as random, stratified, and cluster sampling. 6. Recognize biases in data collection.
	Exploring and Summarizing Data (T-3)	1. Construct and interpret frequency distributions, including relative and cumulative types. 2. Build and analyze histograms to identify data shapes like skewed or symmetric. 3. Learn various statistical visualization plots. 4. Use these tools to summarize and visualize biological and health data patterns.

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP.	TOPIC	LEARNING OUTCOMES
HISTOLOGY AND EMBRYOLOGY	Histology Of Endocrine Organs (T-2)	1. Identify the histological features of major endocrine glands (pituitary, pineal, thyroid, parathyroid, adrenal) and relate their structure to their function. 2. Describe the embryological origins, anatomical relationships, and microscopic organization of the pituitary, thyroid, parathyroid, and adrenal glands. 3. Explain the structural and functional connection between the hypothalamus and pituitary gland, including the roles of the anterior and posterior lobes. 4. Name the cell types of the anterior pituitary, identify their staining characteristics (acidophils, basophils), and describe the hormones they produce. 5. Describe the structural organization and unique features of the thyroid, parathyroid, and adrenal glands, including hormone production processes and histological differences. 6. Explain the zonation and blood supply of the adrenal cortex and recognize the adrenal medulla and its similarity to sympathetic neurons.
	Histology Of Eye (T-2)	1. Describe the three layers of the eye wall and identify their key structural components relevant to function. 2. Identify the embryologic origins of the eye and their clinical significance. 3. Explain the morphology and functional roles of the eyelid, conjunctiva, and associated specialized structures. 4. Explain the production, flow, and functional importance of aqueous humor in ocular physiology. 5. Describe the anatomical features of the retina, including the fovea, optic disc, and the distribution of retinal blood vessels. 6. Describe the retinal epithelium and its relationship with the outer segments of rods and cones, linking structure to visual function.
	Histology Of Ear (T-2)	1. Describe the overall organization of the ear, the histological components of the external and middle ear, their characteristic features, and explain their embryological origins. 2. Identify the structural differences between the outer, middle, and inner ear, and explain their respective functions. 3. Recognize the location and structure of the cochlea and its compartments, and describe the location and production of endolymph. 4. Identify the structure and function of hair cells in the cochlear organ of Corti and the vestibular regions of the inner ear. 5. Describe what sensory hair cells are, and explain how they differ in structure and function from the neurons of the spiral ganglion.
	Histology Of Skin And Adnex (T-2)	1. Identify the epidermis, dermis, and hypodermis, and explain their embryologic origins, organization, and functions. 2. Differentiate between the two main types of skin and explain their features and functions. 3. Describe various skin adnexa and determine their physiological roles. 4. Identify cutaneous sensory receptors and describe their morphological characteristics. 5. Recognize key pathological conditions affecting the skin and epidermal derivatives.
SKILLS		

	Microscopic Structures of Endocrine Organs (P-2)	1. Describe the cellular organization of the major organs of the endocrine system. 2. Distinguish the different types of pituitary cells under the light microscope. 3. Recognize the thyroid and parathyroid glands in histological sections, and identify the follicular and parafollicular cells in the thyroid gland, as well as the chief and oxyphil cells in the parathyroid gland. 4. Name and describe the different layers of the adrenal gland, along with their specific histological features. 5. Recognize the adrenal medulla in histological sections and describe its key histological features.
	Microscopic Structures of Ear (P-2)	1. Show the structural differences between the outer, middle, and inner ear, and recognize them at the light microscope level. 2. Distinguish the auditory parts of the inner ear from those of the vestibular system. 3. Show the components of the organ of Corti.
	Microscopic Structures of Eye (P-2)	1. Identify and distinguish the three layers of the eye and describe their morphological features. 2. Examine the cornea, limbus, and sclera under the light microscope and describe their histological characteristics. 3. Examine the choroid, iris, and lens under the light microscope and describe their cellular composition and key features. 4. Examine the retinal epithelium under the light microscope and describe its cellular composition and relationship with the outer segments of rods and cones.
	Microscopic Structures of Skin And Adnex (P-2)	1. Distinguish the two main types of skin under the light microscope. 2. Identify and differentiate the layers of the epidermis under the light microscope, including epidermal ridges. 3. Identify the two layers of the dermis and the hypodermis, including dermal papillae. 4. Examine hair follicles and the types of skin glands (sebaceous, eccrine, apocrine) under the microscope, describing their structure and function. 5. Examine skin sensory receptors under the microscope and describe their morphological features.

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP.	TOPIC	LEARNING OUTCOMES
PHYSIOLOGY	Introduction To Endocrine System (T-2)	1. Define a hormone molecule 2. Explain the categorization of hormones with respect to their chemical structures 3. State the physiological mechanisms for the synthesis of hormones 4. Describe functional relationships between hormone molecules and their receptors 5. Explain the transport and clearance processes of hormones 6. State the feedback control mechanism in hormone synthesis and secretion 7. Describe the mechanisms of actions of hormones by considering intracellular signaling pathways in target tissues

Organization Of The Hypothalamo - Hypophyseal System and Hormones of Pituitary Gland (T-2)	1. Define the classification of pituitary gland hormones 2. Explain the physiological functions of pituitary hormones 3. State the feedback mechanism controlling the synthesis and secretion of anterior lobe pituitary hormones 4. Describe functional relationship between hypothalamus and the anterior lobe pituitary hormones 5. Explain the regulation of synthesis and secretion of posterior lobe pituitary hormones 6. State the involvement of hypothalamus in the synthesis and secretion of posterior lobe pituitary hormones 7. Describe the significance and clinical importance of hypothalamus 8. Explain the physiological abnormalities seen in the abnormal secretion of growth hormone
Thyroid Hormones (T-2)	1. Describe the formation and secretion of thyroid hormones 2. Describe the major steps of iodide metabolism which result in iodination of thyroglobulin 3. Describe cellular processes that mediate the effects of thyroid hormones 4. Define effects of the thyroid hormones on the organs and the systems 5. Define effects of the over and under production of thyroid hormones on the organs and the systems 6. Describe regulation of thyroid hormone secretion 7. Define the effects of thyroid-stimulating hormone (TSH) on thyroid gland 8. Define the hypothalamus - pituitary gland – thyroid gland axis
Endocrine Functions of Pancreas (T-2)	1. Describe the physiological anatomy of the pancreas 2. Name the hormones secreted from pancreas 3. Describe physiological roles of the pancreatic hormones 4. Describe effects of insulin and glucagon on metabolism of carbohydrate, lipid and protein 5. Define diabetes mellitus, describe pathophysiology of the disease and sub-types of diabetes mellitus 6. Explain the possible effects of over secretion of insulin
Calcium and Bone Metabolism (T-2)	1. Specify the normal ranges of calcium and phosphate concentrations in the extracellular fluid 2. Define the role of calcium and phosphate in bone structure 3. Explain the regulation process of blood calcium and phosphate levels 4. Define the exchange mechanism of calcium between the bone and the extracellular fluid 5. Define the effect of hyper- and hypocalcemia on the different organ systems 6. Describes the "stress" related control of bone deposition rate. 7. Define the effect of Vitamin D on different organs. 8. Define the effects of parathyroid hormone on the different organs and tissues 9. Explain the regulation of parathyroid hormone secretion 10. Defines the role of calcitonin hormone on calcium ion concentrations 11. Explain the regulation of calcitonin secretion
Adrenal Hormones and Stress Response (T-2)	1. Describe and contrast the regulation of synthesis and release of the adrenal steroid hormone 'cortisol' 2. Identify the major physiological actions of cortisol on different organs or tissues 3. Describe the biological consequences of sympatho-adrenal medulla activation and identify their major physiological actions 4. List the stimuli that increase adrenal medullary secretion 5. Identify diseases caused by over secretion or deficiency of cortisol and catecholamines

	Taste and Olfaction (T-1)	1. Describe the position, the structure and the functions of taste buds. 2. Name the five major taste receptors and signal transduction mechanisms in these receptors. 3. Outline the transmission of the taste signals to the insular cortex. 4. Describe the organization of the olfactory epithelium and olfactory bulb. 5. Describe transduction of the signals from the olfactory receptors. 6. Outline the olfactory pathways. 7. Explain the adaptation mechanism of olfactory sensation
	Hearing And Vestibular System (T-2)	1. Define the physiological anatomy of the ear 2. Explain the types of receptors involved in hearing and equilibrium and their locations in the ear 3. State the physiological mechanisms involved in sound transmission 4. Describe importance and chemical composition of endolymph in the stimulation of hair cells 5. Explain the functional organization of Corti Organ and its importance in hearing 6. State the electrical characteristics of hair cells 7. Describe the involvement of neural pathways carrying auditory information from ear to the relevant cortical areas 8. Explain the classification of vestibular system 9. Define the components of vestibular apparatus 10. State the physiological mechanisms and components of vestibular system involved in the sensation of equilibrium 11. Describe the relevant neural pathways transmitting vestibular information from ear to the relevant parts of the central nervous system
	Physiology of Vision (T-2)	1. Describe the parts of the eye by explaining their functions 2. Explain pupillary light reflex 3. Describe the organization of the retina 4. Explain how light rays are brought to a focus on the retina 5. Describe accommodation process 6. Define hyperopia, myopia, astigmatism, presbyopia, and strabismus 7. Describe the properties of rods and cones and explain how they respond to light rays 8. Describe the properties and functions of bipolar, horizontal, amacrine, and ganglion cells of the retina. 9. Trace the neural pathways that transmit visual information from the rods and cones to the visual cortex. 10. Describe the responses of cells in the visual cortex and the functional organization of the dorsal and ventral visual pathways. 11. Explain how we perceive depth 12. Describe the neural pathways involved in color vision
SKILLS		
	Sensory Physiology Lab (P-2)	1. Define the physiological basis of deep tendon reflexes 2. Explain usage of reflex hammer 3. State the reasons of the examination of deep tendon reflexes in basic clinical practice 4. Describe the physiological mechanisms for achieving visual acuity 5. Explain the logic of construction of Snellen chart 6. State the usage of Snellen chart in order to assess visual acuity 7. Describe the basics of color blindness 8. Explain usage of Ishihara color test for assessing color blindness 9. Define the Weber-Rinne test 12. State the usage of Weber-Rinne test for assessing auditory problems

At the end of this lesson, the student will be able to:

SKILLS

DEP	TOPIC	LEARNING OUTCOMES
COMMUNICATION SKILLS IN MEDICINE	Introduction to Communication Skills	1. Discuss why communication skills in medicine are important 2. Clarify the feelings that drive human actions 3. Define aggressive, passive and assertive types of behavior 4. Discover that human beings react differently in a given situation depending on their own levels of acceptance 5. Distinguish the necessary action to be taken (listening / self-expression) during communication
	Active Listening	1. Define the steps of active listening 2. Appraise importance of body language in communication 3. List the sentences that may act as barriers in communication 4. Demonstrates active listening skills when talking to a person in problem
	Self-expression; Conflict Resolution	1. Distinguish different forms of self-expression 2. Identify negative effect of judgmental self-expression in interpersonal relationship 3. Describe three steps of self-expression using "I language" 4. Demonstrate correct self-expression method in role plays 5. Define two different types of conflicts 6. Explain different methods of resolution in necessity based conflicts 7. Comprehends reasons of conflicts in people who has different values 8. Discuss the ways of conflict resolution in people with different values
	Using the basic communication skills in doctor-patient relationship	1. Adapts basic communication skills to doctor- patient interaction 2. Uses techniques to build up and maintain rapport with the patient 3. Uses techniques of active listening while talking to the patient 4. Evaluates emotions of the patient and responds in accordance with the emotion 5. Encourages the patient to Express his/her concerns

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At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
PHILOSOPHY AND ETHICS	European Medicine in the Renaissance time (14.-19. centuries) (T-2)	1. Define the prominent features of Renaissance Medicine in Europe 2. Define the medical treatment methods and new discoveries at that time. 3. Define the developments and tools used for the diagnosis and prognosis of diseases. 4. Outline the legacy of the level of this era in Europe.
	Seljuks Civilization and Medicine Part 1 (T-1)	1. Define the prominent features of Seljuks Civilization and Medicine. 2. Define the medical treatment methods. 3. Define the tools used for the diagnosis and prognosis of diseases. 4. Outline the legacy of the level of this era in Europe.
	Health and Disease – I (T-2)	1. Define health and disease in various ways. 2. Comprehend why it is not easy to define what disease is. 3. Explain certain criteria used to define some diseases.

