



BAU TIP

BAHÇEŞEHİR UNIVERSITY SCHOOL OF MEDICINE

"scientia et amore vitae"



BAHÇEŞEHİR UNIVERSITY

SCHOOL OF MEDICINE

CLASS 1

ACADEMIC PROGRAMME

2022-2023

BAU TIP

BAHÇEŞEHİR ÜNİVERSİTESİ TIP FAKÜLTESİ

"scientia et amore vitae"

Dean	Türker Kılıç, Prof.
Vice Dean	Demet Koç, Assist. Prof.
Class 1 Coordinator	Yasemin Çanilloğlu, Assist. Prof.
Class 1 Co- Coordinator	Seyda İğnak Tarlığ, Assit. Prof.
Course 1 Coordinator	Yasemin Canilloğlu, Assist. Prof.
Course 2 Coordinator	Timuçin Avşar, Assist. Prof.
Course 3 Coordinator	Eren Öğüt, Assist. Prof.
Course 4 Coordinator	Erdem Yılmaz, Assist. Prof.
Course 5 Coordinator	Seyda İğnak Tarlığ, Assit. Prof.
Course 6 Coordinator	Yasemin Keskin Ergen, Assit. Prof.
Course 7 Coordinator	Yeşim Neğiş, Assoc. Prof.
Course 8 Coordinator	Berna Doğan, Assit. Prof.

FIRST YEAR					
1. Semester					
CODE	COURSE	T	P	C	E
ENG1003	Communication Skills and Academic Reporting I	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
MED1007	Cardiovascular and Respiratory 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
MED1002	Gastrointestinal System and Metabolism	3	2	4	6
MED1004	Urogenital System	3	2	4	6
MED1006	Nervous System	3	2	4	6
MED1008	Sensory Organs and Endocrine System	3	2	4	6
		16	12	22	30

	COURSE 1		COURSE 2		COURSE 3		COURSE 4		COURSE 5		COURSE 6		COURSE 7		COURSE 8		TOTAL
	<i>T</i>	<i>P</i>	<i>T</i>	<i>P</i>	<i>T</i>	<i>P</i>	<i>T</i>	<i>P</i>	<i>T</i>	<i>P</i>	<i>T</i>	<i>P</i>	<i>T</i>	<i>P</i>	<i>T</i>	<i>P</i>	
Anatomy	13	6	21	14	32	10	34	12	25	14	15	8	24	12	19	10	269
Behavioral Sciences													4		8		12
Biophysics	7	2	9	1	6	1	11	1	2		2		4	1	6	1	54
Biochemistry	15	4	14	2	13	-	6	-	26		9	2	10	2	8	2	113
Evidence Based Medicine and Statistics									2		4		2		4		12
Histology and Embryology	13	8	10	-	4	2	9	6	9	9	16	8	3	2	8	8	115
Immunology							5		8								13
Medical Biology	14	-	6	-	4	-	2										26
Medical Microbiology			5	-	4	-											9
Physiology	3	-	6	3	12	1	37	3	17		13	1	28		19	1	144
Radiologic Anatomy			10	-	6		10		8		8		10		6		58
<i>Clinical Skills</i>	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	20
Communication Skills in Medicine				8													8
TOTAL	66	21	82	29	83	16	116	24	98	24	68	20	86	18	79	23	853
STUDY TIME	40		50		50		40		40		34		40		38		332

	COURSE 1		COURSE 2		COURSE 3		COURSE 4		COURSE 5		COURSE 6		COURSE 7		COURSE 8		TOTAL
	<i>T</i>	<i>P</i>	<i>T</i>	<i>P</i>	<i>T</i>	<i>P</i>	<i>T</i>	<i>P</i>	<i>T</i>	<i>P</i>	<i>T</i>	<i>P</i>	<i>T</i>	<i>P</i>	<i>T</i>	<i>P</i>	
Medical Ethics and History of Medicine	6		10		10				8		8		10				52
Philosophy	6		10		8				8		8		10				50

BAHÇEŞEHİR UNIVERSITY SCHOOL OF MEDICINE
2022 – 2023 ACADEMIC CALENDAR FOR THE FIRST YEAR

2022 – 2023 ACADEMIC YEAR FALL SEMESTER

September 26, 2022	Orientation Seminars
September 26-October 21 2022	1 st Block – Molecular Basis of Cell
October 24- November 25 2022	2 nd Block- Cell, Tissue and Organ Systems
November 28- December 30 2022	3 rd Block - Musculoskeletal System
January 02 - February 03 2023	4 th Block - Cardiovascular and Respiratory Systems
October 28-29 Friday, Saturday 2022	Republic Day of Turkey (National holiday)
February 06-17, 2023	Semester Break

2022 – 2023 ACADEMIC YEAR SPRING SEMESTER

20 February – 24 March 2023	5 th Block – Gastrointestinal System and Metabolism
March 27 – April 19, 2023	6 th Block – Urogenital System
April 24 – May 26 2023	7 th Block – Nervous System
May 29 – June 23 2023	8 th Block – Sensory Organs and Endocrine System
April 20-23, 2023	Ramadan Feast Holiday
May 01, 2023, Monday	Labor and Solidarity Day
May 19, 2023, Friday	Commemoration of Atatürk, Youth and Sports Day (National holiday)
June 27-July 1, 2023	Kurban Bayramı Holiday
July 03, 2023	Make-up Exams for Courses
July 07 2023	Final Exam
July 212023	Resit Exam for the Final exam

BAHÇEŞEHİR UNIVERSITY SCHOOL OF MEDICINE PHASE I (2022-2023)

	Committee Names	EXAM 1 (Theoretical Exam)		EXAM 2 (Practical Exam)		AVERAGE OF COMMITTEE GRADES	EXAM 3 (FINAL EXAM)		YEAREND GRADE	PASSING GRADE
		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 questions) (2 sections)	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: Cardiovascular and Respiratory Systems	MCQ (100 questions)	80 %	PRACTICAL EXAMS ¹	20%					
	Committee 5: Gastrointestinal System and Metabolism	MCQ (100 questions)	80 %	PRACTICAL EXAMS ¹	20%					
	Committee 6: Urogenital System	MCQ (100 questions)	80 %	PRACTICAL EXAMS ¹	20%					
	Committee 7: Nervous System	MCQ (100 questions)	80 %	PRACTICAL EXAMS ¹	20%					
	Committee 8: Sensory Organs and Endocrine System	MCQ (100 questions)	80 %	PRACTICAL EXAMS ¹	20%					
	Communication Skills ³								% 100	
	Clinical Skills	OSCE	%50	Clinical Skills Evaluation ⁴	%50			% 100		

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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 APPENDİX 1.

⁴Clinical Skills are evaluated according to APPENDİX 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:	
CLINICAL SKILL TOPIC:	
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.

MED 1001: MOLECULAR BASIS OF CELL				
Course Date	September 26-October 21, 2022			
Exam Dates	Practical Exams: October 20, 2022 Theoretical Exam: October 21, 2022, Hour: 10:00-12:00			
Course Coordinator:	YASEMİN ERSOY ÇANILLIOĞLU			
Academic Unit	Academic Staff	Theoretical hours	Practical hours	Total
Anatomy	Çağatay Barut, Prof Eren Öğüt, Assist. Prof.	13	6	19
Biophysics	Serdar Durdağı, Prof. Berna Doğan, Assist. Prof. Enes Kotil, Assist. Prof.	7	2	9
Biochemistry	Yeşim Neğiş, Assoc. Prof. Özlem Unay Demirel, Assist. Prof. Erdem Yılmaz, Assist. Prof. Berna Doğan, Assist. Prof.	15	4	19
Histology and Embryology	Yasemin Ersoy Canıllıoğlu, Assist. Prof. Dila Şener, Assist. Prof.	13	8	21
Medical Biology	Timuçin Avşar, Assist. Prof. Seyda İğnak Tarlığ, Assist. Prof.	14	-	14
Physiology	Yasemin Keskin Ergen, Assist. Prof.	3	-	3
Clinical Skills	Demet Koç, Assist. Prof.	1	1	2
TOTAL		66	21	87
Medical Ethics and History of Medicine	Kadircan Keskinbora, Prof.	6	-	6
Philosophy		6	-	6
Communication Skills and Academic Reporting		12	-	12
STUDY TIME				40

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	Basic concepts, descriptions and nomenclature (terminology), general information about bones (T-5)	<ol style="list-style-type: none"> 1. Explain anatomy, 2. Explain anatomical position and orientation 3. Define general concepts in anatomy 4. Explain directional terms 5. Explain regional terms 6. Describe body planes and sections 7. Explain anatomical axes and movements 8. Describe body cavities and membranes 9. Explain basic structural features of a bone 10. Recognize structural features of a bone 11. Classify the bones 12. Give suitable examples regarding bone types 13. Explain general terms related with skeletal system 14. Explain common conditions that affect the skeletal system
	Scapula, Clavicula, Humerus, Radius, Ulna and Skeleton of the Hand (T-2)	<ol style="list-style-type: none"> 1. Explain anatomical structures of each upper limb bone 2. Describe the relationship of upper limb bones with each other. 3. Differentiate the bones of the right and left sides 4. Break down parts of each upper limb bone 5. Explain the biomechanical functions of the upper limb bones
	Coxal Bone and Femur (T-2)	<ol style="list-style-type: none"> 1. Explain anatomical structures of coxae and femur 2. Describe the relationship of coxae and femur with each other and surrounding bones. 3. Differentiate the bones of the right and left sides 4. Break down parts of coxae and femur 5. Explain the biomechanical functions of the coxae and femur
	Tibia, Fibula, Patella, Skeleton of the Foot (T-2)	<ol style="list-style-type: none"> 1. Explain anatomical structures of each lower limb bone 2. Describe the relationship of lower limb bones with each other. 3. Differentiate the bones of the right and left sides 4. Break down parts of each lower limb bone 5. Explain the biomechanical functions of the lower limb bones
	Vertebral Column, Sacral Bone, Coccygeal Bone, Sternum, Ribs (costae) (T-2)	<ol style="list-style-type: none"> 1. Explain common anatomical structures of each vertebra 2. Explain differentiating anatomical structures of different regions of the vertebral column 3. Describe the curvatures of the vertebral column 4. Explain common anatomical structures of each rib 5. Explain differentiating anatomical structures of different types of ribs 6. Explain parts of sternum

		7. Explain the biomechanical functions of each vertebra, rib and sternum
SKILLS		
Lab: Scapula, Clavicle, Humerus, Radius, Ulna and Skeleton of the Hand (P-2)		1. Demonstrate anatomical structures of each upper limb bone on sample bones and models 2. Break down parts of each upper limb bone
Lab: Coxal Bone, Femur, Tibia, Fibula, Patella, Skeleton of the Foot (P-2)		1. Demonstrate anatomical structures of each lower limb bone on sample bones and models 2. Break down parts of each lower limb bone
Lab: Vertebral Column, Sacral Bone, Coccygeal Bone, Sternum, Ribs (costae) (P-2)		1. Demonstrate anatomical structures of each vertebra, sacrum, coccygis, rib and sternum on sample bones and models

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-1)	1. Describe the scopes of biophysics 2. Discuss the leading scientists in the field of biophysics in 20 th 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-2)	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)	<ol style="list-style-type: none"> 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.
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At the end of this lesson, the student will be able to:

KNOWLEDGE

DEP.	TOPIC	LEARNING OUTCOMES
BIOCHEMISTRY	Introduction to Biochemistry (T-1)	<ol style="list-style-type: none"> 1. Describe the scientific areas of biochemistry 2. Describe the general structure of amino acids, proteins, lipids and carbohydrates
	Introduction to biomolecules (T-1)	<ol style="list-style-type: none"> 1. Describe the structure of atom 2. Define the important elements found in living organisms 3. Define concepts of electronegativity and partial charges 4. Define the types of bonds observed in organic molecules 5. Distinguish between covalent and non-covalent interactions 6. Describes the significance of carbon-carbon binding in biomolecules 7. Describes chemical functional groups that are biologically important 8. Recognize common functional groups of carbon containing compounds 9. Explain isomeric structures, stereoisomers, geometric, optical isomerism, and enantiomers 10. Classify the four major complex biomolecules found in living cells
	Biochemical properties of water (T-1)	<ol style="list-style-type: none"> 1. Describe the structural properties of water 2. Explain the superior properties of water over other liquids 3. Describe the physical and chemical properties of water 4. Explain the solvent properties of water and its importance for living organisms 5. Describe the interaction of water molecules with other hydrophilic and hydrophobic molecules 6. Discuss the importance of hydrogen bonds between water molecules
	Ionization of water and pH (T-1)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 1. List and name the 20 amino acids that commonly occur in proteins and recognize their three-letter and one-letter abbreviations 2. Describe the stereoisomerism and optical properties of amino acids and differentiate between L- and D-amino acid 3. Classify the 20 common amino acids of proteins according to their functional side chains and describe their structural formulas and important chemical properties.

	<ol style="list-style-type: none"> 4. Tell rare and newly discovered amino acids found in protein structure and describe how they are inserted in protein structure during translation process 5. Describe post-translational modifications of amino acids and importance of this in protein structure 6. Describe the formation physical and chemical properties of a peptide bond and discuss the following terms: peptide backbone, N-terminus, C-terminus 7. Explain the hydrolysis of a peptide bond 8. Describe how amino acids undergo to different type of reactions with their carboxyl and amino groups and tell the importance of this in characterization of amino acids and in biological systems
Acidic and Basic Properties of Amino Acids (T-1)	<ol style="list-style-type: none"> 1. Describe the acid-base properties of amino acids and formation of zwitterions 2. Describe the ionization state and pka of amino acids and their ionic forms with or without any ionizable groups on the side chain 3. Describe how titration curves can be obtained for amino acids and explain how the charge on amino acids changes at any given pH. 4. Describe the isoelectric point, how it is calculated and the use
Protein Structure and Functions (T-2)	<ol style="list-style-type: none"> 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-3)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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 , equipment & instruments (P-2)	<ol style="list-style-type: none"> 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
Preparation of Buffers and Determination of pH (P-2)	<ol style="list-style-type: none"> 1. Explain the use of pH strips and pH meter to measure the pH of solutions 2. Describe preparation of buffer solutions by both the direct and indirect methods. 3. Tell how a buffer resists changes in pH upon addition of acid or base solutions and distinguish between unbuffered and buffered solutions

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)	<ol style="list-style-type: none"> 1. Tell the etymology of histology term 2. Classify the histology 3. Tell the four main tissues 4. Explain the steps required in preparing tissues for light microscopy 5. Explain the study methods of Histology by their staining properties 	
	Introduction to Embryology (T-1)	<ol style="list-style-type: none"> 1. Tell the etymology of embryology term 2. Classify the embryonic and fetal periods 3. Explain the terms of general embryology 	
	Epithelium and Surface Differentiations (T-2)	<ol style="list-style-type: none"> 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 Lining and Glandular Epithelium (T-2)	<ol style="list-style-type: none"> 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 	
	Histology of Connective tissue (T-2)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 1. Define the origin of the cartilage tissue 2. Classify the cartilage tissue 3. Explain histological features and functions of the cartilage tissue 	
	Histological Structure of Bone Tissue (T-2)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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		
	Histology Lab: Use of Microscope and Epithelial Tissue (P-2)	<ol style="list-style-type: none"> 1. Categorize lining and glandular epithelium 2. Discriminate lining epithelium on slides taken from esophagus, small intestine, kidney, urinary bladder, trachea and skin 3. Discriminate glandular epithelium on slides taken from parotid, submandibular gland. 4. Define epithelial tissue features by light microscope 	
Histology Lab: Connective Tissue (P-2)	<ol style="list-style-type: none"> 1. Count the connective tissue types 2. Discriminates connective tissue taken from mesothelium, skin, tendon, umbilical cord, adipose tissue 3. Defines features of the connective tissue by light microscope 		

Histology Lab: Cartilage Tissue (P-2)	<ol style="list-style-type: none"> 1. Categorize the cartilage tissue 2. Discriminate cartilage tissue taken from trachea, pinna and annulus fibrosis 3. Define cartilage tissue features by light microscope
Histology Lab: Bone Tissue & Osteogenesis (P-2)	<ol style="list-style-type: none"> 1. Categorize 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 universal features of cells (T-1)	<ol style="list-style-type: none"> 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
	The Cell Structure & Function (Prokaryotic-Eukaryotic Cells) (T-2)	<ol style="list-style-type: none"> 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; Lipid bilayer, membrane proteins and other molecules (T-1)	<ol style="list-style-type: none"> 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 glycocalix 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)	<ol style="list-style-type: none"> 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)

	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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-1 (T-1)	<ol style="list-style-type: none"> 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-2 (T-1)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
PHYSIOLOGY	Introduction to physiology (T-1)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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:

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
RADIOLOGIC ANATOMY	Introduction to Radiology and Radiological Anatomy (T-1)	<ol style="list-style-type: none"> 1. Assess the function of radiology 2. Differentiate between diagnostic and interventional radiology 3. Associate radiology with radiotherapy and PET imaging 4. Understand the basic principles, image generation and equipment of radiography, fluoroscopy and contrast medium applications 5. Appreciate the basic principles of CT and US.
	Introduction to Radiology and Bone Imaging (T-1)	<ol style="list-style-type: none"> 1. Assess the advantages of slice images over radiographic images 2. Understand how radiological anatomy can support learning anatomy 3. Differentiate between the basic properties of the radiological modalities 4. Assess the radiological modalities for bone imaging 5. Show different parts of bone on radiography CT and MRI
	Bones of the Upper Extremity (T-1)	<ol style="list-style-type: none"> 1. Assess the radiographic images of the scapula and the clavicle, and show all the anatomical subparts of the bone on images 2. Interpret the radiographic images of the humerus and the elbow, and show all the anatomical subparts of the bone on images 3. Assess the radiographic images of the radius and the ulna and show all the anatomical subparts of the bone on images 4. Comprehend the radiographic images of the wrist and the hand and show all the anatomical detail of the bone on images

	Bones of the Lower Extremity (T-1)	<ol style="list-style-type: none"> 1. Discern the bones of the pelvic girdle with all the anatomical detail on radiographic images 2. Assess the bones of the hip with all the anatomical detail on radiographic images, 3. Demonstrate the femur and the knee joint with all the anatomical detail on radiographic images, 4. Discern the tibia and the fibula with all the anatomical detail on radiographic images, 5. Assess the ankle joint and the bones of the foot with all the anatomical detail on radiographic images,
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At the end of this lesson, the student will be able to:

SKILLS

DEP	TOPIC	LEARNING OUTCOMES
CLINICAL SKILLS	Clinical Skills Lab (CSL) Rules	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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.

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
MEDICAL ETHICS AND HISTORY OF MEDICINE I	Why should we teach and learn the history of medicine? (T-2)	<ol style="list-style-type: none"> 1. Comprehend the importance of learning the history of medicine. 2. Comprehend the significance of ancient Chinese, Indian, Egyptian, Greek and Roman medicine.
	Important Scientists of History of Medicine (T-2)	<ol style="list-style-type: none"> 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.
	Medicine in prehistorical time (T-2)	<ol style="list-style-type: none"> 1. Comprehend some medical applications and important events in the prehistoric times 2. Explain certain prominent features of these applications. 3. Explain prominent events of this time

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
PHILOSOPHY	Introduction to the class (T-2)	<ol style="list-style-type: none"> 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
	Introduction to philosophy of science I - Induction (T-2)	<ol style="list-style-type: none"> 1. Comprehend Aristotelian method of deduction 2. Comprehend Francis Bacon's inductive method 3. Distinguish between induction and deduction 4. Define validity and soundness
	Introduction to philosophy of science II - Problems with induction (T-2)	<ol style="list-style-type: none"> 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

MED 1003: CELL, TISSUE AND ORGAN SYSTEMS				
Course Date	October 24- November 25, 2022			
Exam Dates	Practical Exams: November 24, 2022 Theoretical Exam: November 25, 2022; Hour: 10:00-12:00			
Course Coordinator:	TİMUÇİN AVŞAR			
Academic Unit	Academic Staff	Theoretical hours	Practical hours	Total
Anatomy	Çağatay Barut, Prof Eren Öğüt, Assist. Prof.	21	14	35
Biophysic	Serdar Durdağı, Prof. Berna Doğan, Assist. Prof. Enes Kotil, Assist. Prof.	9	1	10
Biochemistry	Yeşim Neğiş, Assoc. Prof. Özlem Unay Demirel, Assist. Prof. Erdem Yılmaz, Assist. Prof.	14	2	16
Histology and Embryology	Yasemin Ersoy Canıllıoğlu, Assist. Prof. Dila Şener, Assist. Prof.	10	-	10
Medical Biology	Seyda İğnak Tarlığ, Assist. Prof.	6	-	6
Medical Microbiology	Orhan Cem Aktepe, Prof. Gülden Çelik, Prof. Sibel Ergüven, Prof	5	-	5
Physiology	Sema Tülay Köz, Assoc. Prof. Yasemin Keskin Ergen, Assist. Prof. Mehmet Ozansoy, Assist. Prof.	6	3	9
Radiologic Anatomy	Canan Erzen, Prof.	10	-	10
Clinical Skills	Demet Koç, Assist. Prof.	1	1	2
Communication Skills in Medicine (Group 1)	Figen Dağlı, Prof.	-	8	8
TOTAL		82	29	111
Medical Ethics and History of Medicine	Kadircan Keskinbora, Prof.	10	-	10
Philosophy		10	-	10
Communication Skills and Academic Reporting		20	-	20
STUDY TIME				50

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	Frontal bone, occipital bone, parietal bone, temporal bone (T-2)	<ol style="list-style-type: none"> 1. Explain basic concepts of the cranial structures, 2. Recognize the general overview of the cranium 3. Explain anatomical structures of the frontal bone 4. Explain anatomical structures of the occipital bone 5. Explain anatomical structures of the parietal bone 6. Explain anatomical structures of the temporal bone 7. Describe the relationship of cranial bones with each other 8. Break down parts of each cranial bone 9. Differentiate the bones of the right and left sides 10. Define the openings related with cranium bones
	Maxilla, Mandible, Zygomatic Bone, Lacrimal Bone, Nasal Bone (T-2)	<ol style="list-style-type: none"> 1. Explain anatomical structures of the maxilla 2. Explain anatomical structures of the mandibula 3. Explain anatomical structures of the zygomatic bone 4. Explain anatomical structures of the lacrimal bone 5. Explain anatomical structures of the nasal bone 6. Describe the relationship of cranial bones with each other 7. Break down parts of each cranial bone 8. Differentiate the bones of the right and left sides 9. Define the openings related with cranium bones
	Sphenoid Bone, Palatine Bone, Vomer Bone, Ethmoid Bone, Hyoid Bone (T-2)	<ol style="list-style-type: none"> 1. Explain anatomical structures of the sphenoid 2. Explain anatomical structures of the palatine bone 3. Explain anatomical structures of the vomer 4. Explain anatomical structures of the ethmoid bone 5. Explain anatomical structures of the hyoid bone 6. Describe the relationship of cranial bones with each other 7. Break down parts of each cranial bone 8. Differentiate the bones of the right and left sides 9. Define the openings related with cranium bones
	Cranium as a whole, Overview of Skull (T2)	<ol style="list-style-type: none"> 1. Explain frontal aspect of the cranium and related structures 2. Explain lateral aspect of the cranium and related structures 3. Explain occipital aspect of the cranium and related structures 4. Explain superior aspect of the cranium and related structures 5. Explain external and internal surfaces of the cranial base and related structures
	Introduction to joints (types, structures, basic movements) (T-2)	<ol style="list-style-type: none"> 1. Differentiate different types of joints according to connective tissue type 2. Differentiate different types of joints according to mobility 3. Explain morphologic features of different joint types 4. Explain the relationships of structures of different joint types

	<ol style="list-style-type: none"> 5. Explain basic movements performed for each different type of joint 6. Differentiate synovial joints according to number of axes of movement 7. Differentiate synovial joints according to the number of bones involved 8. Differentiate synovial joints according to shape of articulating surfaces
Shoulder joint, elbow (cubital) joint (T-1)	<ol style="list-style-type: none"> 1. Explain the type of shoulder joint according to connective tissue type, mobility and shape of articulating surfaces 2. Differentiate morphologic features of shoulder joint 3. Explain the relationships of structures of shoulder joint 4. Explain movements of the shoulder joint 5. Explain the type of elbow joint according to connective tissue type, mobility and shape of articulating surfaces 6. Differentiate morphologic features of elbow joint 7. Explain the relationships of structures of elbow joint 8. Explain movements of the elbow joint
Radioulnar Articulation (Distal+Proximal), Wrist joints, finger joints (T-2)	<ol style="list-style-type: none"> 1. Explain the types of radioulnar joints according to connective tissue type, mobility and shape of articulating surfaces 2. Differentiate morphologic features of radioulnar joints 3. Explain the relationships of structures of radioulnar joints 4. Explain movements of the radioulnar joints 5. Explain the types of wrist and finger joints according to connective tissue type, mobility and shape of articulating surfaces 6. Differentiate morphologic features of wrist and finger joints 7. Explain the relationships of structures of wrist and finger joints 8. Explain movements of the wrist and finger joints
Hip joint, knee joint, pelvis: structure, articulations, and diameter (T-2)	<ol style="list-style-type: none"> 1. Explain the type of hip joint according to connective tissue type, mobility and shape of articulating surfaces 2. Differentiate morphologic features of hip joint 3. Explain the relationships of structures of hip joint 4. Explain movements of the hip joint 5. To explain the type of knee joint according to connective tissue type, mobility and shape of articulating surfaces 6. Differentiate morphologic features of knee joint 7. Explain the relationships of structures of knee joint 8. Explain movements of the knee joint 9. Explain the structure of the pelvis 10. Differentiate the types of joints of pelvis 11. Differentiate the diameters of te pelvis 12. Discuss the differences between the males and females regarding pelvis
Talocrural articulation, joints of the foot (T-2)	<ol style="list-style-type: none"> 1. Explain the type of talocrural joint according to connective tissue type, mobility and shape of articulating surfaces 2. Differentiate morphologic features of talocrural joint 3. Explain the relationships of structures of talocrural joint 4. Explain movements of the talocrural joint 5. Explain the types of joints of the foot according to connective tissue type, mobility and shape of articulating surfaces 6. Differentiate morphologic features of joints of the foot 7. Explain the relationships of structures of joints of the foot 8. Explain movements of the joints of the foot
Temporomandibular joint, Atlanto-occipital joint, median atlantoaxial joint, lateral atlantoaxial joint, the intervertebral joint, vertebral column (T-2)	<ol style="list-style-type: none"> 1. Explain the type of temporomandibular joint according to connective tissue type, mobility and shape of articulating surfaces 2. Differentiate morphologic features of temporomandibular joint 3. Explain the relationships of structures of temporomandibular joint 4. Explain movements of the temporomandibular joint 5. Explain the types of atlanto-occipital joint, median atlantoaxial joint, lateral atlantoaxial joint, the intervertebral joint according to connective tissue type, mobility and shape of articulating surfaces 6. Differentiate morphologic features of atlanto-occipital joint, median atlantoaxial joint, lateral atlantoaxial joint, the intervertebral joint