	Seljuk Civilization and Medicine - Part 2 (T-1)	1. Explain Islamic Medicine contribution in Eastern and Western World in Seljukian Era 2. Define Prominent Scientist and Physician in Seljukian Geography 3. Explain Contributions of Seljuk's Madrasa Education Curriculum on Medicine and Science in Europe 4. travel of the science from Eastern/Islamic World to Europe via Sicily transfer way 5. Explain the first Medical Schools built in Italy
	What is Ethics? Relations-Morality, Ethics, and Law (T-2)	1. Explain the dynamics between ethics and the law. 2. Explain how to implement contemporary ethical principles by examining the difference between ideas (duties). 3. Explain actions (consequences) as they pertain to the principles and principles of ethics. 4. Explain why ethics may differ among different cultures and why this knowledge is important. 5. Explain the importance of ethics in modern medicine in today's culturally diverse health care environment.
	Health and Disease – II (T-2)	1. Distinguish between the different approaches to defining the concept of disease. 2. Explain the naturalist conception of disease. 3. Explain the constructivist conception of disease.
	Principles Of Medical Ethics (T-2)	1. Explain the Principles of Medical Ethics 2. Explain the common terms and principles of modern bioethics. 3. Explain why bioethics needs to be integrated through conscious design in order for the health care provider to deliver ethical care. 4. Explain Integrity, respect for privacy, truth telling, respect for Privacy
	Death (I) (T-2)	1. Distinguish between different philosophical approaches to death. 2. Explain which of these definitions are rather counterintuitive for which reasons. 3. Comprehend the relationship between death and harm.
	Turkish Medicine during the Early Years of the Turkish Republic (T-2)	1. Focus on a pivotal period of transformation, where Turkey transitioned from the late Ottoman system to a modern, secular republic 2. Understand how a new state ideology shaped healthcare policy, institutional reform, and public health initiatives 3. Identify and explain the major legislative changes that modernized Turkish healthcare 4. Learn about the massive campaigns launched to combat common infectious diseases like malaria, trachoma, and syphilis, which were widespread problems at the time 5. Understand the role of medicine in nation-building, as a tool to project modernity and progress
	Death (II) (T-2)	1. Comprehend the relationship between death and harm. 2. Distinguish between different objections against the harm thesis. 3. Explain each of these objections.

COURSE 6 / MED 1007: CARDIOVASCULAR AND RESPIRATORY SYSTEM				
Course Date	March 16 – April 17, 2026			
Exam Dates	Practical Exams: April 17, 2026 Theoretical Exam: April 17, 2026			
Academic Unit	Academic Staff	Theoretical hours	Practical hours	Total
Anatomy	Ahmet Usta, Prof. Uğur Baran Kasırga, Assist. Prof.	31	12	43
Biophysics	Serdar Durdağı, Prof. Bircan Dinç, Assist. Prof. Duygu Tarhan, Assist Prof	10	1	11
Evidence Based Medicine and Statistics	Hüseyin Tunç, Assist. Prof.	3	-	3
Histology and Embryology	Yasemin Ersoy Canıllıoğlu, Assoc. Prof. Merjem Purelku, Assist. Prof.	7	4	11
Physiology	Yasemin Keskin Ergen, Assist. Prof. Betikay Topkara Arslan, Assist. Prof. Elif Bahadır, Assist. Prof.	22	4	26
Communication Skills in Medicine	Figen Dağlı, Prof.	Other groups		
TOTAL		73	21	94
Philosophy and Ethics	Kadircan Keskinbora, Prof.	8	-	8
Communication Skills and Academic Reporting		12	-	12
STUDY TIME				31

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COURSE AIM:

The aim of this course is to :

- provide knowledge about the anatomy, physiology, biochemistry, and biophysics of the circulatory and respiratory systems;
- get skills about how to take vital signs;
- get basic communication skills in doctor-patient relationship.
- to get skills about working as a part of a team.

LEARNING OUTCOMES

At the end of this lesson, the student will be able to:		
DEP.	TOPIC	LEARNING OUTCOMES
ANATOMY	KNOWLEDGE	
	Thorax, muscles and fascia (T-2)	1. Describe the boundaries and general organization of the thoracic wall. 2. Identify the intercostal muscles (external, internal, innermost) and their roles in respiration. 3. Explain the structure and significance of the endothoracic fascia. 4. Correlate thoracic muscle anatomy with movements of the rib cage during breathing. 5. Describe the neurovascular bundle in the intercostal space and its surgical importance.
	Pleura, Mediastinum and its contents, diaphragm (T-2)	1. Describe the gross anatomy and reflections of the parietal and visceral pleura. 2. Identify the boundaries and subdivisions of the mediastinum and list their contents. 3. Explain the anatomy of the diaphragm, its openings, and innervation by the phrenic nerve. 4. Discuss the relationships of mediastinal structures. 5. Correlate pleural recesses and diaphragmatic movements with respiratory mechanics. 6. Interpret radiological features of the pleura, mediastinum, and diaphragm.
	Muscles of the anterior and lateral Neck, Suprahyoid and infrahyoid Muscles, Scalene Muscles (T-2)	1. Identify the infrahyoid muscles and explain their role in stabilizing the hyoid bone and larynx. 2. Describe the scalene muscles and their anatomical relationships with the brachial plexus and subclavian vessels. 3. Explain the innervation and vascular supply of the suprahyoid, infrahyoid, and scalene muscles. 4. Correlate respiration muscle actions with clinical functions.
	Introduction to cardiovascular system, Outer surface of heart, Pericardium, Location and projections of heart (T-2)	1. Describe the layers of the pericardium (fibrous and serous) and their anatomical relations. 2. Explain the surfaces, borders, and external grooves of the heart. 3. Identify the anatomical landmarks of the apex, base, and diaphragmatic surface of the heart. 4. Describe the arterial supply and venous drainage of the pericardium. 5. Explain the surface projections of the heart and pericardium on the thoracic wall. 6. Discuss pericardial sinuses (transverse and oblique) and their surgical relevance. 7. Recognize clinical correlations: pericarditis, cardiac tamponade, pericardiocentesis. 8. Apply anatomical knowledge to surface anatomy for cardiac auscultation and imaging.
	Inner surface of the Heart, cardiac skeleton, valves and locations of auscultation points (T-2)	1. Identify the chambers of the heart and their internal features (atria, ventricles, septa). 2. Describe the structure and components of the cardiac skeleton. 3. Explain the anatomy and function of the atrioventricular and semilunar valves. 4. List and locate the valve auscultation points on the thoracic wall. 5. Correlate the cardiac skeleton with electrical isolation of atria and

	ventricles. - Discuss congenital and acquired valvular diseases (stenosis, insufficiency, prolapse). - Apply anatomical knowledge to clinical procedures: echocardiography, valve replacement. - Interpret radiological and echocardiographic features of the heart chambers and valves.
Vessels of the heart (coronary circulation), nerves and cardiac conduction system (T-2)	- Describe the course and branches of the right and left coronary arteries. - Explain the venous drainage of the heart, including coronary sinus and tributaries. - Describe the anatomy and distribution of the cardiac plexus. - Explain the components of the conduction system: SA node, AV node, bundle of His, Purkinje fibers. - Correlate coronary artery distribution with myocardial infarction and ischemia. - Discuss common variants in coronary circulation (right vs. left dominance). - Apply anatomical knowledge to clinical interventions: coronary angiography, bypass surgery, pacemaker insertion.
Great vessels of the heart, Arch of aorta, sections of aorta and its branches (T-2)	- Identify the great vessels entering and leaving the heart (superior/inferior vena cava, pulmonary trunk, pulmonary veins, aorta). - Describe the arch of the aorta, its branches, and their anatomical variations. - Explain the topography and relations of the ascending aorta, arch, and descending thoracic aorta. - Correlate the branching pattern of the arch with blood supply to the head, neck, and upper limbs. - Discuss clinical conditions: coarctation of the aorta, aneurysms, traumatic rupture. - Apply anatomical knowledge to imaging techniques (CT angiography, echocardiography). - Interpret surface anatomy and radiological projections of the great vessels.
Thoracic aorta, its topography and its branches (T-2)	- Describe the course of the thoracic aorta from the arch to the diaphragm. - Identify the parietal branches (posterior intercostal arteries, subcostal arteries) and visceral branches (esophageal, bronchial, mediastinal). - Explain the relations of the thoracic aorta with adjacent structures (esophagus, thoracic duct, vertebrae). - Discuss collateral circulation in thoracic aortic obstruction. - Interpret radiological findings of thoracic aortic pathologies.
Vessels of the upper limb (T-2)	- Describe the course, branches, and anastomoses of the subclavian, axillary, brachial, radial, and ulnar arteries. - Explain the arterial arches of the hand (superficial and deep palmar arches). - Describe the venous drainage of the upper limb (superficial veins: cephalic, basilic; deep veins: venae comitantes). - Explain the role of venous valves and clinical importance of superficial vs. deep venous systems. - Discuss the lymphatic drainage of the upper limb and its clinical relevance (axillary nodes, sentinel node). - Apply anatomical knowledge to venipuncture, arterial cannulation, and blood pressure measurement.
Vessels of the lower limb (T-2)	- Describe the course and branches of the femoral artery and its profunda femoris. - Explain the popliteal artery and its division into anterior and posterior tibial arteries. - Identify the dorsalis pedis and plantar arteries, and their clinical significance in pulse palpation. - Describe superficial and deep venous drainage (great and small saphenous veins, venae comitantes). - Explain the anatomy of venous valves and their role in venous return.

Lymphatic system (T-2)	1. Describe the organization of the lymphatic system (lymphatic vessels, nodes, ducts). 2. Identify the main lymphatic ducts and their drainage territories. 3. Explain the distribution and significance of regional lymph nodes (cervical, axillary, inguinal, abdominal, thoracic etc.). 4. Discuss the relationship between lymphatic drainage and cancer metastasis. 5. Correlate lymphatic anatomy with lymphedema and other clinical disorders.
Introduction to respiratory system (T-2)	1. Outline the gross divisions of the respiratory system: upper and lower tracts. 2. Describe the conducting and respiratory portions of the respiratory system. 3. Explain the structural adaptations of the airways for their respective functions. 4. Correlate respiratory anatomy with physiology of ventilation and gas exchange. 5. Identify the relations of major respiratory structures to neighboring organs.
Nasal cavity, paranasal sinuses, pharynx (T-2)	1. Describe the boundaries, regions, and mucosal lining of the nasal cavity. 2. Identify the paranasal sinuses (frontal, ethmoidal, sphenoidal, maxillary) and their drainage pathways. 3. Explain the arterial supply, venous drainage, and innervation of the nasal cavity and sinuses. 4. Describe the divisions of the pharynx (nasopharynx, oropharynx, laryngopharynx) and their relations. 5. Correlate anatomy of the nasal cavity and sinuses with functions in respiration, olfaction, and resonance. 6. Discuss clinical conditions: sinusitis, deviated nasal septum. 7. Interpret radiological anatomy of sinuses and pharynx (CT, MRI, X-ray).
Structure, Components and Functions of Larynx (T-2)	1. Identify the cartilages of the larynx (thyroid, cricoid, arytenoid, epiglottis) and their articulations. 2. Describe the intrinsic and extrinsic muscles of the larynx and their actions. 3. Explain the innervation of the larynx by the recurrent and superior laryngeal nerves. 4. Discuss the functions of the larynx in phonation, respiration, and airway protection. 5. Correlate the anatomy of the vocal folds and glottis with voice production. 6. Apply anatomical knowledge to clinical procedures (tracheostomy, laryngoscopy, intubation).
Trachea and Lungs (T-2)	1. Describe the gross anatomy and relations of the trachea, including its divisions and histological features. 2. Identify the lobes, fissures, and surfaces of the lungs. 3. Explain the bronchopulmonary segments and their clinical importance. 4. Discuss the blood supply, lymphatic drainage, and innervation of the trachea and lungs. 5. Correlate the structure of the lungs with their function in gas exchange. 6. Interpret radiological imaging of the trachea and lungs (CXR, CT).
Thyroid and Parathyroid glands (T-1)	1. Describe the anatomical location, lobes, and relations of the thyroid gland in the neck. 2. Explain the capsule and fascial coverings of the thyroid and their surgical importance. 3. Identify the blood supply (superior and inferior thyroid arteries), venous drainage, and lymphatic pathways. 4. Describe the recurrent and superior laryngeal nerves in relation to the thyroid gland. 5. Explain the location, number, and variation of the parathyroid glands.
SKILLS	