		<ol style="list-style-type: none"> 7. Explain the relationships of structures of atlanto-occipital joint, median atlantoaxial joint, lateral atlantoaxial joint, the intervertebral joint 8. Explain movements of atlanto-occipital joint, median atlantoaxial joint, lateral atlantoaxial joint, the intervertebral joint 9. Discuss the vertebral column as a whole 10. Explain movements of vertebral column as a whole
	Costovertebral joint, sternocostal joint, sternoclavicular joint, acromioclavicular joint, thorax (T-2)	<ol style="list-style-type: none"> 1. Explain the type of costovertebral joint, sternocostal joint, sternoclavicular joint, acromioclavicular joint according to connective tissue type, mobility and shape of articulating surfaces 2. Differentiate morphologic features of costovertebral joint, sternocostal joint, sternoclavicular joint, acromioclavicular joint 3. Explain the relationships of structures of costovertebral joint, sternocostal joint, sternoclavicular joint, acromioclavicular joint 4. Explain movements of the costovertebral joint, sternocostal joint, sternoclavicular joint, acromioclavicular joint 5. Discuss the thorax as a whole 6. Evaluate the thorax depending on the bony reference structures 7. Explain movements of thorax as a whole
SKILLS		
	Lab: Frontal bone, occipital bone, parietal bone, temporal bone (P-2)	<ol style="list-style-type: none"> 1. Demonstrate anatomical structures of each cranial bone on sample bones and models 2. Break down parts of each cranial bone
	Lab: Maxilla, Mandible, Zygomatic Bone, Lacrimal Bone, Nasal Bone (P-2)	<ol style="list-style-type: none"> 1. Demonstrate anatomical structures of each cranial bone on sample bones and models 2. Break down parts of each cranial bone
	Lab: Sphenoid Bone, Palatine Bone, Vomer Bone, Ethmoid Bone, Hyoid Bone (P-2)	<ol style="list-style-type: none"> 1. Demonstrate anatomical structures of each cranial bone on sample bones and models 2. Break down parts of each cranial bone
	Lab: Cranium as a whole (P-2)	<ol style="list-style-type: none"> 1. Demonstrate anatomical structures of cranium as a whole, establish relationships of structures on the whole cranium
	Lab: Shoulder joint, elbow (cubital) joint, Radioulnar Articulation (Distal+Proximal), Wrist joints, finger joints (P-2)	<ol style="list-style-type: none"> 1. Demonstrate anatomical structures of shoulder joint on cadavers and models 2. Demonstrate anatomical structures of elbow joint on cadavers and models 3. Demonstrate anatomical structures and ligaments of radioulnar joints on cadavers and models 4. Demonstrate anatomical structures of wrist and finger joints on cadavers and models
	Lab: Hip joint, knee joint, pelvis: structure, articulations, and diameter, Talocrural articulation, joints of the foot (P-2)	<ol style="list-style-type: none"> 1. Demonstrate anatomical structures of hip joint on cadavers and models 2. Demonstrate anatomical structures of knee joint on cadavers and models 3. Demonstrate anatomical structures of talocrural joint on cadavers and models 4. Demonstrate anatomical structures of joints of the foot on cadavers and models
	Lab: Temporomandibular joint, Atlanto-occipital joint, median atlantoaxial joint, lateral atlantoaxial joint, the intervertebral joint, vertebral column, Costovertebral joint, sternocostal joint, sternoclavicular joint, acromioclavicular joint, thorax (P-2)	<ol style="list-style-type: none"> 1. Demonstrate anatomical structures of temporomandibular joint on cadavers and models 2. Demonstrate anatomical structures of atlanto-occipital joint, median atlantoaxial joint, lateral atlantoaxial joint, the intervertebral joint on cadavers and models 3. Demonstrate anatomical structures of costovertebral joint, sternocostal joint, sternoclavicular joint, acromioclavicular joint on cadavers and models

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

KNOWLEDGE

DEP.	TOPIC	LEARNING OUTCOMES
BIOCHEMISTRY	Structure of Nucleotids (T-2)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 1. List lipid types 2. Describe the basic structure of simple lipids 3. Describe the basic structure of a fatty acid 4. Describe the structure of saturated, unsaturated, monounsaturated and polyunsaturated fatty acids and compare the differences between them 5. Describe cis and trans fatty acids and explain the influence of these forms on biological structures 6. Define the physical properties of fatty acids 7. Explain delta and omega nomenclature of fatty acids 8. Describe the structure of omega-3 and 6 fatty acids 9. Give examples of common fatty acids found in human body 10. Explain the chemical reactions of lipid biomolecules 11. Describe the structure of triglyceride, phospholipid, glycolipid, sphingolipid and cholesterol 12. Classify phospholipids, glycolipids, sphingolipids based on their head groups
	Lipids of Physiological Significance (T-2)	<ol style="list-style-type: none"> 1. Explain major biological functions of lipids 2. Explain the impact of saturated and unsaturated fatty acids on biological membranes 3. List essential fatty acids for human body 4. Describe the function and roles of the omega 3 and 6 fatty acids 5. Discuss how trans fatty acids influence human health 6. Explain the importance of lipids as storage molecules 7. Explain the importance of lipids as structural component of biomembranes 8. Tell the the distribution of lipids in biological membranes 9. Explain the role and function of triglycerides, phospholipids, sphingolipids and cholesterol in the body
	Biochemical properties of the enzymes (T-2)	<ol style="list-style-type: none"> 1. Define enzyme structure 2. Explain general properties of enzymes 3. Explain differences between enzymes and chemical catalytic substances 4. Interpret reaction coordinate diagrams for catalyzed vs uncatalyzed reactions 5. Explain how enzymes are named 6. Describe the 6 major enzyme classifications and the basic type of reaction catalyzed by giving examples 7. Define cofactors and tells their roles on enzyme function 8. Express important coenzymes, their function and the groups they transfer 9. Define the following enzyme-related terms:, prosthetic group, apoenzyme, holoenzyme

	Minerals and trace elements (T-2)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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
	SKILLS	
	LAB- Spectrophotometry (LAB-2)	<ol style="list-style-type: none"> 1. Explain the principles of absorbtion spectrophotometry 2. Describe the structure of a spectrophotometer 3. Define absorbance and transmittance and explain the relationship between them 4. Explain how absorbance and transmittance can be used to characterize compounds and determine their concentrations 5. Explain the principles and basic applications of Lambert- Beer's Law. 6. Explain how maximum absorbance of a compound is determined. 7. Explain how standart solutions are prepared for spectrophotometric measurements 8. Explain the use of blank solutions in spectrophotometric measurements 9. Explain the use of standart curves in spectrophotometric measurements 10. Explain how to calculate the concentration of an unknown solution

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-2)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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-1)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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.

BAHÇESEHIR ÜNİVERSİTESİ TIP FAKÜLTESİ

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
HISTOLOGY AND EMBRYOLOGY	Oogenesis (T-2)	<ol style="list-style-type: none"> 1. Describe the major histological features of the female genital system. 2. Tell the stages and timing of oocyte maturation 3. Explain stages of folliculogenesis 4. Identify the general stages of meiosis to the specific processes of oogenesis 5. Describe the importance of hormone regulation in oogenesis.
	Spermatogenesis (T-1)	<ol style="list-style-type: none"> 1. Describe the major histological features of the male genital system. 2. Describe the spermatogenesis in the following process 3. Identify the general stages of meiosis to the specific processes of spermatogenesis 4. Explain how sperm are produced and the changes in the sperm as they mature. 5. Explain the stages of the spermiogenesis 6. Differentiate between spermatogenesis & spermiogenesis. 7. Describe the importance of hormone regulation in spermatogenesis. 8. Describe the criteria of the semen analyses

	Fertilization (T-1)	<ol style="list-style-type: none"> 1. Discuss the changes of the female reproductive system before ovulation and fertilization. 2. Define the necessary steps which lead to spermatozoa being ready 3. Describe how the enabling of the spermatozoa takes place 4. Explain what capacitation is and why it is important for the formation of a zygote. 5. Identify fertilization and its site. 6. List the phases of fertilization. 7. Describe how the spermatozoon penetrates into the oocyte 8. List the results of fertilization.
	Implantation (T-1)	<ol style="list-style-type: none"> 1. Describe the development of the embryo from the first cells to the blastocyst 2. Describe the histological structures of the endometrium 3. Explain the phases of endometrial changes during the menstruation cycle 4. Explain the various stages of implantation 5. Identify implantation and its site. 6. List the sites of ectopic pregnancy.
	Bilaminar and Trilaminar Disc Formation (T-2)	<ol style="list-style-type: none"> 1. Tell the stages and newly formed structures of bilaminar disc 2. Explain stages of trilaminar disc formation 3. Classify tissue/organs originated from trilaminar disc
	Neurulation (T-1)	<ol style="list-style-type: none"> 1. Explain neuroectoderm development from ectoderm 2. Tell the timing of neural tube formation 3. Classify cells/organs originated from neural crest cells
	Extraembryonic structures (T-2)	<ol style="list-style-type: none"> 1. Name the fetal membranes and cavities together with their components and functions 2. List what constitute a fetal membrane 3. Describe the formation of these extraembryonic structures 4. Define their functions and explain the fate of these structures. 5. Distinguish between the maternal and fetal parts of the placenta 6. Describe the features of twin pregnancies

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
MEDICAL BIOLOGY	Membrane transport and cell signaling (T-1)	<ol style="list-style-type: none"> 1. Explain the concept of signal transduction 2. Explain the signalling 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
	Cell cycle-Division (T-1)	<ol style="list-style-type: none"> 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

		7. Count the importance of the control mechanism of cell division and the basic structures involved in this control
Cell Death (T-1)		<ol style="list-style-type: none"> 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
DNA structure and organization (T-1)		<ol style="list-style-type: none"> 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
DNA, Chromosomes and Genomes (T-2)		<ol style="list-style-type: none"> 1. Define chromosome, chromatine and chromatid structures and their elements. 2. Define heterochromatin and euchromatine 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.

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
MEDICAL MICROBIOLOGY	Introduction to Microbiology : General Concepts (T-1)	<ol style="list-style-type: none"> 1. Define science of microbiology 2. Classify cell types 3. Define basic concepts in microbiology 4. Define basic terminology 5. Classify microorganisms 6. List their important properties 7. List landmark contributions in microbiology history
	Introduction to Bacteriology (T-1)	<ol style="list-style-type: none"> 1. Define cell types and prokaryotic structure 2. List important structural parts 3. Define their functions 4. Define their classification
	Introduction to Virology (T-1)	<ol style="list-style-type: none"> 1. Define virus structure 2. List important structural parts 3. Define their functions 4. Define their classification
	Introduction to Mycology (T-1)	<ol style="list-style-type: none"> 1. Define cell structure 2. List important structural parts 3. Define their functions 4. Define their classification
	Introduction to Parasitology (T-1)	<ol style="list-style-type: none"> 1. Define cell structure 2. List important structural parts 3. Define their functions 4. Define their classification

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
PHYSIOLOGY	Cell Physiology (T-1)	<ol style="list-style-type: none"> 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-1)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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-1)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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-1)	<ol style="list-style-type: none"> 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 (LAB-1)	<ol style="list-style-type: none"> 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 (LAB-1)	<ol style="list-style-type: none"> 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 (LAB-1)	<ol style="list-style-type: none"> 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 3. Describe the term of threshold for an excitable cell 4. Discuss the underlying mechanisms that create the absolute and the relative refractory periods based on the experimental results that they collect during lab 5. Explain how the threshold is changing during relative refractory period based on the experiments that they conducted in a simulation platform 6. Discuss the relationship between the intensity and the duration of stimulation and the generation of action potentials by a neuron

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
RADIOLOGIC ANATOMY	Images of the Skull and The Spine (T-2)	<ol style="list-style-type: none"> 1. Appreciate the anatomical details of the frontal, temporal, occipital, parietal bones on 2 projections of radiographies 2. Describe the bone detail of the base of the cranium and the sphenoid, on radiography and CT images 3. Interpret the facial and orbital bones and the paranasal sinuses on radiography and CT 4. Understand the images of 2 different radiographic projections, Town and Waters projections 5. Appreciate the cervical, thoracic, lumbar, sacral and coccygeal vertebrae on imaging 6. Evaluate the curves and anatomical detail of each group of vertebrae 7. Discern the intervertebral disc, trabeculae pattern and apophyseal joints on CT and MRI 8. Interpret the specific properties of the cervical, thoracic and lumbar vertebrae on imaging
	Upper extremity joints, Arthrography (T-2)	<ol style="list-style-type: none"> 1. Appreciate the structure and types of joints 2. Comprehend the imaging modalities for joints and Arthrography 3. Discern MR images of joints and use of surface coils 4. Appreciate the temporomandibular joint with its disc and muscles on imaging 5. Study the X-ray and MR Arthrography of the shoulder joint

		<ol style="list-style-type: none"> Interpret the shoulder muscles, tendons and ligaments (Rotator Cuff) on MRI Comprehend the muscles, ligaments and tendons of the wrist on MRI Discern the muscles, ligaments and tendons of the wrist on MRI Demonstrate the Carpal Tunnel on MRI
	Lower Extremity Joints, Arthrography (T-2)	<ol style="list-style-type: none"> Appreciate the hip joint with its intracapsular and extracapsular elements on radiography, CT, MRI and arthrography Appreciate the knee joint with its tendons, ligaments menisci on MRI, CT, Arthrography Discern the ankle joint with its tendons, ligaments on MRI, CT, Arthrography Discern the foot joints with its tendons, ligaments on MRI, CT, Arthrography and measure the angle of flat foot

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

SKILLS		
DEP	TOPIC	LEARNING OUTCOMES
CLINICAL SKILLS	Sterile Gloving (T-1) (P-1)	<ol style="list-style-type: none"> Demonstrate how to don and remove sterile gloves Get skills about working as a part of a team.

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 (P-2)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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

		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
MEDICAL ETHICS AND HISTORY OF MEDICINE I	Medicine in Civilizations of Antiquity: Mesopotamia and Egypt (T-2)	<ol style="list-style-type: none"> 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
	Medicine in Civilizations of Antiquity: India, and China (T-2)	<ol style="list-style-type: none"> 1. Define the prominent features of Chinese and Indian 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.
	Medicine in Civilizations of Antiquity: Antique Greek and Rome (T-2)	<ol style="list-style-type: none"> 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.
	Medicine of Ancient Turks (T-2)	<ol style="list-style-type: none"> 1. Define the prominent features of Ancient Turks (Middle Asia) 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
	Medicine in Europa in Medieval Era (T-2)	<ol style="list-style-type: none"> 1. Define the prominent features of Medieval Era's Medicine in Europe. 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.

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

KNOWLEDGE

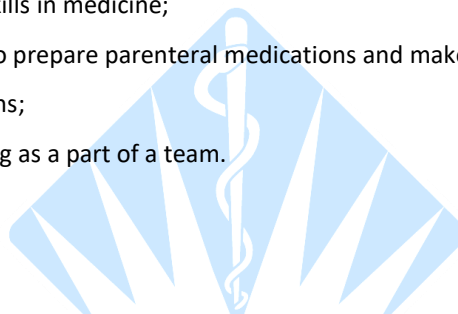
	TOPIC	LEARNING OUTCOMES
PHILOSOPHY	Introduction to philosophy of science III - Appearance and reality (T-2)	<ol style="list-style-type: none"> 1. Distinguish between philosophical understandings of appearance and reality. 2. Distinguish between primary and secondary qualities. 3. Explain the mechanical view of the world. 4. Comprehend direct realism, idea-ism, idealism, and causal realism.
	Introduction to philosophy of science IV - Scientific realism (T-2)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 1. Comprehend the Cartesian dualism. 2. Explain Cartesian methodological doubt.
	Mind and body II - Mental states (T-2)	<ol style="list-style-type: none"> 1. Distinguish between behaviorism, brain-state theory, and functionalism. 2. Explains the problems of these theories. 3. Comprehend the idea of a mental state.
	Mind and body III - Mind and computers (T-2)	<ol style="list-style-type: none"> 1. Distinguish between the computational theory of mind and other theories. 2. Explain the Chinese-room thought experiment.

MED 1005: MUSCULOSKELETAL SYSTEM				
Course Date	November 28- December 30, 2022			
Exam Dates	Practical Exams: December 29, 2022 Theoretical Exam: December 30, 2022, Hour: 10:00-12:00			
Course Coordinator:	EREN ÖĞÜT			
Academic Unit	Academic Staff	Theoretical hours	Practical hours	Total
Anatomy	Çağatay Barut, Prof Eren Öğüt, Assist. Prof.	32	10	42
Biophysics	Serdar Durdağı, Prof. Bircan Dinç, Assist. Prof. Berna Doğan, Assist. Prof.	6	1	7
Biochemistry	Yeşim Neğiş, Assoc. Prof. Özlem Unay Demirel, Assist. Prof. Erdem Yılmaz, Assist. Prof.	13	-	13
Histology and Embryology	Yasemin Canıllıoğlu, Assist. Prof. Dila Şener, Assist. Prof.	4	2	6
Medical Biology	Seyda İğnak Tarlığ, Assist. Prof.	4	-	4
Medical Microbiology	Orhan Cem Aktepe, Prof. Güliden Çelik, Prof..	4	-	4
Physiology	Sema Tulay Köz, Assoc. Prof. Yasemin Keskin Ergen, Assist. Prof. Mehmet Ozansoy, Assist. Prof.	12	1	13
Radiologic Anatomy	Canan Erzen, Prof.	6	-	6
Clinical Skills	Senem Polat, Assist. Prof.	2	2	4
Communication Skills in Medicine	Figen Dağlı, Prof.	Other groups		
TOTAL		83	16	99
Medical Ethics and History of Medicine I	Kadircan Keskinbora, Prof.	10	-	10
Philosophy		8	-	8
Communication Skills and Academic Reporting		12	-	12
STUDY TIME				50

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 definitions- about muscles and tendons (T-2)	<ol style="list-style-type: none"> 1. Explain basic characteristics of the anatomy of the muscular system 2. Recognize the general features of muscle tissue 3. Discuss the functional concepts of muscle tissue 4. Explain the nomenclature of the muscles 5. List and give examples of each of the major criteria for naming skeletal muscles 6. Describe the basic functions and innervations of muscles in the body 7. Recognize origin and insertion concept of the muscles 8. Describe the structure of a skeletal muscle at the organ level 9. Discuss the relationship among prime mover, synergist, and antagonist muscles, using specific examples
	General Definitions about Spinal Cord-Structures, Formation and Course of Spinal nerves, Cervical Plexus (T-2)	<ol style="list-style-type: none"> 1. Describe the overall organization of the nervous system 2. Identify the types of cells found in the nervous system and describe their general functions and characteristics 3. Describe the structure of a typical neuron and describe the general functions of each component 4. Explain the structural and functional classifications of neurons 5. Compare the autonomic nervous system (ANS) and the somatic motor division of the PNS in terms of effector organs and the organization of efferent pathways. 6. Compare the sympathetic and parasympathetic divisions of the ANS in terms of structure and general function. 7. Describe the general function of a sensory receptor. 8. Describe the location and structure of the spinal cord, including the arrangement of white and gray matter within the cord 9. Describe the meninges of the spinal cord 10. Explain the overall organization and general functions of the peripheral nervous system 11. Explain the origin and formation of a spinal nerve and its branches (rami) 12. Identify the spinal nerves and the segments of the spinal cord with which they are associated

	<ol style="list-style-type: none"> 13. Explain the plexus concept and formation 14. Describe the formation of the cervical plexus 15. Identify the branches of the cervical plexus 16. Describe the relationship of the cervical plexus with surrounding structures
<p>Superficial Muscles of the Back: Spinohumeral muscles, spinocostal muscles, Brachial plexus (T-3)</p>	<ol style="list-style-type: none"> 1. Differentiate the layers of the back and the muscles that are found in those layers 2. Explain the fascial structures and trigones related with the back in detail 3. Distinguish superficial muscles of the back: spinohumeral muscles and spinocostal muscles 4. Discuss innervation and function of these muscles 5. Explain formation, relationships and branches of the brachial plexus
<p>Muscles of the Shoulder, Fossa axillaris; associated nerves and vessels; Muscles of the pectoral region (T-2)</p>	<ol style="list-style-type: none"> 1. Explain the fasciae of the shoulder and axilla 2. Explain cutaneous innervation of shoulder 3. Define the muscles of the shoulder 4. Discuss the relationships of the structures of the shoulder in detail 5. Explain the walls of the axilla and the structures that are found in axilla 6. Explain the relation of the structures in the axilla with each other 7. Define axillary lymph nodes in detail 8. Define the muscles of the pectoral region 9. Explain cutaneous innervation of the pectoral region 10. Define the muscles of the pectoral region 11. Distinguish the vessels and nerves of the pectoral region 12. Discuss the relationships of the structures of the pectoral region in detail 13. Describe the spaces between the muscles of the pectoral and differentiate the structures within these spaces
<p>Posterior compartment of the arm (T-1)</p>	<ol style="list-style-type: none"> 1. Explain the fasciae of the posterior compartment of the arm 2. Explain cutaneous innervation of the posterior compartment of the arm 3. Define the muscles of the posterior compartment of the arm 4. Distinguish the vessels and nerves of the posterior compartment of the arm 5. Discuss the relationships of the structures of the posterior compartment of the arm in detail 6. Describe the spaces between the muscles of the posterior compartment of the arm and differentiate the structures within these spaces
<p>Posterior compartment of the forearm: superficial and deep muscles, dorsal structures of the hand; Associated nerves and vessels (T-1)</p>	<ol style="list-style-type: none"> 1. Explain the fasciae of the posterior compartment of the forearm and the dorsum of the hand 2. Explain cutaneous innervation of the posterior compartment of the forearm and the dorsum of the hand 3. Define the muscles of the posterior compartment of the forearm and the dorsum of the hand 4. Distinguish the vessels and nerves of the posterior compartment of the forearm and the dorsum of the hand 5. Discuss the relationships of the structures of the posterior compartment of the forearm and the dorsum of the hand in detail 6. Describe the spaces between the muscles of the posterior compartment of the forearm and the dorsum of the hand and differentiate the structures within these spaces
<p>Deep muscles of the back, lateral and medial group (T-2)</p>	<ol style="list-style-type: none"> 1. Distinguish deep muscles of the back, lateral and medial group 2. Discuss innervation and function of these muscles
<p>Superficial muscles of the neck (Art. atlantoaxialis mediana and lateralis) (T-1)</p>	<ol style="list-style-type: none"> 1. Distinguish superficial muscles of the neck 2. Discuss innervation and function of these muscles
<p>Deep muscles of the neck (Art. atlantooccipitalis) (T-1)</p>	<ol style="list-style-type: none"> 1. Distinguish deep muscles of the neck 2. Discuss innervation and function of these muscles

Lumbosacral plexus (T-1)	<ol style="list-style-type: none"> 1. Explain formation lumbosacral plexus in detail 2. Define branches of lumbosacral plexus 3. Distinguish the branches of lumbosacral plexus 4. Explain course and distribution of each branch of lumbosacral plexus
Gluteal region muscles and canalis obturatorius (T-2)	<ol style="list-style-type: none"> 1. Explain the fasciae of the gluteal region 2. Explain cutaneous innervation of the gluteal region 3. Define the muscles of the gluteal region 4. Distinguish the vessels and nerves of the gluteal region 5. Discuss the relationships of the structures of the gluteal region in detail 6. Describe the spaces between the muscles of the gluteal region and differentiate the structures within these spaces
Muscles of the Thigh: Posterior Compartment, Associated nerves and vessels (T-2)	<ol style="list-style-type: none"> 1. Explain the fasciae of the posterior compartment of the thigh 2. Explain cutaneous innervation of the posterior compartment of the thigh 3. Define the muscles of the posterior compartment of the thigh 4. Distinguish the vessels and nerves of the posterior compartment of the thigh 5. Discuss the relationships of the structures of posterior compartment of the thigh in detail 6. Describe the spaces between the muscles of the posterior compartment of the thigh and differentiate the structures within these spaces
Muscles of the Leg: Posterior Compartment, Associated nerves and vessels, plantar muscles of the foot (T-2)	<ol style="list-style-type: none"> 1. Explain the fasciae of the posterior compartment of the leg and plantar aspect of foot 2. Explain cutaneous innervation of the posterior compartment of the leg and plantar aspect of foot 3. Define the muscles of the posterior compartment of the leg and plantar aspect of foot 4. Distinguish the vessels and nerves of the posterior compartment of the leg and plantar aspect of foot 5. Discuss the relationships of the structures of posterior compartment of leg and plantar aspect of foot in detail 6. Describe the spaces between the muscles of the posterior compartment of leg and plantar aspect of foot and differentiate the structures within these spaces
Anterior compartment of the arm Associated nerves and vessels (T-2)	<ol style="list-style-type: none"> 1. Explain the fasciae of the anterior compartment of the arm 2. Explain cutaneous innervation of the anterior compartment of the arm 3. Define the muscles of the anterior compartment of the arm 4. Distinguish the vessels and nerves of the anterior compartment of the arm 5. Discuss the relationships of the structures of the anterior compartment of the arm in detail 6. Describe the spaces between the muscles of the anterior compartment of the arm and differentiate the structures within these spaces
Anterior compartment of the forearm: superficial and deep muscles Associated nerves and vessels, palmar aspect of the hand (T-2)	<ol style="list-style-type: none"> 1. Explain the fasciae of the anterior compartment of the forearm and palmar aspect of the hand 2. Explain cutaneous innervation of the anterior compartment of the forearm and palmar aspect of the hand 3. Define the muscles of the anterior compartment of the forearm and palmar aspect of the hand 4. Distinguish the vessels and nerves of the anterior compartment of the forearm and palmar aspect of the hand 5. Discuss the relationships of the structures of the anterior compartment of the forearm and palmar aspect of the hand in detail 6. Describe the spaces between the muscles of the anterior compartment of the forearm and palmar aspect of the hand and differentiate the structures within these spaces
Muscles of the Thigh: anterior and medial compartment muscles; adductor canal, femoral triangle	<ol style="list-style-type: none"> 1. Explain the fasciae of the anterior and medial compartments of the thigh

(T-2)	<ol style="list-style-type: none"> 2. Explain cutaneous innervation of the anterior and medial compartments of the thigh 3. Define the muscles of the anterior and medial compartments of the thigh 4. Distinguish the vessels and nerves of the anterior and medial compartments of the thigh 5. Discuss the relationships of the structures of anterior and medial compartments of the thigh in detail 6. Describe the spaces between the muscles of the anterior and medial compartments of the thigh and differentiate the structures within these spaces
Muscles of the Leg: anterior and lateral compartment muscles, dorsal muscles of the foot (T-2)	<ol style="list-style-type: none"> 1. Explain the fasciae of the anterior and lateral compartments of the leg and dorsum of foot 2. Explain cutaneous innervation of the anterior and lateral compartments of the leg and dorsum of foot 3. Define the muscles of the anterior and lateral compartments of the leg and dorsum of foot 4. Distinguish the vessels and nerves of the anterior and lateral compartments of the leg and dorsum of foot 5. Discuss the relationships of the structures of anterior and lateral compartments of the leg and dorsum of foot in detail 6. Describe the spaces between the muscles of the anterior and lateral compartments of the leg and dorsum of foot and differentiate the structures within these spaces
SKILLS	
Introduction to Dissection and Laboratory Safety Guidelines (T-2)	<ol style="list-style-type: none"> 1. Perform basic dissection skills 2. Dissect the cadaver using basic surgical instruments 3. Differentiate different surgical instruments 4. Identify the structures observed during dissection 5. Discuss the laboratory safety guidelines of anatomy lab
Lab: Superficial Muscles of the Back: Spinohumeral muscles, spinocostal muscles, Deep muscles of the back, lateral and medial group; Superficial muscles of the neck (Art. atlantoaxialis mediana and lateralis); Deep muscles of the neck (Art. atlantooccipitalis) (P-2)	<ol style="list-style-type: none"> 1. Demonstrate spinohumeral and spinocostal muscles and related anatomical structures of these muscles including vessels, nerves and fasciae on cadavers and models 2. Demonstrate deep muscles of the back and related anatomical structures of these muscles including vessels, nerves and fasciae on cadavers and models 3. Demonstrate superficial muscles of the neck and related anatomical structures of these muscles including vessels, nerves and fasciae on cadavers and models 4. Demonstrate deep muscles of the neck and related anatomical structures of these muscles including vessels, nerves and fasciae on cadavers and models
Lab: Muscles of the Shoulder, Fossa axillaris; associated nerves and vessels; Muscles of the pectoral region, Brachial plexus (P-2)	<ol style="list-style-type: none"> 1. Demonstrate anatomical structures of shoulder on cadavers and models 2. Demonstrate anatomical structures of axilla on cadavers and models 3. Demonstrate anatomical structures of the pectoral region on cadavers and models 4. Demonstrate the brachial plexus parts and branches and the relationships of these structures on cadavers and models
Lab: Posterior compartment of the arm; Posterior compartment of the forearm, Anterior compartment of the arm; Associated nerves and vessels; Anterior compartment of the forearm: superficial and deep muscles Associated nerves and vessels, palmar aspect of the hand, superficial and deep muscles, dorsal structures of the hand (P-2)	<ol style="list-style-type: none"> 1. Demonstrate anatomical structures of the posterior compartment of the arm on cadavers and models 2. Demonstrate anatomical structures of the posterior compartment of the forearm and the dorsum of the hand on cadavers and models 3. Demonstrate anatomical structures of the anterior compartment of the arm on cadavers and models 4. Demonstrate anatomical structures of the anterior compartment of the forearm, palmar aspect of the hand and the dorsum of the hand on cadavers and models
Lab: Gluteal region muscles and canalis obturatorius; Muscles of the Thigh: Posterior Compartment, Associated nerves and vessels;	<ol style="list-style-type: none"> 1. Demonstrate anatomical structures of the gluteal region on cadavers and models 2. Demonstrate anatomical structures of the posterior compartment of the thigh on cadavers and models