Pleura, Mediastinum and its contents, Diaphragm, Trachea and Lungs, Thorax muscles and fascia (P-2)	1. Identify pleural reflections, recesses, and pleural cavities on cadaver and models. 2. Demonstrate mediastinal subdivisions and locate major contents. 3. Recognize the attachments and openings of the diaphragm. 4. Identify trachea, bronchi, and lung lobes, fissures, and surfaces. 5. Correlate thoracic wall muscles and fascia (intercostals, transversus thoracis) with respiration.
Muscles of the Anterior and Lateral Neck, Suprahyoid, Infrahyoid, and Scalene Muscles (P-2)	1. Identify suprahyoid and infrahyoid muscles on cadaver and models. 2. Dissect and demonstrate the scalene muscles and their relations to brachial plexus and subclavian vessels. 3. Recognize anterior and lateral neck muscles (platysma, sternocleidomastoid) and their actions. 4. Relate muscle anatomy to surface landmarks and palpation (hyoid, thyroid cartilage).
Great Vessels of the Heart, Pericardium, Arch of Aorta, Thoracic Aorta and Branches (P-2)	1. Identify fibrous and serous layers of the pericardium and their reflections. 2. Demonstrate the roots of the great vessels (SVC, IVC, pulmonary trunk, aorta) on cadaveric heart. 3. Identify branches of the aortic arch and their topographic relations. 4. Trace thoracic aorta and its visceral/parietal branches.
Heart Anatomy: Surfaces, Valves, Coronaries, Conduction (P-2)	1. Identify the outer surfaces and borders of the heart on cadaver. 2. Demonstrate chambers and internal structures (interatrial septum, papillary muscles, chordae tendineae). 3. Locate cardiac valves and correlate with auscultation points on surface anatomy. 4. Trace coronary arteries and veins; demonstrate cardiac conduction system pathways.
Vessels of the Upper Limb; Vessels of the Lower Limb (P-2)	1. Identify major arteries of the upper limb (subclavian, axillary, brachial, radial, ulnar) and their course. 2. Demonstrate venous drainage patterns of the upper limb (cephalic, basilic, median cubital vein). 3. Identify main arteries of the lower limb (femoral, popliteal, anterior/posterior tibial, dorsalis pedis). 4. Trace superficial and deep veins of the lower limb (great and small saphenous veins, femoral vein).
Nasal cavity, Paranasal sinuses, Pharynx; Larynx (P-2)	1. Identify the boundaries and structures of the nasal cavity on models and cadaver. 2. Demonstrate paranasal sinus openings and their drainage pathways. 3. Recognize subdivisions of the pharynx and their relations. 4. Identify cartilages and folds of the larynx, including vocal cords.

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP.	TOPIC	LEARNING OUTCOMES
BIOPHYSICS	Basics of cardiac biochemical events (T-1)	1. Describe the phases of the nodal and myocyte action potentials 2. Describe the proteins that conduct the ions for the action potentials 3. Illustrate the chemical and electrical changes for nodal and myocyte action potential phases 4. Relate the coordination of nodal and myocyte action potential generation and completion
	Electrocardiography I-II (T-2)	1. Relate the positive and negative deflections on the ECG paper to repolarization and depolarization wave. 2. Relate the P, QRS, T waves to electrical changes in the heart 3. Describe the 12 lead ECG. 4. Compare the unipolar and bipolar leads and describe the Wilson's center 5. Describe and use the Einthoven's triangle to calculate the I, II, III leads from an electrical dipole on the heart. 6. Describe various heart blocks from an ECG signal and discuss the underlying cause at the heart 7. Describe the heart axis, relate the 12 lead ECG to heart axis 8. Qualitatively calculate the heart axis.

	Circulatory system dynamics (T-1)	1. Describe the ohm's law for hemodynamics 2. Differentiate between the effects of cardiac output, systemic vascular resistance on pressure difference in the circulatory system. 3. Calculate total resistance of wired blood vessels 4. Describe the Reynolds number and its relationship with turbulence 5. Describe turbulent and laminar flow.
	Basic Principles of hemodynamics, Poiseuille's Law, Laplace Law and cardiac cycle (T-2)	1. Define pressure 2. Define Pascal's law 3. Define the continuity equation 4. Define the Bernoulli principle 5. List factors affecting resistance against flow 6. Describe Bernoulli's principle in blood flowing 7. Define Poiseuille's Law (determinants of resistance to flow) 8. Define the total resistance of a network of parallel and series of vessels 9. Define La Place's Law in internal fluid pressure
	Blood pressure and flow (T-1)	1. Describe the factors affecting blood flow 2. Describe blood pressure 3. Describe resistance of blood vessels
	Respiratory system dynamics (T-1)	1. Discuss the necessity for the respiratory system as well as its functions 2. Describe external and internal respiration 3. Define ventilation and perfusion 4. Recall the gas laws, specifically the ones related to partial pressure and pressure gradient 5. Define and explain the functions of respiratory muscles
	Surface tension and alveolar mechanics (T-1)	1. Define surface tension and alveolar surface tension. 2. Describe the effect of surfactant on alveolar surface tension. 3. Identify the forces that oppose gas movement into and out of the lungs. 4. Define compliance of lungs and chest wall. 5. Describe pressure volume relationship in respect to respiration. 6. Define tissue and airway resistance. 6. Discuss the effects of compliance and resistance on alveolar volume.
	External respiratory system, volume and pressure change (T-1)	1. Define the lung volumes and capacity. 2. Describe the changes observed in volume and pressure during respiration. 3. Describe the work of breathing. 4. Discuss the work performed during respiration process based on the pressure – volume differences. 5. Discuss the relationship between respiratory frequency and work required for breathing.
SKILLS		
	LAB- Surface Tension (LAB-1)	1. Measure the pulling force shortly before the liquid lamella breaks away. 2. Determine the surface tension from the measured pulling force. 3. Discuss the concept of surface tension in relation to energy.

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP.	TOPIC	LEARNING OUTCOMES
EVIDENCE BASED MEDICINE AND STATISTICS	Measures of Central Tendency and Variation (T-3)	1. Calculate mean, median, mode, and weighted mean. 2. Select appropriate measures for different distributions. 3. Compute range, variance, standard deviation for samples and populations. 4. Apply the empirical rules. 5. Interpret standard deviation and coefficient of variation. 6. Calculate z-scores, percentiles, quartiles. 7. Construct and interpret boxplots. 8. Identify outliers using quartiles.

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
HISTOLOGY AND EMBRYOLOGY	Histology of blood and bone marrow (T-2)	- Describe the histological features of blood and its cellular components. - Classify the main types of blood cells (erythrocytes, leukocytes, platelets) and state their origin and functions. - Describe the structure of bone marrow and distinguish between red and yellow marrow. - Outline the hematopoietic cell lineages and the differentiation pathways of blood cells. - Correlate the histological features of blood and bone marrow with their physiological and clinical significance.
	Hematopoiesis (T-1)	- Describe prenatal and postnatal hematopoiesis, including primary sites and developmental stages. - Classify the stages of hematopoiesis, including erythropoiesis, granulocytopoiesis, monocytopoiesis, platelet formation, and lymphopoiesis, and relate them to relevant clinical correlations.
	Histology of heart and blood vessels (T-2)	- Describe the components of the circulatory system, including the heart, blood vessels and lymphatic vessels. - Explain the basic structure of blood vessels, including the tunica intima, tunica media and tunica adventitia in arteries and veins. - Describe the different types of capillaries and sinusoids. - Classify arteries and veins primarily according to the cellular and extracellular components of the adventitia and media, as well as according to their size. Explain the histological organisation of lymphatic capillaries and larger lymphatic vessels, their relationship with lymph nodes and the differences between them and blood vessels. - Identify the histological features of the epicardium, myocardium and endocardium of the heart. - Outline the path of the cardiac impulse from the sinoatrial node to the ventricles and recognise the histological features of Purkinje fibres in the ventricles.
	Histology of Respiratory system (T-2)	- Explain the embryonic origin and development of the respiratory system. - Describe the histological organization of the respiratory tract, highlighting differences across the trachea, bronchi, bronchioles, and alveolar regions. - Analyze the structure of the blood-gas barrier in lung tissue and relate it to gas exchange function.
	SKILLS	
	Histology of blood and bone marrow & Hematopoiesis & Histology of heart and blood vessels (P-2)	- Learn how to prepare a proper blood smear, including spreading, air-drying, and staining techniques for microscopic examination. - Identify and describe the morphological features of blood cells under the light microscope. - Identify and describe the layers of the vessel wall, including their histologic features. - Differentiate blood vessels (arteries, veins, and capillaries), describe and distinguish their types according to histological features and size. - Identify and describe the layers of the heart wall and their histological characteristics.
	Histology of Respiratory system (P-2)	- Identify and describe the histological organization of all layers of the respiratory tract (nasal cavity, larynx, trachea, and lung) under the light microscope. - Explain the microscopic structures of these regions, emphasizing epithelium types and supporting tissues such as lamina propria,

		cartilage, smooth muscle, blood vessels, and glands, highlighting their regional differences. 3. Examine alveoli and the blood-air barrier, identifying the cellular components involved in gas exchange.
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At the end of this lesson, the student will be able to:		
KNOWLEDGE		
DEP	TOPIC	LEARNING OUTCOMES
PHYSIOLOGY	Introduction to blood physiology (T-1)	1. Explain the process of hematopoiesis. 2. Explain four major roles of blood: transport, hemostasis, homeostasis and immunity. 3. List whole blood components with their properties as plasma and formed elements. 4. Explain how plasma and serum are obtained 5. Explain plasma proteins and their roles.
	Structure and functions of red blood cells (T-2)	1. Explain regulation of erythropoiesis and importance of vitamin B12, folic acid and iron for RBC production. 2. Explain the features of red blood cells (RBC) by describing their life span, count, shape, hemoglobin concentrations. 3. Explain the meaning of mean corpuscular volume (MCV), microcytosis, macrocytosis; mean corpuscular hemoglobin; and the mean corpuscular hemoglobin concentration (MCHC). 4. Describe how we can measure hematocrit value and what it reflects 5. Explain how red blood cells transport oxygen and CO₂. 6. Describe the metabolic pathways that RBC are using for energy production. 7. Explain the erythrocyte sedimentation rate (ESR) and the factors affecting ESR 6. Explain the blood groups and how we can identify blood types
	Hemoglobin, Iron metabolism and anemia (T-1)	1. Explain the degradation of red blood cell. 2. Describe Hb metabolism and the abnormalities of Hb 3. Explain the absorption, transportation and storage of iron 4. Explain what hemolysis is 5. Describe physiological hyperbilirubinemia of newborn and jaundice 6. Describe the types of anemia by explaining underlying physiological mechanisms 7. Describe the effects of anemia on circulatory system function
	Structure and functions of white blood cells and immunity (T-2)	1. Explain types of white blood cells with their functions. 2. Explain the importance of leukocyte formula 3. Describe the components and functions of immune system 4. Differentiate innate and acquired immunity 5. Identify the roles of the humoral and cellular arms of acquired immunity 6. Describe the regulation of immunity by soluble cytokines and the complement system 7. Define the roles of additional circulating and tissue cell types that contribute to immune response such as granulocytes, mast cells, and monocytes.

	Hemostasis and Coagulation (T-2)	1. Describe vasospasm, role of vasospasm in hemostasis and detailed mechanisms underlying the vasospasm. 2. Describe formation of platelet plug, role of platelet plug in hemostasis and detailed mechanisms underlying the platelet plug formation. 3. Describe formation of blood clot, role of blood clot in hemostasis and detailed mechanisms underlying the blood clot formation. 4. Name each component of intrinsic and extrinsic coagulation pathways 5. Describe process of prevention of blood clotting 6. Name procoagulant and anticoagulants factors and their specific roles 7. Describe concept of fibrinolysis and name factors promoting fibrinolysis 8. Describe bleeding diathesis and role of individual factors in bleeding diathesis 9. Name a few clinically important diseases due to abnormal coagulation 10. Name natural and artificial anticoagulants 11. Name coagulation test that are used in clinical practice and physiology underlying these tests
	Heart muscle, signal transduction in the heart (T-2)	1. Describe the general characteristics of cardiac muscle 2. Describe the underlying ionic currents which generate pacemaker potential and action potential in autorhythmic cells 3. Describe the mechanisms by which action potentials are generated in myocardial contractile cells 4. Differentiate myocardial contractile cells and myocardial autorhythmic cells by explaining their characteristic feature 5. Explain how the impulses generated by sinoatrial node are distributed to the atria and ventricles 6. Explain the steps of excitation-contraction coupling in cardiac muscle 7. Compare cardiac muscle with skeletal muscle in terms of generation of tension 8. List the steps of events that produce rhythmical excitation of the heart 9. Compare units of conduction system in terms of intrinsic firing rates 10. Compare units of conduction system in terms of conduction velocity
	Heart cycle and heart sounds (T-1)	1. Explain process of atrial and ventricular systole and atrial and ventricular diastole 2. Explain the relationship between ventricular pressure, aortic pressure and atrial pressure during the cardiac cycle 3. Explain the basis of the heart sounds 4. Estimate the results of the abnormal valve functions on phonocardiography 5. Describe the chest areas from which sound of each valve is best heard 6. Explain how systole and diastole are affected by changes in heart rate
	Regulation of blood flow (T-1)	1. Describe the factors responsible for maintaining blood flow throughout the body 2. Describe the structure of microcirculation and name the characteristics of the various vessel types 3. Describe the roles of the smooth muscle cells in the blood vessel wall 4. Name the factors that are responsible for vasoconstriction and vasodilation 5. Relate between changes in the microcirculation and the regulation of systemic blood pressure 6. Describe peripheral resistance in the circulation 7. Explain the relationship between pressure and peripheral resistance 8. Explain the relationship between cardiac function, blood

		vessel filling, blood pressure and blood flow
Cardiac output, regulation of the cardiac functions (T-2)		1. Define and calculate cardiac output 2. Explain preload and afterload 3. Explain the relationship between the left ventricular volume and pressure by drawing volume-pressure curve 4. Discuss how left ventricular volume-pressure curve is affected with increased preload and afterload 5. Describe factors affecting heart rate (chronotropic effects) 6. Describe factors affecting conduction velocity in the heart (dromotropic effects) 7. Describe factors that are affecting contractility of the heart (inotropic effects)
Capillary fluid exchange (T-1)		1. Define capillary exchange by explaining diffusion, transcytosis and bulk flow 2. Describe the factors that are affecting capillary exchange 3. Define hydrostatic and osmotic pressures 4. Describe how to calculate net filtration pressure that determines the net flow of fluid across the capillary membrane by considering the four Starling forces
Short- and long-term regulation of blood pressure (T-2)		1. Define blood pressure 2. Describe location and functions of vasomotor center 3. Name parts of the nervous system that innervate blood vessels and heart 4. Describe the anatomic organization of baroreceptors and their functions 5. Describe the anatomic organization of chemoreceptors and their functions 6. Name all components of renin- angiotensin- aldosterone system and describe function(s) of each component 7. Name atrial natriuretic peptide (ANP) and anti- diuretic hormone (ADH), and describe their roles in regulation of blood pressure
Respiratory mechanics; lung volume and capacities (T-2)		1. Define partial pressure and calculate the partial pressure of each of the important gases in the atmosphere at sea level. 2. List the passages through which air passes from the exterior to the alveoli, and describe the cells that line each of them. 3. List the major muscles involved in respiration, and state the role of each. 4. Define the basic measures of lung volume and give approximate values for each in a normal adult. 5. Define compliance, and give examples of diseases in which it is abnormal. 6. Describe the chemical composition and function of surfactant. 7. List the factors that determine alveolar ventilation.
Regulation of Respiration (T-1)		1. Describe the roles of respiratory centers located in the brain stem in determining the basic pattern of respiratory activity 2. Explain the pacemaker activity of medullary inspiratory neurons 3. List factors that could modify the basic breathing pattern 4. Describe the respiratory consequences of alterations seen in PO_2, PCO_2 and pH 5. Define the locations and roles of central and peripheral chemoreceptors
Gas Exchange and Gas Transport (T-2)		1. Define the pressure exerted by each gas in a mixture of gases is independent of the pressure exerted by the other gases (Dalton's Law) 2. Explain gases in a liquid diffuse from higher partial pressure to lower partial pressure (Henry's Law) 3. Describe the components of the alveolar-capillary membrane 4. Explain the various factors determining gas transfer: -Surface area, thickness, partial pressure difference, and diffusion coefficient of gas 5. State the partial pressures of oxygen and Carbon dioxide in the atmosphere, alveolar gas, at the end of the pulmonary capillary, in systemic capillaries, and at the beginning of a pulmonary capillary 6. Describe the relationship between PO_2 and % saturation of

		hemoglobin with oxygen (Oxygen- hemoglobin dissociation curve), and the significance of the shape of this relationship - Define how DPG, temperature, H⁺ ions and PCO₂ affect affinity of O₂ for Hemoglobin and the physiological importance of these effects. - State the significance of fetal Hb and adult myoglobin. - Describe the role of the enzyme carbonic anhydrase, and the CO₂ dissociation curve. - Describe how H⁺ is transported in the blood.
SKILLS		
	Lab: Blood physiology: Hematocrit Measurements, Determination of Blood Groups, Bleeding Time and Coagulation Time (P-2)	- Collect capillary blood sample from fingertip by using a lancet - Define and measure hematocrit value from capillary tube - Describe and measure bleeding time from fingertip - Describe and measure coagulation time by using slide and capillary tube methods - Explain blood types and determine blood type by using anti-bodies of Anti-A, Anti-B and Anti Rh (D)
	Lab: Examining the effect of chemical modifiers and ions on heart rate in a simulation platform (P-1)	- Define the effects of epinephrine, pilocarpine, atropine, and digitalis on heart rate based on the series of experiment that they conducted in a simulation platform - Relate the chemical modifiers of the heart rate to sympathetic and parasympathetic activation - Describe the potential effect of potassium, sodium, and calcium ions on heart rate based on the series of experiment that they conducted in a simulation platform - Define inotropic and chronotropic effects on heart - Discuss how calcium channel blockers might be used pharmaceutically
	Lab: Studying the effects of blood vessel radius and blood pressure on blood flow rate in a simulation platform (P-1)	- Describe how vessel radius is changed in the body - Discuss the effect of blood vessel radius on blood flow rate based on the results of their experiments that they conducted in a simulation platform - Describe the sources of blood pressure - Discuss the effect of blood pressure on blood flow rate based on the data that they collected during the experiment. - Compare the effects of changes in afferent and efferent arteriole radius when changes in blood pressure occur

At the end of this lesson, the student will be able to:		
SKILLS		
DEP	TOPIC	LEARNING OUTCOMES
COMMUNICATION SKILLS IN MEDICINE	Introduction to Communication Skills	- Discuss why communication skills in medicine are important - Clarify the feelings that drive human actions - Define aggressive, passive and assertive types of behavior - Discover that human beings react differently in a given situation depending on their own levels of acceptance - Distinguish the necessary action to be taken (listening / self-expression) during communication
	Active Listening	- Define the steps of active listening - Appraise importance of body language in communication - List the sentences that may act as barriers in communication - Demonstrates active listening skills when talking to a person in problem

	Self-expression; Conflict Resolution	1. Distinguish different forms of self-expression 2. Identify negative effect of judgmental self-expression in interpersonal relationship 3. Describe three steps of self-expression using "I language" 4. Demonstrate correct self-expression method in role plays 5. Define two different types of conflicts 6. Explain different methods of resolution in necessity-based conflicts 7. Comprehends reasons of conflicts in people who has different values 8. Discuss the ways of conflict resolution in people with different values
	Using the basic communication skills in doctor-patient relationship	1. Adapts basic communication skills to doctor- patient interaction 2. Uses techniques to build up and maintain rapport with the patient 3. Uses techniques of active listening while talking to the patient 4. Evaluates emotions of the patient and responds in accordance with the emotion 5. Encourages the patient to Express his/her concerns

At the end of this lesson, the student will be able to:		
KNOWLEDGE		
DEP	TOPIC	LEARNING OUTCOMES
PHILOSOPHY AND ETHICS	Health and Disease - III (T-2)	1. Distinguish between the different approaches to defining the concept of disease. 2. Explain the naturalist conception of disease. 3. Explain the constructivist conception of disease.
	Ethics-Metaethics, Utilitarianism (T-2)	1. Comprehensive understanding of how to think critically about moral issues 2. Focus on developing analytical skills and a theoretical framework for ethical decision-making 3. Learn to distinguish between key terms like morality, ethics, and values 4. A solid grasp of the core questions in moral philosophy, such as "What makes an action right or wrong?" and "What constitutes a good life?"
	Death (III) (T-2)	1. Comprehend the relationship between death and harm. 2. Distinguish between different objections against the harm thesis. 3. Explain each of these objections.
	PLAGIARISM (T-2)	1. Defining Plagiarism and Academic Integrity: Students will be able to clearly define what plagiarism is, recognizing that it encompasses more than just directly copying text. They will learn to identify different forms of plagiarism, including: - Direct plagiarism (word-for-word copying without citation). - Paraphrasing plagiarism (rewording an idea without giving credit). - Mosaic or "patchwriting" plagiarism (mixing original words with a source's words and structure without citation). - Self-plagiarism (reusing one's own work from a previous course without permission or citation). - Contract cheating (submitting work that was written by someone else, for pay or otherwise). 2. Improper use of AI tools in academic writing.

COURSE 7 / MED 1002: GASTROINTESTINAL SYSTEM AND METABOLISM				
Course Date	April 20 – May 22, 2026			
Exam Dates	Practical Exams: May 22, 2026 Theoretical Exam: May 22, 2026			
Academic Unit	Academic Staff	Theoretical hours	Practical hours	Total
Anatomy	Ahmet Usta, Prof. Uğur Baran Kasırğa, Assist. Prof.	4	-	4
Biochemistry	Yeşim Neğiş, Assoc. Prof. Özlem Unay Demirel, Assoc. Prof. Merve Karayel Başar, Assist. Prof.	18	-	18
Biophysics	Serdar Durdağı, Prof. Bircan Dinç, Assist. Prof. Duygu Tarhan, Assist Prof	3	1	4
Evidence Based Medicine and Statistics	Hüseyin Tunç, Assist. Prof.	4	-	4
Histology and Embryology	Yasemin Ersoy Canıllıoğlu, Assoc. Prof. Merjem Purelku, Assist. Prof.	4	6	10
Physiology	Yasemin Keskin Ergen, Assist. Prof. Betilay Topkara Arslan, Assist. Prof. Elif Bahadır, Assist. Prof.	16	-	16
Clinical Skills	Yasemin Keskin Ergen, Assist. Prof. Gözde Argunşah, Assist. Prof.	2	4	6
Communication Skills in Medicine	Figen Dağlı, Prof.	Other groups		
TOTAL		51	11	62
Philosophy and Ethics	Kadircan Keskinbora, Prof.	16	-	16
Communication Skills and Academic Reporting		12		12
STUDY TIME	31			

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COURSE AIM:

The aim of this course is to:

- explain the development of digestive system;
- define the basic structures, main functions and radiological images of the digestive system;
- get knowledge about membrane biophysics;
- get knowledge about Evidence Based Medicine;
- get skills about how to perform recovery position and Heimlich maneuver;
- get basic communication skills in doctor-patient relationship;
- get skills about working as a part of a team.