Muscles of the Thigh: anterior and medial compartment muscles; adductor canal, femoral triangle; Lumbosacral plexus (P-2)	<ol style="list-style-type: none"> 3. Demonstrate anatomical structures of the anterior and medial compartments of the thigh on cadavers and models 4. Demonstrate the lumbosacral plexus formation , parts and branches and the relationships of these structures on cadavers and models
Lab: Muscles of the Leg: Posterior Compartment, Associated nerves and vessels, plantar muscles of the foot; Muscles of the Leg: anterior and lateral compartment muscles, dorsal muscles of the foot (P-2)	<ol style="list-style-type: none"> 1. Demonstrate anatomical structures of the posterior compartment of leg and plantar aspect of foot on cadavers and models 2. Demonstrate anatomical structures of the anterior and lateral compartments of the leg and dorsum of foot on cadavers and models

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

DEP.	TOPIC	LEARNING OUTCOMES	
BIOPHYSICS	Actin-Myosin Interactions (T-1)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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 	
	SKILLS		
	Measuring Action Potential (P-1)	<ol style="list-style-type: none"> 1. Measure propagation of electrical signal through th nerve cell 2. Observe and test a neuron with electric currents 3. Determine different current intensity effects on action potentials 4. Plot the current current and action potential relation 	

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

DEP.	TOPIC	LEARNING OUTCOMES
BIOCHEMISTRY	Mechanisms of Enzyme Catalysis (T-1)	<ol style="list-style-type: none"> 1. Explain the characteristics of enzyme's active site 2. Explain enzyme specificity and the types of specificities 3. Define activation energy and explain how an enzyme functions as a catalyst in lowering the activation energy of reactions 4. Propose a thermodynamic explanation of why enzymes cannot alter the equilibrium of reactions 5. Define the term transition state and explain the role of transition state in lowering activation energy 6. Describe how enzymes increase reaction rates 7. Explain the mechanisms of enzyme catalysis 8. Explain the key-lock and induced fit model of enzyme catalysis 9. Describe the factors affecting enzyme activity
	Enzyme Kinetics (T-1)	<ol style="list-style-type: none"> 1. Explain the importance of enzyme kinetics 2. Define initial velocity (v_0) and explain the effect of substrate concentration on enzyme velocity 3. Explain how enzymes affect reaction rates 4. Define Michaelis-Menten kinetics and explain the important conclusions about Michaelis – Menten Kinetics. 5. Explain the steady state assumption 6. Describe the significance of an enzyme's K_m value in metabolic systems. 7. Explain how a Lineweaver-Burke plot is derived and explain the advantages of using these type of double reciprocal plots 8. Define enzyme turnover number (K_{cat}) and explain how it is calculated
	Inhibition of Enzyme Activity (T-1)	<ol style="list-style-type: none"> 1. Explain what an enzyme inhibitor is 2. Explain the types of enzyme inhibition 3. Describe how enzyme inhibitors interact with enzymes 4. Explain how a Lineweaver-Burke plot is used to evaluate types of inhibition 5. Explain how the inhibitors affects an enzyme's measured kinetic parameters (K_m and V_{max} values) 6. Explain suicide inhibition (mechanism-based inhibition)
	Mechanism of Hormone action (T-2)	<ol style="list-style-type: none"> 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
	Introduction to Extracellular matrix biochemistry (T-1)	<ol style="list-style-type: none"> 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
	Biochemistry of collagen, fibrillin and elastin (T-1)	<ol style="list-style-type: none"> 1. Define collagen, fibrillin and elastin 2. Tell the functional role of collagen, fibrillin and elastin 3. Explain the biosynthesis of collagen and elastin in the cell
	Biochemistry of fibronectin, laminin and integrins (T-1)	<ol style="list-style-type: none"> 1. Define fibronectin, laminin and integrins 2. Tell the functional role of fibronectin, laminin and integrins 3. Explain the structure of fibronectin, laminin and integrins

	Biochemistry and Regulation of Muscle Contraction (T-3)	<ol style="list-style-type: none"> 1. Define molecular structure of muscle 2. Explain the sliding filament theory 3. Classify the muscle proteins 4. Explain the each step of muscle contraction by means of ATP use 5. Define the source of energy needed for muscle contraction 6. Define the actin-myosin interactions in striated, smooth and skeletal muscle 7. Tell the properties of nitric oxide 8. Explain the differences between striated, smooth and cardiac muscle 9. Explain the regulation of muscle contraction by calcium ions
	Lipoproteins (T-2)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 1. Tell the general features of muscle tissue 2. Classify the muscle tissue 3. Explain the differences between muscle tissue types 	
	Formation of somites (T-1)	<ol style="list-style-type: none"> 1. Identify paraxial, intermediate and lateral mesoderm and recognize somites. 2. Define how sclerotome, myotome, and dermatome form and the structures and tissues derived from each. 3. Define the congenital malformations in the development of the skeleton. 	
	Embryonic folding, body walls, and body cavity (T-1)	<ol style="list-style-type: none"> 1. Define the formation of the gut tube in the context of lateral folding and define the craniocaudal folding, including the formation of foregut midgut and hindgut. 2. Describe the formation of the intraembryonic coelom and identify its splanchnic/visceral and somatic/parietal portions. 3. Define how folding changes the position of the heart tubes and septum transversum and describe the formation of body cavities (pericardium, pleural cavities and peritoneum) 4. Describe the fate of the extraembryonic coelom. 5. Define how the diaphragm is formed. 	
	SKILLS		
	Lab: Muscle (LAB-2)	<ol style="list-style-type: none"> 1. Count the muscle tissue types 2. Identify the three types of muscle by light microscope including distinctive features of each 3. Define features of the muscle tissue by light microscope 4. Identify the muscle organization with their connective tissue layers. 	

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
MEDICAL BIOLOGY	DNA Replication (T-1)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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-1)	<ol style="list-style-type: none"> 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.) 6. Explain post-transcriptional modification of RNA and its importance
	Translation (T-1)	<ol style="list-style-type: none"> 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	Laboratory equipments and Safety rules (T-1)	<ol style="list-style-type: none"> 1. Define Microbiology laboratory 2. List types of laboratory equipments 3. Classify consumables in the laboratory 4. Describe safety rules and GLP 5. Explain the inform consent for the Laboratory
	Microscopy and culture techniques (T-1)	<ol style="list-style-type: none"> 1. Define Microscope 2. List types of microscopes 3. Classify staining methods 4. Classify bacteria according to their staining properties 5. Define how to culture bacteria 6. List types of media and steps in identification
	Host - Parasite Relationship (T-1)	<ol style="list-style-type: none"> 1. Define the terms microbiota, colonization, infection and disease 2. Describe the ways microbes cause tissue damage 3. Define portals of entry and exit of infectious agents 4. Define bacterial virulence factors 5. Define modes of infectious disease transmission
	Sterilization & disinfection (T-1)	<ol style="list-style-type: none"> 1. Define the terms sterilization, disinfection, decontamination, sanitization, antisepsis 2. Describe the microorganisms that are most resistant and least resistant to control measures 3. Define four categories of cellular targets for physical and chemical agents Define the four biosafety levels

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
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PHYSIOLOGY	Overview of nervous system (T-2)	<ol style="list-style-type: none"> 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-2)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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.
	Exercise, muscle hypertrophy and atrophy (T-1)	<ol style="list-style-type: none"> 1. Describe the characteristic of slow and fast-twitch muscle fibers hypertrophy mechanisms under different physical activities. 2. Explain the muscle atrophy, and hyperplasia mechanisms. 3. Know about regeneration of muscle tissue under different stimulation. 4. List the conditions which causes to sarcopenia and cachexia.
	Smooth muscle (T-2)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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:

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
RADIOLOGIC ANATOMY	Images of the Upper Extremity Muscles (T-2)	<ol style="list-style-type: none"> 1. Demonstrate the muscles of the shoulder on MRI 2. Discern the muscles of the upper arm 3. Assess the muscles of the forearm on MRI 4. Show the muscles extending over the elbow joint
	Images of muscles of the pelvis, hip, thigh, and leg (T-2)	<ol style="list-style-type: none"> 1. Demonstrate pelvic, and hip muscles on MRI 2. Assess the muscles of the thigh (quadriceps, adductor and hamstring muscles) 3. Depict the muscles of the ventral, dorsal and lateral leg groups and show the insertion of their tendons on the foot
	Images of the Hand and Foot Muscles (T-2)	<ol style="list-style-type: none"> 1. Appreciate the muscles and tendons of the hand 2. Assess the Carpal Tunnel on MRI 3. Show the muscles and tendons of the foot on MRI 4. Assess and measure the flat foot on radiography

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)	<ol style="list-style-type: none"> 1. Describe the types of the parenteral drug administration routes 2. List the equipment necessary for the parenteral drug administration 3. Define the needs for safe and effective administration 4. Prepare medications from ampules 5. Prepare medications from vials
	Injections II: Intradermal, subcutaneous and intramuscular injections (T-1, P-1)	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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”

		<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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
MEDICAL ETHICS AND HISTORY OF MEDICINE I	Medicine in Islamic Civilization Part 1 (T-2)	<ol style="list-style-type: none"> 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.
	European Medicine in the Renaissance time (14.-19. centuries) (T-2)	<ol style="list-style-type: none"> 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-2)	<ol style="list-style-type: none"> 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.
	Ottoman Civilization and Medicine (T-2)	<ol style="list-style-type: none"> 1. Explain the Prominent Physicians (esp. Writers of books) 2. Explain the Prominent Asylum Daruşşifas (Hospitals, esp. having Medical Schools or Training functions) 3. Define Variola (Smallpox - Çiçek) Disease inoculation and vaccine – Turkish method Variola immunization 4. Define the contribution of Lady Montagu... Edward Jenner, and explain the survey of the Jenner Vaccination Vaccine from inoculation to vaccination. 5. 1839 Mekteb-i Tıbbiye-i Şahane (Establishing Military School of Medicine) 6. Acquiesce «New Medicine» (Cellular Pathology and medicine of the day).
	Medicine in Turkey in Republic Time (T-2)	<ol style="list-style-type: none"> 1. Define the prominent features of Medicine in Turkey in Republic Time 2. Define the medical tools and organization against the endemic diseases. 3. Define the tools used for the diagnosis and prognosis of problems. 4. Outline the legacy of the level of this era in Turkey.

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
PHILOSOPHY	Consciousness I - The concept of consciousness (T-2)	<ol style="list-style-type: none"> 1. Comprehend what consciousness is. 2. Distinguish between consciousness and phenomenal consciousness. 3. Explain Thomas Nagel's views on consciousness.
	Consciousness II - The concept of qualia	<ol style="list-style-type: none"> 1. Comprehend the details of the concept of qualia 2. Explain various arguments in favor of the existence of qualia

(T-2)	
Consciousness III - Mind and neurobiological states (T-2)	<ol style="list-style-type: none">1. Comprehend the idea that explains the mind solely in terms of neurobiological states.2. Explain Patricia Churchland's objections to this view.
Personal Identity (T-2)	<ol style="list-style-type: none">1. Comprehend Derek Parfit's objections to the idea of personal identity.2. Explain the alternative view to the idea of personal identity.



BAU TIP

BAHÇEŞEHİR ÜNİVERSİTESİ TIP FAKÜLTESİ

"scientia et amore vitae"

MED 1007: CARDIOVASCULAR AND RESPIRATORY SYSTEM				
Course Date	2 January- 3 February 2023			
Exam Dates	Practical Exams: 2 February 2023 Theoretical Exam: 3 February 2023, Hour:10:00-12:00			
Course Coordinator:	ERDEM YILMAZ			
Academic Unit	Academic Staff	Theoretical hours	Practical hours	Total
Anatomy	Çağatay Barut, Prof Eren Öğüt, Assist. Prof.	34	12	46
Biophysic	Serdar Durdağı, Prof. Bircan Dinç, Assist. Prof.	11	1	12
Biochemistry	Yeşim Neğiş, Assoc. Prof. Özlem Unay Demirel, Assist. Prof. Erdem Yılmaz, Assist. Prof.	6	-	6
Histology and Embryology	Yasemin Ersoy Canıllıoğlu, Assist. Prof. Dila Şener, Assist. Prof.	9	6	15
Immunology	Orhan Cem Aktepe, Prof.	5	-	5
Medical Biology	Seyda İğnak Tarlığ, Assist. Prof.	2	-	2
Physiology	Sema Tülay Köz, Assoc. Prof. Yasemin Keskin Ergen, Assist. Prof. Mehmet Ozansoy, Assist. Prof.	37	3	40
Radiologic Anatomy	Canan Erzen, Prof.	10	-	10
Clinical Skills	Demet Koç, Assist. Prof.	2	2	4
Communication Skills in Medicine	Figen Dağlı, Prof.	Other groups		
TOTAL		116	24	140
STUDY TIME				40

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	Thorax, muscles and fascia (T2)	<ol style="list-style-type: none"> 1. Explain the borders of the thorax 2. Explain the fascia of the thorax 3. Explain cutaneous innervation of the thorax 4. Define the muscles of the thorax 5. Distinguish the vessels and nerves of the thorax 6. Discuss the relationships of the structures of thorax in detail 7. Describe the spaces between the muscles of the thorax and differentiate the structures within these spaces
	Pleura, Mediastinum and its contents, diaphragm (T-2)	<ol style="list-style-type: none"> 1. Explain the pleura and differentia its subdivisions 2. Define the projection of the pleura on thoracic wall 3. Define the mediastinum 4. Distinguish the subdivisions of the mediastinum 5. List the structures inside each subdivision of the mediastinum 6. Discuss the relationships of the structures of the mediastinum in detail 7. Describe the morphology of the diaphragm 8. Define the vessels and nerves of the diaphragm, pleura and mediastinum 9. Describe the openings on the diaphragm and list content of each opening 10. Distinguish the levels of the opening on the diaphragm according to vertebral column 11. Explain the lymphatics of the pleura, mediastinum and diaphragm
	Muscles of the anterior and lateral Neck, Suprahyoid and infrahyoid Muscles, Scalene Muscles (T-2)	<ol style="list-style-type: none"> 1. Explain the fasciae of the neck region 2. Explain cutaneous innervation of the neck region 3. Define the muscles of the anterior and lateral neck, suprahyoid and infrahyoid muscles, scalene muscles 4. Distinguish the vessels and nerves of the neck region 5. Discuss the relationships of the structures of the neck region in detail 6. Differentiate the trigones of the neck and discuss the structures in each trigone in detail 7. Discuss the relationship of structures in terms of their functions 8. Explain the lymphatics of the neck region
	Introduction to cardiovascular system, Outer surface of heart, Location and projections of heart (T-2)	<ol style="list-style-type: none"> 1. Differentiate the parts of the cardiovascular system 2. Explain the lymphatics of the heart 3. Explain the location and relationships of the heart in detail 4. Distinguish the structures on the outer surface of the heart in detail 5. Describe the projection of the heart on the thoracic wall
	Great vessels of the heart, Pericardium, Arch of aorta, sections of aorta and its branches (T-2)	<ol style="list-style-type: none"> 1. Describe the pericardium 2. Discuss the relationships of the pericardium 3. Define the great vessels of the heart 4. Explain the morphological aspects of the great vessels of the heart 5. Define the relationships of the great vessels of the heart in detail