LEARNING OUTCOMES

At the end of this lesson, the student will be able to:		
KNOWLEDGE & SKILLS		
DEP.	TOPIC	LEARNING OUTCOMES
ANATOMY	Abdomen topography; walls (T-2)	1. Describe the surface anatomy and regional divisions of the abdomen (quadrants, regions, lines, planes). 2. Explain the layers of the anterior abdominal wall (skin, fasciae, muscles, transversalis fascia, peritoneum). 3. Identify the muscles of the abdominal wall (rectus abdominis, external/internal oblique, transversus abdominis) and their functions. 4. Describe the inguinal canal and its clinical significance in hernia formation. 5. Discuss the anatomy of the posterior abdominal wall (psoas major, quadratus lumborum, iliacus). 6. Recognize clinical conditions.
	Abdominal vessels (T-2)	1. Describe the abdominal aorta, its parietal and visceral branches, and their areas of supply. 2. Explain the venous drainage of the abdomen, including the inferior vena cava and tributaries. 3. Describe the lymphatic drainage of abdominal organs and walls.

BAHÇEŞEHİR ÜNİVERSİTESİ TIP FAKÜLTESİ

"scientia et amore vitae"

At the end of this lesson, the student will be able to:		
KNOWLEDGE		
DEP.	TOPIC	LEARNING OUTCOMES
BIOCHEMISTRY	Introduction to metabolism (T-1)	1. Define and classify metabolism 2. Explain the principles of metabolic reactions in anabolic and catabolic pathways 3. Explain the activated carriers in the metabolism 4. List the different type of reactions in metabolism 5. Discuss the regulation of metabolic pathways

	Glycolysis and its regulation (T-2)	1. Describe the overall purpose, reactants, products, cellular localization, and tissue distribution of glycolysis 2. Compare aerobic and anaerobic glycolysis and their physiological significance in different tissues 3. Explain the sequence of glycolytic reactions, the key enzymes involved, and the consequences of their deficiencies 4. Identify the regulatory points of glycolysis and explain their control mechanisms, including allosteric, hormonal, and covalent regulation 5. Explain the role of glucose transporters (GLUTs) and tissue-specific differences in glucose uptake and regulation 6. Discuss the biosynthetic functions of glycolysis and its importance in whole-body glucose homeostasis
	Fates of Lactate, Pyruvate and NADH (T-1)	1. Explain the fates of pyruvate under aerobic and anaerobic conditions 2. Compare common fermentative pathways, their products, and why fermentation yields less ATP than aerobic respiration 3. Describe the role of lactate dehydrogenase, its localization, regulation, and the fate of lactate in metabolic cooperation between muscle and liver 4. Explain the role and fate of cytosolic NADH and the electron/energy shuttles linking glycolysis to respiration and fermentation 5. Describe how dietary glycogen, starch, disaccharides, and hexoses enter the glycolytic pathway
	The Citric Acid Cycle and its Regulation (T-2)	1. Explain the structure, required cofactors/vitamins, reaction mechanism, hormonal and allosteric regulation, and products of the pyruvate dehydrogenase (PDH) complex. 2. Describe the overall purpose, localization, reactants, and products of the citric acid (Krebs) cycle. 3. Explain the reactions, regulatory steps, enzymes, intermediates, and products of the citric acid cycle, including the net result of one turn. 4. Identify the energy carrier molecules produced in the citric acid cycle and analyze their significance for cellular metabolism. 5. Discuss the roles of enzymes and cofactors in the citric acid cycle and predict the biochemical and clinical consequences of their deficiencies. 6. Explain the products and net result of one turn of the citric acid cycle. 7. Recognize the entry and exit points of citric acid cycle intermediates and evaluate their significance as precursors in biosynthetic pathways. 8. Explain the central role of the citric acid cycle in connecting glycolysis, gluconeogenesis, oxidative phosphorylation, fatty acid metabolism, and amino acid metabolism.
	Electron transport chain and oxidative phosphorylation (T-2)	1. Describe the components and organization of the electron transport chain into functional complexes in the inner mitochondrial membrane. 2. Explain the pathway of electron flow and the associated proton translocation across the membrane. 3. Identify the inhibitors of the electron transport chain and list its key regulation points and mechanisms. 4. Define and explain oxidative phosphorylation, including the chemiosmotic theory of ATP synthesis. 5. Discuss the regulation of ATP synthesis and its integration with cellular energy demands. 6. Describe the malate–aspartate and glycerol 3-phosphate shuttle systems and their roles in electron transfer.

Gluconeogenesis and its regulation (T-2)	1. Describe the purpose, tissue distribution, and subcellular localization of gluconeogenesis 2. Compare gluconeogenesis with glycolysis and explain the bypass reactions 3. Identify the enzymes, cofactors, and steps of gluconeogenesis 4. Describe the substrates for gluconeogenesis, their entry points, and the conditions in which they are used 5. Explain the energetic cost of gluconeogenesis and why animals cannot synthesize glucose from fatty acids 6. Explain the reciprocal, hormonal, and metabolic regulation of gluconeogenesis and its role in maintaining blood glucose levels
Biosynthesis and breakdown of glycogen (T-1)	1. Define the structure and purpose of glycogen and discuss its advantages and disadvantages as a storage form of glucose 2. Describe the steps, enzymes, and cofactors of glycogen synthesis (glycogenesis) and glycogen breakdown (glycogenolysis), including their cellular and tissue localization 3. Explain the roles of glycogen synthase, branching enzyme, glycogen phosphorylase, debranching enzyme, and glucose-6-phosphatase in glycogen metabolism 4. Predict the biochemical and clinical consequences of enzyme deficiencies in glycogen metabolism 5. Summarize the overall regulation and physiological importance of glycogen metabolism
Regulation of glycogen metabolism (T-1)	1. Explain how glycogen synthesis is regulated by hormones and allosteric modulators 2. Compare and contrast the purpose, hormonal and allosteric regulation of glycogenesis in hepatocytes vs skeletal muscle 3. Explain how glycogen breakdown is regulated by hormones and allosteric modulators 4. Compare and contrast the purpose, hormonal and allosteric regulation of glycogenolysis in hepatocytes vs skeletal muscle
Biosynthesis of fatty acids and Regulation (T-2)	1. Determine the role of lipids in metabolism 2. Describe the reactants and products, their cellular localization, and their tissue distribution of fatty acid biosynthesis 3. List the components of fatty acid synthase system 4. Describe the source of NADPH in fatty acid biosynthesis 5. Describe the shuttle system for transfer of acetyl groups from mitochondria to cytosol 6. Explain the role of acetyl CoA in fatty acid biosynthesis 7. Explain how fatty acid biosynthesis is regulated by hormones and allosteric modulators 8. Describe the hormonal and allosteric regulation of fatty acid biosynthesis 9. Describe the inter-regulation of fatty acid biosynthesis and glycolysis 10. Describe the role of Acetyl CoA carboxylase
Biosynthesis of triacylglycerol and Regulation (T-2)	1. Define the structure of triacylglycerol and its importance in lipid metabolism 2. Describe the reactants and products, their cellular localization, and their tissue distribution of triacylglycerol 3. Explain the triacylglycerol synthesis by mentioning the enzymes, and cofactors involved in the pathway 4. Describe the role of glycerol 3-phosphate dehydrogenase in triacylglycerol biosynthesis 5. Describe the role of acyl CoA synthetase in triacylglycerol biosynthesis 6. Explain the hormonal and metabolic regulation of triacylglycerol biosynthesis 7. Describe the triacylglycerol cycle in metabolism 8. Explain the association between gluconeogenesis and triacylglycerol biosynthesis 9. Explain the regulation of phosphatidic acid biosynthesis and breakdown

	Biosynthesis of eicosanoids (T-1)	1. Describe the biosynthesis of eicosanoids, including their reactants, products, cellular localization, tissue distribution, and key enzymes involved in prostaglandin and leukotriene formation. 2. Explain the relationship between essential fatty acids and arachidonic acid as a precursor of eicosanoids. 3. Analyze the functional roles of eicosanoids and their significance in metabolism.
	Biosynthesis of membrane phospholipids (T-1)	1. Describe the role of membrane phospholipids in metabolism and their biosynthesis, including precursors, reactants, products, localization, and tissue distribution. 2. Identify and analyze the key enzymes involved in phospholipid and sphingolipid biosynthesis and their metabolic roles. 3. Explain the relationship between triacylglycerol and membrane phospholipid biosynthesis. 4. Discuss the metabolic and functional significance of specific phospholipids such as cardiolipin, phosphatidylinositol, and phosphatidylcholine.

At the end of this lesson, the student will be able to:		
KNOWLEDGE		
DEP	TOPIC	LEARNING OUTCOMES
BIOPHYSICS	Membrane biophysics (T-2)	1. Discuss the physical aspects of the functioning of biological membranes 2. Understanding of membrane structure and properties, membrane transport processes, membrane steady state properties, 3. Describe biophysics of ionic channels, conduction properties of biological cells 4. Explain the models of membrane excitability.
	Solubility of gases in blood and blood fluids (T-1)	1. Describe the factors affecting the solubility of gases. 2. Describe Henry's law for solubility of gases in liquid. 3. Compare the composition of atmospheric air and alveolar air. 4. Describe the mechanisms that drive gas exchange. 5. Discuss the importance of sufficient ventilation and perfusion, and how the body adapts when they are insufficient
	SKILLS	
	Lab: Analyses of Blood Gases (LAB-1)	1. Discuss the difference between arterial blood and venous blood 2. Describe basic concepts of blood gas 3. Explain arterial blood sampling 4. Discuss the importance of blood gas analysis and its applications in medicine 5. Draws and calculates blood gas data by using manual nomograms

At the end of this lesson, the student will be able to:		
KNOWLEDGE		
DEP	TOPIC	LEARNING OUTCOMES
EVIDENCE BASED MEDICINE AND STATISTICS	Fundamentals of Probability (T-2)	1. Define probability, sample space, and simple events. 2. Calculate probabilities using relative frequency. 3. Apply addition and multiplication rules for disjoint, non-disjoint, and independent events. 4. Compute complementary probabilities. 5. Understand conditional probability and Bayes' theorem. 6. Use counting rules like factorials, permutations, and combinations. 7. Solve probability problems in health contexts.