	6. Explain the lymphatics of the pericardium
Inner surface of the Heart, cardiac skeleton, valves and locations of auscultation points (T-2)	<ol style="list-style-type: none"> 1. Distinguish the chambers of the heart 2. Discuss the internal structures of the heart in detail 3. Describe the location of the heart valves 4. Describe the cardiac skeleton 5. Demonstrate the locations of auscultation points on the thoracic wall.
Vessels of the heart (coronary circulation), nerves and cardiac conduction system (T-2)	<ol style="list-style-type: none"> 1. Distinguish the arteries of the heart including branches of each coronary artery. 2. Distinguish the veins of the heart including the branches of each main vein. 3. Define the conduction system of the heart. 4. Describe the relationships of the conduction system of the heart with the rest of the heart on models and cadavers. 5. Discuss the nerves of the heart in detail 6. Explain the functions of conduction system of heart 7. Define clinical relevance of vessels of the heart
Thoracic aorta, its topography and its branches (T-2)	<ol style="list-style-type: none"> 1. Describe the thoracic aorta and its topography according to the vertebral column 2. Distinguish the branches of the thoracic aorta 3. Explain the relationships of the branches of the thoracic aorta 4. Describe the functions and clinical relevance of the thoracic aorta and its branches
Vessels of the upper limb (T-2)	<ol style="list-style-type: none"> 1. Describe the arteries of the upper limb 2. Describe the branches of each artery of the upper limb 3. Describe the anastomosis between the arteries of the upper limb 4. Distinguish the course and relationships of artery of the upper limb 5. Distinguish the veins of the upper limb
Vessels of the lower limb (T-2)	<ol style="list-style-type: none"> 1. Describe the arteries of the lower limb 2. Describe the branches of each artery of the lower limb 3. Describe the anastomosis between the arteries of the lower limb 4. Distinguish the course and relationships of artery of the lower limb 5. Distinguish the veins of the lower limb
Lymphatic system (T-4)	<ol style="list-style-type: none"> 1. Describe anatomical components of lymphatic system 2. Describe localization and relationships of cisterna chyli and thoracic duct 3. Distinguish the primary lymphoid structures 4. Define the localization, relationships and connections of lymph nodes of the upper limb 5. Define the localization, relationships and connections of lymph nodes of the lower limb 6. Define the localization, relationships and connections of lymph nodes of the neck region 7. Define the localization, relationships and connections of lymph nodes of the thorax 8. Define the localization, relationships and connections of lymph nodes of the abdomen 9. Define the localization, relationships and connections of lymph nodes of the pelvis
Development of respiratory system, Introduction to respiratory system and components of respiratory system (T-2)	<ol style="list-style-type: none"> 1. Discuss the development of the respiratory system 2. Define the basic structures of the respiratory system 3. Distinguish the conducting and respiratory parts of the respiratory system 4. Explain the location and gross structure of the individual respiratory organs 5. Trace the path of air flow from the external nares to the alveoli 6. Explain the main functions of the respiratory system
Nasal cavity, paranasal sinuses, pharynx (T-2)	<ol style="list-style-type: none"> 1. Identify the anatomical subdivisions of the nose 2. Define the structures constituting each subdivision of the nose 3. Describe the vessels and nerves of the nose

	<ol style="list-style-type: none"> Define the relationships of the nose with surrounding structures Identify the paranasal sinuses Define the structures constituting each paranasal sinus Describe the vessels and nerves of each paranasal sinus Define the relationships of each paranasal sinus with surrounding structures Define the location of the pharynx and identify the subdivision of the pharynx Define the connections of each subdivision of the pharynx Define the basic relationships of the pharynx with surrounding structures Explain the lymphatics of the nose and paranasal sinuses Describe the functions and importance of the nasal cavity, paranasal sinuses and pharynx
Structure, Components and Functions of Larynx (T-4)	<ol style="list-style-type: none"> Explain the location and skeleton of the larynx Explain each cartilage of larynx in detail Define the fibroelastic membrane of the larynx Describe the internal aspect of the larynx and its subdivisions Explain the location of each muscle of the larynx Define the innervation and function of each laryngeal muscle Explain the sensory and motor innervation of the larynx Explain the lymphatics of the larynx Describe the functions and importance of the larynx
Trachea and Lungs (T-2)	<ol style="list-style-type: none"> Explain the location and anatomical features of trachea in detail Describe the neurovascular structures of the trachea in detail Discuss the relationships of trachea in detail Explain the bronchial tree in detail Explain the location and anatomical features of the lungs in detail Describe the neurovascular structures of the lungs in detail Explain the lymphatics of the trachea and lungs Discuss the relationships of lungs and related structures in detail Describe the main functions and clinical relevance of the trachea and lungs
SKILLS	
Lab: Pleura, Mediastinum and its contents, diaphragm, Trachea and Lungs, Thorax, muscles and fascia (P-2)	<ol style="list-style-type: none"> Demonstrate anatomical structures of the pleura, diaphragm and mediastinum on cadavers and models Demonstrate anatomical structures of the trachea and lungs on cadavers and models Demonstrate anatomical structures of the thorax on cadavers and models
Lab: Muscles of the anterior and lateral Neck, Suprahyoid and infrahyoid Muscles, Scalene Muscles (P-2)	<ol style="list-style-type: none"> Demonstrate anatomical structures of the neck region on cadavers and models
Lab: Great vessels of the heart, Pericardium, Arch of aorta, sections of aorta and its branches; Thoracic aorta, its topography and its branches (P-2)	<ol style="list-style-type: none"> Demonstrate the pericardium and related structures on cadavers and models Identify the great vessels of the heart and their relationships on cadavers and models Demonstrate the thoracic aorta, branches of the thoracic aorta and their relationships on cadavers and models
Lab: Introduction to cardiovascular system, Outer surface of heart, Location and projections of heart; Inner surface of the Heart, cardiac skeleton, valves and locations of auscultation points; Vessels of the heart (coronary circulation), nerves and cardiac conduction system (P-2)	<ol style="list-style-type: none"> Demonstrate the parts of the cardiovascular system on cadavers and models Demonstrate the location and relationships of the heart on cadavers and models Demonstrate the chambers of the heart and internal structures of the heart, heart valves and related structures on cadavers and models Demonstrate arteries and veins of the heart on cadavers and models

Lab: Vessels of the upper limb; Vessels of the lower limb (P-2)	<ol style="list-style-type: none"> 1. Demonstrate the arteries and veins of the upper limb on cadavers and models 2. Demonstrate the arteries and veins of the lower limb on cadavers and models
Lab: Nasal cavity, paranasal sinuses, pharynx; Structure, Components and Functions of Larynx (P-2)	<ol style="list-style-type: none"> 1. Demonstrate nose and paranasal sinuses including vessels, nerves on cadavers and models 2. Demonstrate paranasal sinuses, pharynx and its subdivisions on cadavers and models 3. Demonstrate anatomical structures of the larynx on cadavers and models 4. Demonstrate the components of respiratory system on cadavers and models

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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 1. Describe the factors affecting blood flow 2. Describe blood pressure 3. Describe resistance of blood vessels
	Respiratory system dynamics (T-1)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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. 7. Discuss the effects of compliance and resistance on alveolar volume.
External respiratory system, volume and pressure change (T-1)	<ol style="list-style-type: none"> 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.
Solubility of gases in blood and blood fluids (T-1)	<ol style="list-style-type: none"> 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- Surface Tension (LAB-1)	<ol style="list-style-type: none"> 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
BIOCHEMISTRY	Regulation of enzyme activity (T-2)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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
	Cardiac injury markers (T-2)	<ol style="list-style-type: none"> 1. Classify the biomarkers used to test cardiac function 2. Tell clinical states related with myocardial injury 3. Explain the biomarkers of myocardial injury 4. Explain the biomarkers used in case of hemodynamic stress 5. Explain the biomarkers used to test inflammation and prognosis 6. Explain the use of cardiac markers in clinical states of cardiac injury

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES	
HISTOLOGY AND EMBRYOLOGY	Histology of heart and blood vessels (T-2)	<ol style="list-style-type: none"> 1. Define the parts of the circulatory system as heart, blood vessels, and lymphatic vessels. 2. Describe the basic architecture of vascular structures with the tunica intima, tunica media and tunica adventitia in arteries and veins. 3. Describe the types of capillaries and sinusoids 4. Discriminate both arteries and veins which are classified primarily according to the cellular and the extracellular components of the adventitia and media and also according to size. 5. define the histological organization of lymphatic capillaries and larger lymphatic vessels, their relationship to lymph nodes, and how they differ from blood vessels. 6. Identify the histological features of the epicardium, myocardium and endocardium of the heart. 7. Define the path of the cardiac impulse from sinoatrial node to the ventricle, and recognize histologic features of the purkinje fiber in the ventricle 	
	Histology of blood and bone marrow (T-2)	<ol style="list-style-type: none"> 1. Tell the histological features of blood tissue 2. Explain bone marrow structures 	
	Hematopoiesis (T-1)	<ol style="list-style-type: none"> 1- Explain prenatal and postnatal hematopoiesis 2- Classify the stages of hematopoiesis including erythropoiesis, granulocytopenia, monocytopenia, platelet formation, lymphopoiesis and explain relevant clinical correlations. 	
	Histology of lenfoid organs (T-2)	<ol style="list-style-type: none"> 1. Distinguish histologic fetatures of the central and peripheral lymphoid organs. 2. Describe the general location, histological structures and functions of the lymphoid organs: tonsils, lymph nodes, spleen, thymus. 3. Describe the path taken by lymph as it flows through the lymph nodes. 4. Define blood flow through the spleen according to the open and closed theories of circulation. 	
	Histology of Respiratory system (T-2)	<ol style="list-style-type: none"> 1. Tells the histological features of respiratory system 2. Explains embryonic origin of respiratory system 3. Tells blood-gas barriers structures in lung tissue 	
	SKILLS		
	Histology Lab: Histology of Blood and Respiratory System (P-2)	<ol style="list-style-type: none"> 1. Define the features of the blood cells by light microscope. 2. Identify the histological organization of nose, larynx, trachea and lung ender the light microscope. 3. Explain the microscopic structures of nose, larynx, trachea and lung. 	
Histology Lab: Heart and blood vessels (P-2)	<ol style="list-style-type: none"> 1. Discriminate blood vessels as artery, vein and capillaries by light microscope. 2. Discriminate layers of the wall of vessels with their histologic features. 3. Define the layers of the wall of heart with their histologic features 		
Histology Lab: Lymphoid Organs (P-2)	<ol style="list-style-type: none"> 1. Count the central and peripheral lymphoid organs. 2. Discriminate lymphoid organs taken from thymus, lymph nodes, spleen, tonsils. 3. Define histologic features of the lymphoid organs by light microscope. 		

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	KNOWLEDGE	
	TOPIC	LEARNING OUTCOMES

	Introduction to immunology (T-1)	<ol style="list-style-type: none"> 1. List of the milestones in immunology 2. Describe the immune system compartments 3. Define the basic concepts of immunology 4. Explain the main mechanisms between immune cells 5. Classify the future prospect on immunology
	Tissue and Cells of The Immune System (T-2)	<ol style="list-style-type: none"> 1. List primary and secondary tissue in the immune system 2. Describe the structural details of immune tissue 3. Classify the cells belonging to the immune system and their differentiation with its markers 4. Explain the functional stages of the cells in tissues located specific area of each organ 5. Define the development mechanisms of T-cells and B-cells
	Innate immunity (T-2)	<ol style="list-style-type: none"> 1. List and define the types of innate immune system cells 2. Discriminate innate and adaptive immune compartments 3. Explain the types of primary immune defence mechanisms 4. Describe the complement system and activation pathways in different conditions 5. Explain the phagocytosis and intracellular mechanisms 6. Classify the other acute phase reactants and their role in immunological reactions

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
MEDICAL BIOLOGY	Molecular basis of immunology-I (T-1)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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 princibles 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-nonsel self 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	Introduction to blood physiology (T-1)	<ol style="list-style-type: none"> 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.

<p>Structure and functions of red blood cells (T-2)</p>	<ol style="list-style-type: none"> 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
<p>Hemoglobin, Iron metabolism and anemia (T-2)</p>	<ol style="list-style-type: none"> 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
<p>Structure and functions of white blood cells and immunity (T-2)</p>	<ol style="list-style-type: none"> 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 8. Define the roles of additional circulating and tissue cell types that contribute to immune response such as granulocytes, mast cells, and monocytes.
<p>Homeostasis and Coagulation (T-2)</p>	<ol style="list-style-type: none"> 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
<p>Heart muscle, signal transduction in the heart (T-2)</p>	<ol style="list-style-type: none"> 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

		<ol style="list-style-type: none"> 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
	<p>Heart cycle and heart sounds (T-2)</p>	<ol style="list-style-type: none"> 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
	<p>Electrocardiography (T-3)</p>	<ol style="list-style-type: none"> 1. Describe the way the electrocardiogram (ECG) is recorded 2. Describe the standards that are used for recording a 12-lead ECG 3. Compare the various waveforms that are generated when recording electrocardiograms with the standard limb leads, augmented limb leads, and precordial leads 4. State the relationship between electrical events of cardiac excitation and the generation of the various waveforms, intervals, and segments that can be observed on ECG 5. Calculate heart rate by using ECG data 6. Explain how the electrical axis of the heart can be calculated by using ECG data recorded from limb leads 7. Calculate mean electrical axis of QRS complex under different conditions
	<p>Regulation of blood flow (T-2)</p>	<ol style="list-style-type: none"> 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
	<p>Cardiac output, regulation of the cardiac functions (T-2)</p>	<ol style="list-style-type: none"> 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)

<p>Capillary fluid exchange and edema (T-2)</p>	<ol style="list-style-type: none"> 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 5. Define edema 6. Explain the four types of alteration in capillary exchange that result with edema by giving examples
<p>Short- and long-term regulation of blood pressure (T-2)</p>	<ol style="list-style-type: none"> 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
<p>Lymphatic system (T-2)</p>	<ol style="list-style-type: none"> 1. Describe the structural differences between the lymphatic system and the general circulatory system and make the structural description of the lymphatic system 2. Describe the importance of the lymphatic system in maintaining intravascular fluid volume for a healthy life 3. Define the functional relationship between the lymphatic system and general circulatory system 4. List the effective factors affecting the flow of lymphatic fluid 5. Describe the importance of the effect of lymphatic system on the integration of the body 6. Define the factors that allow the flow of lymphatic fluid in the lymphatic system. 7. List the factors that cause changes in the composition of lymphatic fluid. 8. Describe the importance of the lymphatic system in maintaining protein concentration, interstitial volume, and interstitial pressure. 9. Describe the effect of interstitial pressure on lymphatic flow 10. Define the vital role of the lymphatic system in the protection of homeostasis.
<p>Circulation Through Special Regions (T-3)</p>	<ol style="list-style-type: none"> 1. Describe the special features of the circulation in the brain. 2. Describe the blood-brain barrier. 3. Explain the role of cerebrospinal fluid and the surrounding cells on blood flow. 4. Explain the coronary circulation during each cardiac cycle. 5. Describe the effects of autonomic nervous system on cardiac blood flow. 6. Explain the effect of hypoxia on cardiac muscle 7. Explain the muscle blood flow at rest and during exercise. 8. Describe the regulation of cutaneous circulation 9. Describe the blood flow through lung's functional zones. 10. Describe the maternal cardiovascular changes. 11. Explain the role of placenta on fetal blood flow 12. Explain the difference between fetal hemoglobin and adult Hb in terms of oxygen affinity
<p>Respiratory mechanics; lung volume and capacities (T-2)</p>	<ol style="list-style-type: none"> 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.

		<ol style="list-style-type: none"> Define the basic measures of lung volume and give approximate values for each in a normal adult. Define compliance, and give examples of diseases in which it is abnormal. Describe the chemical composition and function of surfactant. List the factors that determine alveolar ventilation.
	Regulation of Respiration (T-2)	<ol style="list-style-type: none"> Describe the roles of respiratory centers located in the brain stem in determining the basic pattern of respiratory activity Explain the pacemaker activity of medullary inspiratory neurons List factors that could modify the basic breathing pattern Describe the respiratory consequences of alterations seen in PO₂, PCO₂ and pH Define the locations and roles of central and peripheral chemoreceptors Compare and contrast the respiratory/metabolic acidosis and alkalosis
	Gas Exchange and Gas Transport (T-2)	<ol style="list-style-type: none"> 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) Explain gases in a liquid diffuse from higher partial pressure to lower partial pressure (Henry's Law) Describe the components of the alveolar-capillary membrane Explain the various factors determining gas transfer: -Surface area, thickness, partial pressure difference, and diffusion coefficient of gas 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 Describe the relationship between PO₂ 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.
	Effects of exercise on cardiovascular and respiratory systems (T-2)	<ol style="list-style-type: none"> Explain the physiological stress involved in exercise for respiratory and cardiovascular system. Describe the effects of exercise on ventilation and O₂ diffusion capacity in the tissues. Describe the changes in respiratory and cardiovascular systems with the activity of sympathetic nervous system. List the effects of acute exercise, chronic exercise, and conditioning on cardiovascular variables.
SKILLS		
	Lab: Blood physiology "Determination of Blood Groups", "Blood Cell Counting with Haemocytometer", "Determination of Bleeding Time" "Test of Osmotic Fragility" (P-1)	<ol style="list-style-type: none"> Collect capillary blood sample from fingertip by using a lancet Define and measure hematocrit value from capillary tube Prepare blood smear preparation Recognize the types of blood cells in a blood smear preparation Calculate the leukocyte formula from a blood smear preparation Measure sedimentation rate Explain blood types and determine blood type by using antibodies 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)	<ol style="list-style-type: none"> 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

		<ol style="list-style-type: none"> Define inotropic and chronotropic effects on heart Discuss how calcium channel blockers might be used pharmaceutically
	<p>Lab- Studying the effects of blood vessel radius and blood pressure on blood flow rate in a simulation platform (P-1)</p>	<ol style="list-style-type: none"> 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:

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
RADIOLOGY	Images of the mediastinum (T-1)	<ol style="list-style-type: none"> Show competence in mediastinal borders, contents shown as on radiography, CT, MRI Depict the lymphatic System of the mediastinum shown on Radiography, CT, MRI Demonstrate the great vessels of the mediastinum Appreciate the hila shown on radiography
	Circulatory System Imaging (T-2)	<ol style="list-style-type: none"> Demonstrate the cervical, cerebral circulation Describe the arteries of the thorax, aorta Demonstrate the arteries of the abdomen Demonstrate the arteries of the extremities
	Cardiac Imaging (T-2)	<ol style="list-style-type: none"> Understand the anatomy, divisions and contents of the mediastinum, shown on CT, MRI Demonstrate the heart chambers and walls shown on radiography, CT, MRI Depict heart valves and vessels shown by MRI Assess heart arteries shown by angiography (DSA, CTA, MRA)
	Respiratory System Imaging I (Nasopharynx, oropharynx, larynx) (T-2)	<ol style="list-style-type: none"> Assess the borders, contents of nasopharynx demonstrated by CT images Demonstrate the walls and contents of oropharynx demonstrated by CT and MRI Describe the borders, spaces and muscles of the larynx shown on MRI, CT images Demonstrate the paranasal sinuses shown on radiography and CT
	Respiratory System Imaging II (Lungs) (T-3)	<ol style="list-style-type: none"> Describe the anatomy of the trachea and the bronchial system on radiography and CT Understand the anatomy and the function of the pleura and the diaphragm Demonstrate the segments of the lungs on CT Understand the alveoli and depict the vessels of the lungs Evaluate the radiography and CT of the normal thorax

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)	<ol style="list-style-type: none"> 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
	Vital Signs II: Arterial Blood Pressure, Respiratory Rate, Oxygen Saturation Measurement	<ol style="list-style-type: none"> Describe the blood pressure Describe the Korotkoff sounds Demonstrate the proper technique for taking blood pressure

(T-1), (P-1)	<ol style="list-style-type: none"> 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
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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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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

MED 1002: GASTROINTESTINAL SYSTEM AND METABOLISM				
Course Date	20 February – 24 March 2023			
Exam Dates	Practical Exams: 23 March 2023 Theoretical Exam: 24 March 2023, Hour: 10:00-12:00			
Course Coordinator:	SEYDA İĞNAK TARLIÇ			
Academic Unit	Academic Staff	Theoretical hours	Practical hours	Total
Anatomy	Çağatay Barut, Prof Eren Öğüt, Assist. Prof.	25	14	39
Biochemistry	Yeşim Neğiş, Assoc. Prof. Özlem Unay Demirel, Assist. Prof. Erdem Yılmaz, Assist. Prof.	26	-	26
Biophysics	Serdar Durdağ, Prof. Bircan Dinç, Assist. Prof.	2	-	2
Evidence Based Medicine and Statistics	Cüneyd Parlayan, Assist. Prof.	2	-	2
Histology and Embryology	Yasemin Ersoy Canilloğlu, Assist. Prof. Dila Şener, Assist. Prof.	9	9	18
Immunology	Orhan Cem Aktepe, Prof.	8	-	8
Physiology	Sema Tülay Köz, Assoc. Prof. Yasemin Keskin Ergen, Assist. Prof.	17	-	17
Radiology	Canan Erzen, Prof.	8	-	8
Clinical Skills	Demet Koç, Assist. Prof.	1	1	2
Communication Skills in Medicine	Figen Dağlı, Prof.	Other groups		
TOTAL		98	24	122
Medical Ethics and History of Medicine	Kadircan Keskinbora, Prof.	8	-	8
Philosophy		8	-	8
Communication Skills and Academic Reporting		20		20
STUDY TIME				40

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	Digestive System, Introduction to Digestive System, Components and Development of Oral Cavity (T-2)	<ol style="list-style-type: none"> 1. Explain the components of the digestive tract 2. Explain the basics of the development of the oral cavity 3. Define the walls and subdivisions of the oral cavity 4. Discuss the vessels and nerves of the oral cavity 5. List the structures of each subdivision of the oral cavity 6. Discuss the relationships of the structures of the oral cavity in detail 7. Describe the connections of the oral cavity 8. Explain the lymphatics of the oral cavity 9. Describe the main functions of digestive system and oral cavity
	Facial Muscles: The Mimic and Mastications Muscles, Parotid Region; temporal fossa; infratemporal fossa, pterygopalatine fossa (T-2)	<ol style="list-style-type: none"> 1. Explain the localization and functions of the muscles of the facial expression 2. Discuss the vessels and nerves of the face 3. Distinguish the relationships of the structures of face in detail 4. Explain the cutaneous innervation of the face 5. Define the localization and functions of the muscles of mastication 6. Discuss the nerves of the muscles of mastication 7. Differentiate the localization of the parotid region, temporal fossa, infratemporal fossa and pterygopalatine fossa 8. Explain the structures placed in these fossae in detail 9. Explain the relationships of these structures 10. Describe the clinical relevance of parotid region, temporal fossa, infratemporal fossa and pterygopalatine fossa
	Tongue, teeth, hard palate, soft palate and muscles (T-2)	<ol style="list-style-type: none"> 1. Describe the location and anatomy of the tongue 2. Explain and classify the muscles of the tongue 3. Distinguish the functions of each muscle 4. Describe the motor and sensory innervation and vessels of tongue in detail 5. Discuss the relationship of tongue with surrounding structures in detail 6. Explain the location of each teeth and classify them 7. Explain the anatomic features of a tooth 8. Explain the nerves and vessels of teeth. 9. Discuss the relationship of teeth with surrounding structures in detail 10. Describe the location and anatomy of hard and soft palate 11. Explain and classify the muscles of the soft palate 12. Distinguish the functions of each muscle 13. Define the sensory innervation of hard palate

	<ol style="list-style-type: none"> Describe the motor and sensory innervation and vessels of soft palate in detail Discuss the relationship of hard and soft palate with surrounding structures in detail Demonstrate tongue, teeth, hard palate, soft palate and muscles on cadavers and models
Sublingual gland, submandibular gland (T-2)	<ol style="list-style-type: none"> Describe the location and anatomy of the sublingual and submandibular glands Describe the innervation and vessels of sublingual and submandibular glands in detail Discuss the relationship of sublingual and submandibular glands with surrounding structures in detail Describe the main functions and clinical relevance of sublingual and submandibular glands
Pharynx, Oesophagus (T-2)	<ol style="list-style-type: none"> Distinguish the subdivisions of pharynx Describe the borders of each subdivision of pharynx Explain the muscles of pharynx in detail Describe the gaps between the muscles of pharynx and state the structures passing through these gaps Discuss the relationships of each subdivision of the pharynx in detail Explain the nerves, vessels and lymphatics of the pharynx Explain functions of pharynx Explain the location and subdivisions of the oesophagus Explain the constrictions of the oesophagus Describe the vertical alignment and lateral curvatures of the oesophagus Discuss the relationships of each subdivision of the oesophagus in detail Explain the nerves, vessels and lymphatics of the oesophagus Explain the functions of oesophagus
Liver and Gallbladder (biliary vesicle), lesser omentum, Omental Bursa, Omental Foramen (foramen epiploicum), v. porta hepatis and its tributaries (T-2)	<ol style="list-style-type: none"> Describe the location, anatomical aspects, subdivisions, relationships of liver and gallbladder Distinguish the vessels, nerves and lymphatics of liver and gallbladder Explain the location, borders, contents and relationships of omental bursa and omental foramen Define the formation, localization, course and relationships of the hepatic portal vein. Define the functions of liver, gall bladder, omental bursa, omental foramen Describe the functions and clinical significance of hepatic portal vein and portocaval anastomoses
Clinical and Topographic Regions of anterior Abdominal wall, Muscles of the anterior abdominal wall and Inguinal canal (T-2)	<ol style="list-style-type: none"> Distinguish the topographical divisions of the anterior abdominal wall. Discuss the distribution of the abdominal structures within each topographical region Explain the fasciae of the anterior abdominal wall Explain cutaneous innervation of the anterior abdominal wall Define the muscles of the anterior abdominal wall Distinguish the vessels and nerves of the anterior abdominal wall Define the location of the inguinal canal Explain anatomical differences of the inguinal canal in both genders Discuss the relationships of the structures of the anterior abdominal wall and inguinal canal in detail Describe the relationships of the structures related with inguinal canal
Peritoneum, greater omentum (Omentum majus), lesser omentum,	<ol style="list-style-type: none"> Describe the peritoneum, its layers, subdivision and peritoneal cavity and its subdivisions.