	Discrete Probability Distributions (T-2)	1. Define discrete random variables and probability distributions. 2. Construct and verify distributions. 3. Calculate mean, variance, and standard deviation for discrete cases. 4. Identify binomial distribution requirements. 5. Compute binomial probabilities, mean, and variance. 6. Recognize Poisson distribution conditions. 7. Calculate Poisson probabilities. 8. Use Poisson as an approximation to binomial in biological applications.
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At the end of this lesson, the student will be able to:		
KNOWLEDGE		
DEP	TOPIC	LEARNING OUTCOMES
HISTOLOGY AND EMBRYOLOGY	Introduction to Histology of Upper GIS (T-1)	1. Describe the histological organization of the oral cavity, pharynx, tongue, and esophagus, highlighting the main layers. 2. Identify the different types of oral mucosa and tongue papillae, noting key structural differences. 3. Outline the developmental stages of the tooth. 4. Recognize the histological features of the adult tooth and the cells responsible for enamel, dentin, and cementum formation. 5. Compare histological differences along the pharynx and upper, middle, and lower esophagus.
	Introduction to Histology of Lower GIS (T-1)	1. Describe the layers in the wall of the digestive tract (mucosa, submucosa, muscularis externa, and adventitia/serosa). 2. Identify the regional histological differences in the lower gastrointestinal tract from the stomach to the anus, and correlate structure with function. 3. Recognize gastric glands and intestinal glands, identify simply their constituent cells, and define their secretory products along with their functions. 4. Differentiate between gastric glands, cardiac glands, and pyloric glands.
	Introduction to Histology of liver, bile ducts, gall bladder and pancreas (T-1)	1. Describe the basic histological architecture and blood supply of the liver. 2. Recognize the structure of portal triads, hepatic lobules, and hepatic sinusoids, and identify their main components. 3. Identify the cells of liver tissue, including hepatocytes, Kupffer cells, endothelial cells, and Ito cells. 4. Describe the histological features and main components of the gallbladder. 5. Identify the histological features of the pancreas, distinguishing its exocrine (acini, ducts) and endocrine (islets of Langerhans) components, and relate them to their functions.
	Introduction to Histology of Salivary glands (T-1)	1. Classify the salivary glands. 2. Describe the general histological features of exocrine glands, and relate these to the major and minor salivary glands. 3. Identify the parenchyma (functional units and ducts of the salivary glands), and correlate the structural features of their constituent cells with the functions of these ducts. 4. Describe the stroma of the salivary glands, including cells such as myoepithelial cells and nerves, in relation to acinar cells and their role in secretory functions.
	SKILLS	
	Histology of Upper GIS (P-2)	1. distinguish the histological features of the oral cavity, tongue, and teeth under the light microscope. 2. Compare oral mucosa types and lip, and differentiate the

		various tongue papillae, highlighting their similarities and differences. 3. Demonstrate the histological layers of the esophagus and identify their organization. 4. Identify regional variations along the esophagus.
	Histology of Lower GIS (P-2)	1. Identify the major histological layers of the lower gastrointestinal tract, including the mucosa, submucosa, muscularis externa, and adventitia/serosa. 2. Distinguish the histological differences between regions of the lower GI tract, such as the small intestine (duodenum, jejunum, ileum), large intestine (colon), rectum, and anal canal. 3. Recognize histological features that correlate with the absorptive and secretory functions of different segments of the lower GI tract. 4. Identify regional specializations of the lower GI tract
	Histology of Salivary glands, liver, pancreas, gall bladder (P-2)	1. Describe the histological characteristics of major salivary glands, including parenchyma, stroma. 2. Identify the key structures of the liver, including portal triads, classical lobules, and main liver cell types. 3. Distinguish the exocrine and endocrine components of the pancreas, including acini, ducts, and islets of Langerhans. 4. Describe the histological features of the gallbladder, including all layers of its wall.



At the end of this lesson, the student will be able to:		
KNOWLEDGE		
DEP	TOPIC	LEARNING OUTCOMES
PHYSIOLOGY	General principles of regulation in the GI tract (T-2)	1. Explain the basic functions of the gastrointestinal system (GIS) including immune, digestive, reflexive responses. 2. Identify the segments of the gastrointestinal tract and the specialized functions attributed to each. 3. Explain the cellular specialization; mucosa, submucoza, muscularis externa and seroza. 4. Define gastrointestinal motility by means of smooth muscle contraction and releases Ca^{2+} as a result of different stimulations. 5. Explain the role of Cajal cells and electrical activity of GI smooth muscle (slow waves and spikes) on GI motility 6. Describe the neural regulation of GIS by explaining the special features of the enteric nervous system (myenteric and submucosal) and its relation with autonomic nervous system. 7. Explain the regulation of splanchnic blood circulation during the postprandial and fasting time. 8. List the factors that control different mechanisms of GI functions (hormonal, neural, paracrine effects)
	Cephalic phase of digestion (T-2)	1. Explain secretory changes that occur on different segments of the gastrointestinal tract during cephalic, gastric, and intestinal phases. 2. Explain the cephalic phase stimulus such as thinking about the consumption of food, olfactory, visual inputs and auditory inputs effects on secretion from the glandular cells. 3. Explain how the brain centers (limbic system, hypothalamus, cortex) influence secretion and the motility of the GI tract 4. Explain the structures of the salivary glands, and their secretory elements; primary and secondary steps of secretion 5. Explain why the saliva is hypotonic comparing to plasma. 6. Define the regulation of saliva under both parasympathetic and sympathetic stimulation. 7. Give example for the effect of the impaired salivary secretion; Sjögren's syndrome. 8. Define working mechanisms of upper and lower esophageal sphincters.

		- Explain swallowing mechanism and the peristaltic movement of esophagus (primary and secondary peristalsis). - Give examples with the paralysis of the swallowing mechanism; under anesthesia, damage to cranial nerves or muscular dystrophies.
	Gastric phase of digestion (T-2)	- Explain the role of stomach on digestion. - Explain different stimulus which influence the secretion of gastric acid. - Explain the role of other gastric secretory products including intrinsic factor and mucus. - Describe the motor activity to mix the secretions and propulsion towards the pyloric sphincter. - Explain the coordinated motor activity that regulates the emptying of gastric content into the duodenum (i.e. the enterogastric reflex) - Explain the role of the following hormones on gastric acid secretion and motility: gastrin, somatostatin, histamine, gastrin releasing peptides, motilin, CCK, secretin - Describe the migrating myoelectric complexes activities during fasting. - Describe the structure of parietal cell type and the formation of HCl- mechanism. - Describe the meaning of 'Achlorhydria and Hypochlorhydria'.
	Digestive Functions of the liver and pancreas (T-2)	- Explain the major functions of the liver on digestion. - Explain the characteristics of the hepatic circulation between canalicular lumen and sinusoids. - Explain blood flow properties with the related zone on liver. - Explain the bile acid synthesis and enterohepatic circulation of bile salts. - Describe the hormonal and neural mechanisms that coordinate gallbladder emptying. - Explain the role of the pancreas on digestion. - Understand how and when the digestive enzymes of the pancreas become active. - Explain the effects CCK and secretin hormones on sphincter of oddi, on gallbladder secretions and gastric & duodenal motility.
	Intestinal phase of digestion (T-2)	- Describe the motility of the small intestine and colon. - Explain the effects of hormones, paracrine, and neural pathways on digestion, secretions, and the motility of small intestine - Explain the haustration, segmentation, propulsion, mass movement. - Explain digestion process of carbohydrate, protein and fat molecules in small intestine - Describe the roles of bacterial colonization of colon in digestion and absorption of nutrients - Explain the reflex responses in GI tract. - Explain the defecation mechanism.
	Absorption of nutrients and water (T-2)	- Describe the absorptive process of monosaccharides that are formed as a result of digestion of carbohydrates - Describe mechanisms of absorption of amino acids - Describe the role of bile acids in absorption of fats - Describe the role of emulsification and micelle formation in absorption of fats - Define role of lymphatic system in the absorption of fats - Describe mechanisms of nucleic acid absorption - Describe mechanisms of vitamins absorption - Describe absorptive process of vitamin B12 and name the related proteins - Define the role of intestinal flora in the synthesis of vitamin K. - Describe mechanisms of mineral (calcium, iron, magnesium) absorption - Describe major absorptive processes that take place in the colon - Describe the mechanisms of water absorption

	Regulation of food intake (T-2)	1. Explain how food intake is regulated by hypothalamic centers 2. Name the hypothalamic nuclei that regulates food intake 3. List the factors that regulate food intake 4. Explain how hormones released from gastrointestinal system regulates food intake 5. Explain the role of leptin in food intake regulation 6. Discuss what would happen when the food intake regulation system fails 7. Define basal metabolic rate (BMR) and how we can measure BMR
	Thermoregulation (T-1)	1. Name the parts of the hypothalamus involved in thermoregulation 2. List the heat loss and heat production mechanisms by giving examples 3. Describe how the body responds to changes in core or environmental temperatures 4. Explain what fever is and how the body responds to fever 5. Describe the process by which sweat is produced
	Liver (T-1)	1. List and explain the functions of the liver 2. Define the functions of the liver cells and their relationship with each other 3. Defines the relationship between liver and circulatory, digestive, and immune systems. 4. Describe how liver stores copper and iron 5. Explain the role of liver for the metabolism and storage of fat soluble vitamins A, D, E, and K 6. List the proteins that are synthesized in the liver and briefly explain their functions 7. Explain the role of the liver in detoxification of foreign substances and xenobiotics. 8. Describe the processes of biotransformation and degradation of the substances taken up from blood 9. Explain the role of the of liver in the carbohydrate and lipid metabolisms 10. Describe how liver regeneration takes place

At the end of this lesson, the student will be able to:

SKILLS		
DEP	TOPIC	LEARNING OUTCOMES
CLINICAL SKILLS	Vital Signs II: Arterial Blood Pressure, Respiratory Rate, Oxygen Saturation Measurement (T-1), (P-2)	1. Describe the blood pressure 2. Describe the Korotkoff sounds 3. Demonstrate the proper technique for taking blood pressure 4. Identify the sources of error in measuring blood pressure and suggest techniques to minimize them 5. Tell the normal ranges of the respiratory rate 6. Describe how to count patient's respiratory rate 7. Describe the working principles of pulse oximetry 8. List the common areas for use of pulse oximetry 9. Describe the limitations of pulse oximetry 10. Tell the normal ranges of oxygen saturation 11. Describe how to measure oxygen saturation with a pulse oximetry
	Basic Life Support, Defibrillation (T-1) (P-2)	1. Define how to assess the patient 2. Describe the aim of each step in the chain of survival 3. Define the contents of Basic Life Support 4. Describe how to perform chest compression and rescue breathing 5. Describe how to perform Automated External Defibrillator 6. Define the precautions of Automated External Defibrillation 7. List the sequence of Cardiopulmonary Resuscitation and Automated External Defibrillation

At the end of this lesson, the student will be able to:

SKILLS		
DEP	TOPIC	LEARNING OUTCOMES
COMMUNICATION SKILLS IN MEDICINE	Introduction to Communication Skills	1. Discuss why communication skills in medicine are important 2. Clarify the feelings that drive human actions 3. Define aggressive, passive and assertive types of behavior 4. Discover that human beings react differently in a given situation depending on their own levels of acceptance 5. Distinguish the necessary action to be taken (listening / self-expression) during communication
	Active Listening	1. Define the steps of active listening 2. Appraise importance of body language in communication 3. List the sentences that may act as barriers in communication 4. Demonstrates active listening skills when talking to a person in problem
	Self-expression; Conflict Resolution	1. Distinguish different forms of self-expression 2. Identify negative effect of judgmental self-expression in interpersonal relationship 3. Describe three steps of self-expression using "I language" 4. Demonstrate correct self-expression method in role plays 5. Define two different types of conflicts 6. Explain different methods of resolution in necessity based conflicts 7. Comprehends reasons of conflicts in people who has different values 8. Discuss the ways of conflict resolution in people with different values
	Using the basic communication skills in doctor-patient relationship	1. Adapts basic communication skills to doctor- patient interaction 2. Uses techniques to build up and maintain rapport with the patient 3. Uses techniques of active listening while talking to the patient 4. Evaluates emotions of the patient and responds in accordance with the emotion 5. Encourages the patient to Express his/her concerns

At the end of this lesson, the student will be able to:

KNOWLEDGE		
DEP	TOPIC	LEARNING OUTCOMES
PHILOSOPHY AND ETHICS	Health Care Law, Ethics & Medical Practice (T-2)	1. Define National and international documents, legal regulations, and ethical codes related to medicine and health 2. Explain Professional values, professional identity development, and historical perspective, continuous openness to professional and individual development 3. Explain Professional dominance, organization, and autonomy 4. Explain Health and Occupational Defense
	Professional and Ethical Responsibilities (T-2)	1. Learn to distinguish and apply key ethical frameworks. 2. Focus on moral duties and rules; utilitarianism, which evaluates actions based on their consequences (the greatest good for the greatest number); 3. Focus on virtue ethics, which emphasizes the development of moral character 4. Ability to recognize ethical problems in a professional context

Ethical Highlights in Clinical Trials (T-2)	1. This class would give students a deep understanding of the moral responsibilities and principles that govern research involving human subjects 2. Foundation for understanding the development of landmark documents like the Nuremberg Code and the Declaration of Helsinki. 3. Students will then be able to explain the core principles of the Belmont Report: respect for persons, beneficence, and justice. 4. The Importance of Informed Consent 5. The challenges of obtaining informed consent from vulnerable populations
Teaching & Learning Ethics (T-1)	1. Explain Medical ethics principles and rules 2. Explain the Ethical sensitivity 3. Explain duties of med. Doctors 4. Define Unprofessional/unethical behavior towards patients and their relatives
Ethics and Deontology (T-1)	1. Define Deontology (definition, features) 2. Explain Medical ethics principles and rules 3. Explain the Ethical sensitivity 4. Explain duties of med. Doctors 5. Define Unprofessional/unethical behavior towards patients and their relatives 6. Explain to whom or what we owe the moral obligations E.g., who are we morally obliged to help, and how? 7. Explain how it can be taught and received.
Well-being – I (T-2)	1. Comprehend the relationship between health and well-being. 2. Distinguish between different theories of well-being. 3. Explain hedonism. 4. Explain objections against hedonism.
ETHICS - Moral Philosophy – Major Areas of Ethics Part 1 (T-2)	1. Define the difference between ethics and morals. 2. Define the code of ethics 3. Define the subdivisions of ethics 4. Explain the schools on ethics of last century's prominent philosophers (Kant, Bentham, Hume, Moore, Mill) 5. Explain the legal nature and ethical dimension of the doctor-patient relationship
Well-being – II (T-2)	1. Comprehend the relationship between health and well-being. 2. Distinguish between different theories of well-being. 3. Explain desire-satisfaction theories and objective list theories of well-being. 4. Explain the objections against each.
ETHICS - Moral Philosophy – Major Areas of Ethics - Part 2 (T-2)	1. Define instrumental and principle based ethics 2. Define the other ethical rules 3. Define why ethics necessary for organizations. 4. Give some examples which discussed interactively during the lectures 5. Explain the coordination of the health service delivery process (cases that require cooperation and team service in preventive, treatment and rehabilitative services) and ethics

COURSE 8 / MED 1004: UROGENITAL SYSTEM				
Course Date	May 25 – June 19, 2026			
Exam Dates	Practical Exams: June 19, 2026 Theoretical Exam: June 19, 2026			
Academic Unit	Academic Staff	Theoretical hours	Practical hours	Total
Anatomy	Ahmet Usta, Prof. Uğur Baran Kasırga, Assist. Prof.	3	-	3
Biophysics	Serdar Durdağı, Prof. Bircan Dinç, Assist. Prof. Duygu Tarhan, Assist. Prof.	1	2	3
Biochemistry	Yeşim Neğiş, Assoc. Prof. Özlem Unay Demirel, Assoc. Prof. Merve Karayel Başar, Assist. Prof.	15	-	15
Histology and Embryology	Yasemin Ersoy Canıllıoğlu, Assoc. Prof. Merjem Purlku, Assist. Prof.	18	5	23
Physiology	Yasemin Keskin Ergen, Assist. Prof. Betilay Topkara Arslan, Assist. Prof.	12	1	13
TOTAL		49	8	57
Philosophy and Ethics	Kadircan Keskinbora, Prof.	2		2
Communication Skills and Academic Reporting		8		8
STUDY TIME				30

COURSE AIM:

The aim of this course is to:

- define the anatomy, histology, physiology, functional properties, and embryological development of organs forming urogenital system;
- get knowledge about research;
- get basic communication skills in doctor-patient relationship;
- get skills in basic life support and defibrillation;
- get skills about working as a part of a team.

LEARNING OUTCOMES

At the end of this lesson, the student will be able to:		
KNOWLEDGE & SKILLS		
DEP.	TOPIC	LEARNING OUTCOMES
ANATOMY	Pelvic floor (T-2)	1. Describe the boundaries and layers of the pelvic floor (pelvic diaphragm, urogenital diaphragm). 2. Identify the main muscles of the pelvic floor (levator ani, coccygeus, deep transverse perineal) and their functions. 3. Correlate the pelvic floor anatomy with childbirth and pelvic organ prolapse. 4. Discuss the innervation and vascular supply of the pelvic diaphragm.
	Ischioanal fossa (T-1)	1. Describe the anatomical boundaries and contents of the ischioanal fossa. 2. Explain the fat-filled nature of the space and its function in allowing anal canal expansion. 3. Identify the course of the pudendal canal (Alcock's canal) and its neurovascular structures. 4. Discuss the clinical importance of infections in the ischioanal fossa.

At the end of this lesson, the student will be able to:		
KNOWLEDGE		
DEP.	TOPIC	LEARNING OUTCOMES
BIOPHYSICS	Biophysics of Glomerular Filtration (T-1)	1. Define the magnitude of renal blood flow and glomerular filtration 2. Explain magnitude of renal blood flow and glomerular filtration 3. Describe the coupled transport 4. Define glomerular hemodynamics 5. Distinguish filtration barrier to macromolecules
	LAB: Differential Scanning Calorimeter (DSC) experiment (P-2)	1. Make thermal calibration of differential scanning calorimeter 2. Explore principles of differential scanning calorimetry analysis 3. Measure the samples of differential scanning calorimeter 4. Analysis of differential scanning calorimetry data

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP.	TOPIC	LEARNING OUTCOMES
BIOCHEMISTRY	Biosynthesis of cholesterol (T-2)	1. Explain the structure of cholesterol and describe the steps, reactants, products, cellular localization, and tissue distribution of its biosynthesis. 2. Identify the rate-limiting enzyme of cholesterol biosynthesis. 3. Discuss the regulation mechanisms of cholesterol biosynthesis.
	Oxidation of fatty acids and Ketone body formation (T-2)	1. Define and classify fatty acids 2. Discuss the oxidation of fatty acid degradation of fully saturated fatty acid with an even number of carbon atoms 3. Explain the extra transformations necessary for the degradation of unsaturated fatty acids and fatty acids with an odd number of carbons 4. Discuss the regulation of fatty acid oxidation by mentioning the rate limiting enzyme 5. Explain the reciprocal regulation of fatty acid oxidation and biosynthesis 6. Differences between oxidation of fatty acids and biosynthesis of fatty acids 7. Define ketone body 8. Name different ketone bodies synthesized during the metabolism 9. Describe the conditions in which the ketone bodies are synthesized 10. Describe the role of acetyl CoA in the formation and degradation of ketone bodies 11. Describe the process of ketone body export from the liver
	Pathways of Sugar Metabolism: Pentose Phosphate Pathway, Fructose, and Galactose Metabolism (T-2)	1. Compare and contrast the overall purpose, reactants, products, and cellular localization of the pentose phosphate pathway. 2. Explain the oxidative and non-oxidative phases of the pentose phosphate pathway, including enzymes, cofactors, and regulatory mechanisms. 3. Describe and analyze the roles of NADPH in metabolism, including its contribution to reduced glutathione formation. 4. Explain the biochemical basis of glucose-6-phosphate dehydrogenase deficiency and its link to hemolytic anemia. 5. Describe the uronic acid pathway and its role in glucuronic acid synthesis. 6. Explain the metabolism of fructose and galactose by fructokinase and hexokinase, and identify the diseases associated with their metabolic defects.
	Biosynthesis of amino acids (T-2)	1. Explain the dynamics of the free amino acid pool and factors affecting nitrogen balance 2. Define essential, conditionally essential, and nonessential amino acids, and list them accordingly 3. List ketogenic and glucogenic amino acids and explain their metabolic fates 4. Integrate amino acid synthesis with precursors from glycolysis, the citric acid cycle, and the pentose phosphate pathway 5. Describe transamination reactions, the synthesis of glutamate and glutamine, and their central roles in metabolism 6. Describe the synthesis pathway of each nonessential amino acid 7. Explain the role of cofactors such as folic acid, vitamin B12, and S-adenosylmethionine (SAM) in one-carbon metabolism
	Conversion of amino acids to specialized products (T-1)	1. Cite examples of amino acid involvement in biosynthetic processes beyond protein synthesis 2. Describe heme biosynthesis, including precursors, the role of glycine, and the rate-limiting step 3. Explain how glycine and arginine contribute to the synthesis of creatine and other metabolites 4. Explain the role of arginine in the biosynthesis of nitric oxide, polyamines, and related compounds 5. Describe the synthesis of catecholamines, thyroid hormones, serotonin, and histamine from their amino acid precursors

		6. Identify the role of tetrahydrobiopterin in amino acid metabolism
	Catabolism of proteins and amino acid nitrogen (T-1)	1. Explain the structure of amino acids and the phases of their oxidation, including conditions that promote oxidative processes. 2. Categorize and describe oxidative deamination reactions of amino acids. 3. Discuss and analyze transamination reactions, including their reactants, cofactors, enzymes, and role in amino acid oxidation. 4. Explain the roles of glutamine and glutamate as carriers of amino groups. 5. Describe the mechanisms of ammonia transport during amino acid oxidation.
	Catabolism of the carbon skeletons of amino acids (T-1)	1. Classify amino acids as glucogenic, ketogenic, or both, and identify their conversion to key metabolic intermediates such as pyruvate, acetyl-CoA, α-ketoglutarate, succinyl-CoA, and oxaloacetate. 2. Explain the reactions and pathways of phenylalanine and tyrosine metabolism. 3. Describe the degradation pathway of branched-chain amino acids and its metabolic significance. 4. Analyze how amino acid catabolism connects to central metabolic pathways. 5. Discuss the clinical significance of defects in amino acid metabolism.
	Urea cycle and its regulation (T-2)	1. Explain the fate of amino groups in catabolism of amino acids 2. Explain the link between urea cycle and citric acid cycle 3. Discuss the aspartate and argininosuccinate shunt 4. Explain the reactions by mentioning reactants, enzymes and cofactors involved in urea cycle 5. Describe the reactants and products, their cellular localization, and their tissue distribution of urea cycle 6. Explain the overflow of nitrogen in metabolism briefly 7. Discuss the overall equation of urea cycle 8. Mention the rate limiting enzyme in urea cycle 9. Explain the role of N-acetylglutamate in urea cycle regulation 10. Explain the biosynthesis of N-acetylglutamate in the formation of urea 11. Discuss the role of carbamoyl phosphate in the regulation of urea
	Integration Of Carbohydrate, Lipid and Protein Metabolism (T-2)	1. Describe the principles of metabolism and the differences 2. Explain the basic elements of the integration of metabolism between anabolism and catabolism 3. Outline the major metabolic pathways involving glucose, fatty acids and amino acids 4. Explain the central roles of glucose-6-phosphate, pyruvate and acetyl-CoA in the integration of metabolism 5. Explain the integration of metabolite at tissue level (skeletal muscle, heart, liver, adipose tissue, brain) 6. Explain how hormones such as insulin, glucagon, epinephrine and cortisol control metabolic responses of cells. 7. Describe how metabolic processes are integrated under different physiological and pathological conditions such as well-fed, fasting and starvation conditions

At the end of this lesson, the student will be able to:

KNOWLEDGE		
DEP	TOPIC	LEARNING OUTCOMES
HISTOLOGY	Introduction to Histology of Urinary system (T-1)	1. Describe the structural organization of the kidney, distinguishing between the cortex and medulla along with their specific structures. 2. Describe the components of a nephron, including the organization of the renal corpuscle and tubules, as well as the types of cells present within them. 3. Describe the filtration barrier between the blood and the urinary space in the renal corpuscle. 4. Compare the structure of the proximal convoluted tubule, distal convoluted tubule, and collecting tubule. 5. Describe the blood supply to the kidney. 6. Describe the transitional epithelium and explain the relationship between its structure and function.
	Oogenesis and Ovary (T-2)	1. Describe the major histological features and organization of the female genital system, with emphasis on the ovary. 2. Outline the processes of oogenesis from intrauterine life through adulthood, including the stages and timing of oocyte maturation. 3. Explain the stages of folliculogenesis, follicle development, ovulation, and formation of the corpus luteum. 4. Identify the general stages of meiosis and their specific relevance to oogenesis. 5. Describe the cyclical changes in the ovaries and their correlation with fluctuating levels of estrogen and progesterone. 6. Explain the hormonal regulation of oogenesis, including estrogen production by the theca interna and granulosa cells.
	Spermatogenesis and Testis (T-2)	1. Describe the histological structure and organization of the testis. 2. Outline the process of spermatogenesis in the germinal epithelium of the seminiferous tubules, from intrauterine life through adulthood. 3. Identify germ cells at various stages of spermatogenesis within the seminiferous tubules, specifying the stages that involve meiosis and those related to cellular differentiation (spermiogenesis). 4. Explain the key stages of spermiogenesis and describe how sperm cells mature and acquire their final structure and function. 5. Differentiate between spermatogenesis and spermiogenesis in terms of their processes and outcomes. 6. Recognize Sertoli and Leydig cells, and explain their roles in sperm production. 7. Describe the structure and functional importance of the blood-testis barrier, including its cellular components. 8. Explain the role of hormonal regulation—particularly the roles of FSH, LH, and testosterone—in the control of spermatogenesis. 9. Describe the main criteria assessed in semen analysis and their clinical significance. 10. Recognize key pathological conditions related to testicular function and spermatogenesis.
	Ovulation and Fertilisation (T-1)	1. Explain the ovulation process and the accompanying changes in the ovary and female reproductive system before fertilization. 2. Describe the preparation and capacitation of spermatozoa in the female reproductive tract. 3. Outline the fertilization process, including sperm penetration of the oocyte, formation of the zygote, its site, and the phases of fertilization. 4. Explain the genetic, meiotic, and early mitotic events involved in fertilization and the resulting chromosomal and developmental outcomes.

Implantation (T-1)	1. Describe the development of the embryo from the first cells to the blastocyst stage. 2. Explain the histological structure, cyclic changes, and decidual transformation of the endometrium during the menstrual cycle. 3. Describe the stages of implantation and identify its normal site. 4. Recognize the possible sites of ectopic pregnancy and their clinical significance.
Bilaminar and Trilaminar Disc Formation (T-2)	1. Define the bilaminar embryonic disc and identify its two layers: the epiblast and the hypoblast. 2. Describe the formation of the bilaminar disc during the second week of embryonic development. 3. Explain the significance of the amniotic cavity and yolk sac in relation to the bilaminar disc. 4. Identify the events that lead to the transition from the bilaminar to the trilaminar disc during the third week of development. 5. Describe the process of gastrulation and the role of the primitive streak in trilaminar disc formation. 6. List the three germ layers (ectoderm, mesoderm, endoderm) and describe their embryological origins from the epiblast.
Neurulation (T-1)	1. Define neurulation and explain its role in early embryonic development. 2. Describe the formation of the neural plate, groove, and tube. 3. Explain primary neurulation and neural tube closure. 4. Recognize the formation and migration of neural crest cells, and list the key structures derived from them. 5. Recognize common neural tube defects and their prevention.
Introduction to Histology Of Female Reproductive System (T-2)	1. Define the basic developmental stages of the female reproductive organs. 2. Describe the histological structure and regional variations of the major female reproductive organs (ovaries, uterine tubes, uterus, and vagina). 3. Explain cyclical and functional changes in the female reproductive organs, including hormonal regulation during the menstrual cycle and pregnancy. 4. Identify the histological features of the external genitalia.
Extraembryonic structures (T-2)	1. Name the fetal membranes and cavities, including their components and functions. 2. List the structures that constitute the fetal membranes. 3. Describe the formation of extraembryonic structures. 4. Explain the functions and eventual fate of these fetal membranes. 5. Describe the characteristics and types of twin pregnancies.
Placenta (T-1)	1. Describe the roles of the chorion and its components in placental development and explain the supportive role of the amnion. 2. Define chorionic villi and explain their structural and functional significance in early placental development. 3. Explain the formation of the placenta, including the interaction between maternal and fetal tissues. 4. Describe the macroscopic and microscopic structure of the mature placenta. 5. Explain the concept of the placental (fetomaternal) barrier and describe the direction and regulation of maternal and fetal blood flow. 6. Distinguish between the maternal and fetal components of the placenta. 7. Recognize common clinical conditions and developmental abnormalities related to the placenta and fetal membranes

Teratology (T-1)	1. Explain the fundamental principles of teratology. 2. Identify the critical periods of embryonic and fetal development. 3. Describe the frequency, clinical significance, and timing-related effects of major and minor congenital malformations. 4. Recognize common genetic and environmental causes of congenital malformations and exposures to avoid before and during pregnancy.
Introduction to Histology Of Male Reproductive System (T-2)	1. Describe the histological structure and function of the intra- and extratesticular duct systems involved in sperm production, maturation, and ejaculation. 2. Identify the histological features and functions of the accessory sex glands, including the seminal vesicles, prostate, and bulbourethral glands. 3. Explain the specific contributions of each gland and duct to the composition of semen in the final ejaculate. 4. Identify the histological structures of the penis and describe the roles of its components in erection and detumescence. 5. Trace the pathway of spermatozoa through the male reproductive tract, from the site of production to the point of ejaculation.
SKILLS	
Microscopic structures of the urinary system (P-1)	1. Distinguish the microscopic structures of the renal cortex and medulla. 2. Identify the structural components of a nephron and describe their basic histological features. 3. Differentiate the proximal tubule, distal tubule, and collecting duct under the light microscope based on their distinct histological characteristics. 4. Recognize the key histological features of the ureter, urinary bladder, and urethra using light microscopy.
Microscopic Structures Of Male Reproductive System (P-2)	1. Describe the histological organization of the testis and distinguish between the various cell types within the germinal epithelium of the seminiferous tubules. 2. Compare the histological features of intratesticular and extratesticular ducts to differentiate between them. 3. Identify and describe the histological features of the accessory sex glands and the penis under the light microscope.
Microscopic Structures Of Female Reproductive System (P-2)	1. Identify histologic sections of the major female reproductive organs: ovary, uterine tubes, uterus, and vagina. 2. Distinguish the histological organization of the ovary into cortex and medulla and describe their key features. 3. Recognize the stages of follicular growth (primary, secondary, tertiary) and the corpus luteum, including their specific cell types: granulosa cells, theca cells, interstitial gland cells, and granulosa lutein cells. 4. Classify the epithelium of the uterine tubes, uterus, and vagina, and describe the regional variations, layer structures (mucosa, muscularis, serosa/adventitia), and functional adaptations in each organ.

At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
PHYSIOLOGY	Urine Formation by the Kidneys:I. Glomerular Filtration, Renal Blood Flow, and Their Control (T-2)	1. Define the functions of the kidney by giving examples 2. Explain the stages of urine formation by the kidney 3. Describe the structural and the functional differences between cortical and medullary nephrons 4. Describe the properties of glomerulus and filtration barrier 5. Explain the process of glomerular filtration and the features of glomerular filtrate 6. Explain the effects of dilation and vasoconstriction of afferent and efferent arterioles on glomerular filtration rate (GFR) and renal blood flow. 7. Explain the role of tubuloglomerular feedback mechanism in regulation of GFR 8. Explain the effects of hormones and paracrine secretions on GFR and renal blood flow 9. Describe the structure of the juxtaglomerular apparatus and its role in regulation of GFR 10. Explain the term of renal clearance and measurement of renal clearance of a substance 11. Explain the measurements of GFR and renal blood flow 12. Describe the micturition reflex
	Urine Formation By The Kidneys: II Tubular Processing Of The Glomerular Filtrate (T-2)	1. Describe the roles of the parts of the renal tubular system in the processing of glomerular filtrate 2. Explain the transport mechanisms playing role in tubular reabsorption and secretion 3. List the important electrolytes and molecules which are processed in the renal tubular system 4. Describe the endocrinal and neural control of tubular reabsorption and secretion 5. Explain clearance methods for the evaluation of kidney functions
	Regulation Of Water And Electrolyte Balance In The Body (T-2)	1. List the factors that determine body water content and describe the effect of each factor (i.e. age, body mass, and body fat) 2. Describe the factors that determine fluid shifts in the body 3. List the routes by which water enters and leaves the body 4. Describe control mechanisms that regulate water intake and water output in urine 5. Describe the renin-angiotensin II – aldosterone system and its effects on fluid – electrolyte balance of the body 6. Explain the regulation of antidiuretic hormone (ADH) secretion and the effects of ADH on body fluid composition 7. Describe the function of atrial natriuretic peptide (ANP) and other natriuretic peptides 8. Describe the mechanisms involved in regulation of sodium balance, blood volume and pressure 9. Give examples for conditions in which the body has a deficiency in water and/or electrolyte balance
	Female Reproductive System Physiology (T-2)	1. Describe hormonal changes that take place during female puberty. 2. Describe the roles of hypothalamus and the anterior pituitary gland in regulation of ovarian cycle. 3. Describe the function of the gonadotropic hormones. 4. Name main hormones secreted from corpus luteum and graft follicles. 5. Describe the changes that occur in female reproductive organs during menstrual cycle. 6. Describe the synthesis, transport and physiological functions of progesterone. 7. Describe the synthesis, transport and physiological functions of estrogens. 8. Describe hormonal changes that take place during female menopause. 9. Define hypogonadism and hypergonadism. 10. Define hormonal system that is required for female fertility.

	Acid - Base Balance (T-1)	1. List the major sources of acids in the body 2. Name the three major chemical buffer systems of the body and describe how they resist pH changes 3. Describe the influence of the respiratory system on acid-base balance 4. Describe how the kidneys regulate hydrogen and bicarbonate ion concentrations in the blood 5. Distinguish between acidosis and alkalosis resulting from respiratory and metabolic factors. 6. Describe the mechanisms of respiratory and renal compensations to acid base disturbances.
	Pregnancy, Labor, And Lactation (T-1)	1. Describe hormonal changes that take place in embryogenesis, implantation, pregnancy and labor 2. Describe physiological effects of hormones during the processes of embryogenesis, implantation, pregnancy and labor 3. Define role of placenta in pregnancy 4. Name the placental hormones and describe their functions 5. Explain the process of lactation 6. Describe the hormones that regulate lactation
	Male Reproductive System Physiology (T-2)	1. List the endocrine glands involved in male reproductive system. 2. List the key hormones secreted from Leyding and Sertoli cells. 3. Explain the regulation of hormone secretions by hypothalamic and pituitary hormones. 4. Explain the process of spermatogenesis, including its time course, spatial distribution, and role of supporting cells and hormones. 5. Explain the morphological and functional features of a mature spermatozoon. 6. Outline the role of chromosomes, hormones, and related factors in sex determination and development. 7. Summarize the hormonal changes that occur at puberty in males. 8. Explain the mechanisms that produce erection and ejaculation. 9. Describe the general structure of testosterone, and explain its biosynthesis, transport, metabolism, and actions. 10. Explain the effects of androgens on target organs, secondary sex characteristics, libido, and sexual behavior. 11. Explain the causes of major reproductive dysfunctions in men.
	SKILLS	
	Lab: Renal Physiology in a simulation platform (P-1)	1. Discuss how changes in afferent arteriole radius impact glomerular capillary pressure and filtration based on the measurements that they performed in the simulation platform 2. Discuss how changes in efferent arteriole radius impact glomerular capillary pressure and filtration based on the measurements that they performed in the simulation platform 3. Discuss how blood pressure affects glomerular capillary pressure and glomerular filtration based on the measurements that they performed during the experiments

At the end of this lesson, the student will be able to:		
KNOWLEDGE		
DEP	TOPIC	LEARNING OUTCOMES
PHILOSOPHY AND ETHICS	Ethic Dilemma; Human Rights, Ethics - Part I-II (T-2)	1. Define the purposes of ethics training 2. Define what do you hope to get out of this? 3. Define the competencies of ethics committees 4. Explain Violations of the right to health 5. Explain Patients' and Physicians' Rights and Responsibilities 6. Define the foundations of medical ethics 7. Define the principles of solution for ethical dilemma 8. Define legal conditions 9. Define Ethical issues in medical record, prescription and report writing 10. Define how to make decisions about ethical issues 11. Define Ethical states regarding the beginning and end of life 12. Define Legal and ethical issues in forced treatment