Omental Bursa, Omental Foramen (foramen epiploicum), Mesentery (T-2)	<ol style="list-style-type: none"> 2. Explain the relationship of abdominal structures according to state of being covered by peritoneum 3. Explain nerves, vessels and lymphatics of the peritoneum 4. Explain the location, borders, contents and relationships of lesser omentum, omental bursa and omental foramen 5. Describe location, attachment, relationships and contents of mesentery
Stomach; Associated nerves and vessels, duodenum (T-2)	<ol style="list-style-type: none"> 1. Describe the location, anatomical aspects, subdivisions, relationships of stomach 2. Distinguish the vessels, nerves and lymphatics of stomach 3. Describe the location, anatomical aspects, subdivisions, relationships of duodenum 4. Distinguish the vessels, nerves and lymphatics of duodenum 5. Define the main function of stomach and duodenum
Pancreas and spleen (T-2)	<ol style="list-style-type: none"> 1. Describe the location, anatomical aspects, subdivisions, relationships of pancreas 2. Distinguish the vessels, nerves and lymphatics of pancreas 3. Describe the location, anatomical aspects and relationships of spleen 4. Distinguish the vessels, nerves and lymphatics of spleen 5. Describe the functions of pancreas and spleen
Small Intestine, Mesentery, Large Intestine (T-2)	<ol style="list-style-type: none"> 1. Describe the location, anatomical aspects, subdivisions, relationships of small intestine 2. Distinguish the vessels, nerves and lymphatics of small intestine 3. Describe location, attachment, relationships and contents of mesentery 4. Describe the location, anatomical aspects, subdivisions, relationships of large intestine 5. distinguish the vessels, nerves and lymphatics of large intestine 6. Define the functions of small intestine, mesentery and large intestine
Muscles of posterior abdominal wall, inferior vena cava and its branches, portal vein, celiac plexus, lumbosacral plexus (T-2)	<ol style="list-style-type: none"> 1. Explain the muscles, fasciae, innervation and vascular supply of the posterior abdominal wall 2. Define the topography and relationships of the inferior vena cava and its tributaries 3. Define the topography and relationships of the celiac plexus and its branches 4. Define the topography and relationships of the portal vein and its tributaries 5. Define the celiac plexus
Abdominal aorta, its topography and its branches (T-1)	<ol style="list-style-type: none"> 1. Describe the abdominal aorta and its topography according to the vertebral column 2. Distinguish the branches of the abdominal aorta 3. Explain the relationships of the branches of the abdominal aorta 4. Demonstrate the abdominal aorta, branches of the abdominal aorta and their relationships on cadavers and models 5. Explain the functions and clinical relevance of the abdominal aorta and its branches
SKILLS	
Lab: Facial Muscles: The Mimic and Mastications Muscles, Parotid Region; infratemporal fossa, pterygopalatine fossa, cavitas oris, tongue, palate, salivary glands; Sublingual gland, submandibular gland (P-2)	<ol style="list-style-type: none"> 1. Demonstrate anatomical structures of facial muscles (mimic and mastication) on cadavers and models. 2. Demonstrate anatomical structures of parotid region, infra temporal fossa, pterygopalatine fossa on cadavers and models 3. Demonstrate anatomical structures of cavitas oris, tongue, teeth, hard and soft palate, salivary glands on cadavers and models 4. Demonstrate sublingual and submandibular glands and related structures on cadavers and models

Lab: Pharynx, Oesophagus; Muscles of the anterior abdominal wall and Inguinal canal (P-2)	<ol style="list-style-type: none"> 1. Demonstrate pharynx, oesophagus and related structures on cadavers and models 2. Demonstrate the topographical regions of the abdominal wall anatomical structures of the anterior abdominal wall and inguinal canal on cadavers and models
Lab: Liver and Gallbladder (biliary vesicle), v. porta hepatis and its tributaries (P-2)	<ol style="list-style-type: none"> 1. Demonstrate the liver and gallbladder, omental bursa and omental foramen and hepatic portal vein and their relationships, vessels and nerves on cadavers and models
Lab: Peritoneum, greater omentum (Omentum majus), lesser omentum, Omental Bursa, Omental Foramen (foramen epiploicum), Mesentery (P-2)	<ol style="list-style-type: none"> 1. Demonstrate peritoneum and related structures on cadavers and models
Lab: Stomach; Associated nerves and vessels, duodenum, pancreas, spleen (P-2)	<ol style="list-style-type: none"> 1. Demonstrate stomach and duodenum and their relationships, vessels and nerves on cadavers and models. 2. Demonstrate pancreas and spleen and their relationships, vessels and nerves on cadavers and models
Lab: Small Intestine, Large Intestine (P-2)	<ol style="list-style-type: none"> 1. Demonstrate small intestine, mesentery and large intestine and their relationships, vessels and nerves on cadavers and models
Lab: Muscles of posterior abdominal wall, inferior vena cava and its branches, portal vein, celiac plexus, lumbosacral plexus, Abdominal aorta, its topography and its branches (P-2)	<ol style="list-style-type: none"> 1. Demonstrate posterior abdominal wall, abdominal aorta, inferior vena cava, portal vein, celiac plexus and related structures on cadavers and models

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

KNOWLEDGE

DEP.	TOPIC	LEARNING OUTCOMES
BIOCHEMISTRY	Introduction to metabolism (T-1)	<ol style="list-style-type: none"> 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-3)	<ol style="list-style-type: none"> 1. Describe the overall purpose of glycolysis, its reactants and products, its cellular localization, and its tissue distribution 2. Compare and contrast aerobic and anaerobic glycolysis in terms of the tissues in which they occur, reactants and products, purposes, and the conditions in which they occur 3. Explain sequence of reactions and how the names of the enzymes in glycolysis relate to the chemical reactions they catalyze. 4. Describe the roles of hexokinase/glucokinase, phosphofructokinase-1 (PFK-1), and pyruvate kinase in glycolysis and predict the biochemical and potential clinical consequences in deficiencies of these enzymes 5. Tell the inhibitors of the glycolytic pathway 6. Explain the biosynthetic functions of glycolytic pathway 7. Explain the entry of dietary glycogen, starch, disaccharides, and hexoses to the glycolytic pathway. 8. Explain how glucose is transported across intestinal epithelial cells and 9. describe the role of glucose transporters (GLUTs) in the transport of glucose into and out of cells, and tissue specific differences in the expression and regulation of GLUTs 10. List the points of regulation in glycolysis and correlate activators and inhibitors of the reactions with the flow of metabolism.

	<ol style="list-style-type: none"> 11. Explain the control mechanisms of glycolytic pathway in muscle and liver 12. Compare and contrast the mechanisms for regulating glycolysis including allosteric mechanisms, hormonal regulation and covalent modification 13. Differentiate the roles of hexokinase and glucokinase in blood glucose regulation 14. Explain the effects of elevated plasma glucose concentration on pancreas, liver, muscle and adipose tissues
<p>Fates of Lactate, Pyruvate and NADH (T-1)</p>	<ol style="list-style-type: none"> 1. Explain the fates of pyruvate under aerobic and anaerobic (fermentation) conditions. 2. Tell the products of two of the more common fermentative pathways, and give an example of an organism that produces each and be able to explain why fermentation produces less ATP than aerobic respiration. 3. Describe the purpose of the reaction catalyzed by lactate dehydrogenase, its reactants and products, cellular and tissue localization, and how it is regulated 4. Explain the fate of lactate and metabolic cooperation between skeletal muscle and the liver 5. Explain the role and fate of the cytosolic NADH produced in glycolysis 6. Be familiar with the electron/energy shuttles used by the respiration and fermentation pathways.
<p>The Citric Acid Cycle and its Regulation (T-2)</p>	<ol style="list-style-type: none"> 1. Explain the general structure, required cofactors/vitamins, reaction mechanism and products of the pyruvate dehydrogenase (PDH) complex 2. Describe the overall purpose, reactants and products of the citric acid (Krebs) cycle, its cellular localization 3. Explain citric acid cycle reactions, enzymes, intermediates and products 4. Identify the energy carrier molecules produced in the citric acid cycle. 5. Explain the products and net result of one turn of the citric acid cycle. 6. Describe the roles of enzymes in the citric acid cycle and predict the biochemical and potential clinical consequences of deficiencies of the enzymes and their cofactors 7. Recognize the entry and exit points of the citric acid cycle intermediate metabolites and comprehend the biological significance of intermediates as sources of reactants for biosynthetic pathways 8. Describe the central role of the citric acid cycle in connecting glycolysis, gluconeogenesis, oxidative phosphorylation, fatty acid metabolism, and amino acid metabolism 9. Explain the hormonal and allosteric regulation of pyruvate dehydrogenase complex 10. Explain the regulatory steps and regulation mechanism of citric acid cycle
<p>Electron transport chain (T-2)</p>	<ol style="list-style-type: none"> 1. Describe the components of the electron transfer chain 2. Explain the organization of electron transport chain into large functional complexes in the inner mitochondrial membrane 3. Discuss the path of electron flow through them, and the proton movements that accompany this flow 4. List the regulation points and mechanisms of electron transport chain

		<ol style="list-style-type: none"> 5. Name the inhibitors of electron transport chain
	Oxidative Phosphorylation (T-1)	<ol style="list-style-type: none"> 1. Define oxidative phosphorylation 2. Describe the chemiosmotic theory of ATP synthesis 3. Explain how ATP synthesis is regulated 4. Describe the malate-aspartate shuttle and glycerol 3-phosphate shuttle systems 5. Explain the agents interfering the oxidative phosphorylation
	Gluconeogenesis and its regulation (T-3)	<ol style="list-style-type: none"> 1. Describe the overall purpose of gluconeogenesis and state the tissues in which gluconeogenesis occurs. 2. Explain the similarities and difference the between gluconeogenesis and glycolysis pathways and draw out the "bypass" reactions of gluconeogenesis that use enzymes other than those in glycolysis 3. Describe the enzymes, the cofactors and steps of the gluconeogenesis pathway and state their subcellular location 4. Tell the different sources of substrate for gluconeogenesis, their entry point to the pathway and discuss the pathways and physiological conditions when each is used 5. Explain why animals cannot produce glucose from fatty acids 6. Explain the net cost of gluconeogenesis 7. Explain the reciprocal regulation of gluconeogenesis and glycolysis. 8. Explain the hormonal and metabolic regulation gluconeogenic enzymes 9. Explain the contribution of gluconeogenesis to blood glucose regulation
	Glycogen Metabolism: Biosynthesis of glycogen & Regulation (T-2)	<ol style="list-style-type: none"> 1. Define the structure of glycogen and state state the overall purpose, advantages and disadvantages of storing glycogen 2. Describe the reactants and products, their cellular localization, and their tissue distribution of glycogenesis 3. Explain the dovo synthesis of glycogen synthesis, stating the enzymes, and cofactors 4. Describe the roles of glycogen synthase and branching enzyme in glycogenesis, and predict the biochemical and potential clinical consequences in deficiencies of these enzymes 5. Explain how glycogen synthesis is regulated by hormones and allosteric modulators 6. Compare and contrast the purpose, hormonal and allosteric regulation of glycogenesis in hepatocytes vs skeletal muscle
	Glycogen Metabolism: Breakdown of glycogen & Regulation (T-2)	<ol style="list-style-type: none"> 1. Explain the breakdown of glycogen stating the enzymes and cofactors 2. Describe the roles of glycogen phosphorylase, debranching enzyme, and glucose 6-phosphatase in glycogen breakdown, and predict the biochemical and potential clinical consequences in deficiencies in these enzymes 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 (T-2)	<ol style="list-style-type: none"> 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

	Regulation of fatty acid biosynthesis (T-1)	<ol style="list-style-type: none"> 1. Explain how fatty acid biosynthesis is regulated by hormones and allosteric modulators 2. Describe the hormonal and allosteric regulation of fatty acid biosynthesis 3. Describe the interregulation of fatty acid biosynthesis and glycolysis 4. Describe the role of Acetyl CoA carboxylase
	Biosynthesis of triacylglycerol (T-2)	<ol style="list-style-type: none"> 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
	Regulation of triacylglycerol biosynthesis (T-1)	<ol style="list-style-type: none"> 1. Explain the hormonal and metabolic regulation of triacylglycerol biosynthesis 2. Describe the triacylglycerol cycle in metabolism 3. Explain the association between gluconeogenesis and triacylglycerol biosynthesis 4. Explain the regulation of phosphatidic acid biosynthesis and breakdown
	Biosynthesis of eicosanoids (T-1)	<ol style="list-style-type: none"> 1. Determine the role of eicosanoids in metabolism 2. Describe the reactants and products, their cellular localization, and their tissue distribution of eicosanoid biosynthesis 3. Identify the two enzymes in prostaglandin and leukotriene biosynthesis 4. Determine the association between essential fatty acids and eicosanoid precursor arachidonic acid 5. Explain the functional role of eicosanoids in metabolism
	Biosynthesis of membrane phospholipids (T-2)	<ol style="list-style-type: none"> 1. Determine the role of membrane phospholipids in metabolism 2. Describe the reactants and products, their cellular localization, and their tissue distribution of membrane phospholipid biosynthesis 3. Identify the enzymes involved in phospholipid and sphingolipid biosynthesis 4. Determine the association between triacylglycerol and membrane phospholipid biosynthesis 5. Identify the precursor of membrane phospholipids 6. Describe the functional role of cardiolipin, phosphatidylinositol and phosphatidylcholine in the metabolism

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
BIOPHYSICS	Membrane biophysics (T-2)	<ol style="list-style-type: none"> 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.

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
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EVIDENCE BASED MEDICINE AND STATISTICS	Introduction to Evidence Based Medicine (EBM) (T-2)	<ol style="list-style-type: none"> 1. Define the term “Scientific Evidence”. 2. Describe the concept of EBM. 3. Explain the importance of EBM in medical practice. 4. Explain application of EBM to medical practice.
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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 upper GIS (T-2)	<ol style="list-style-type: none"> 1. Define the histological features of the layers of organs forming the upper digestive system such as oral cavity, pharynx, tongue, esophagus. 2. Describe the location and histological similarities and dissimilarities among the different types of oral mucosae and lip. 3. Identify the different papillae located on the tongue. 4. Recognize the histological features of the adult tooth and name the cells responsible for the production of enamel, dentin, and cementum. 5. Describe the developmental stages of the tooth. 6. Define the histological differences in the pharynx and the upper, middle and lower portions of the esophagus.
	Histology of Lower GIS (T-3)	<ol style="list-style-type: none"> 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 gi tract from stomach to anus and correlate structure with function. 3. Recognize gastric glands, intestinal gland and identify their constituent cells and define their secretory products with their functions. 4. Differentiate gastric glands, cardiac glands and pyloric glands. 5. Define the corelation between structural features and diseases about lower digestive tract.
	Histology of liver, bile ducts, gall bladder and pancreas (T-2)	<ol style="list-style-type: none"> 1. Describe the basic histological architecture and blood supply of the liver 2. Recognize the structure of portal triads, hepatic lobule and hepatic sinusoids and identify their components 3. Identify the cells of the liver tissue: hepatocytes, kupffer cells, endothelial cells and ito cells 4. Discuss the functions and ultrastructural features of hepatocytes and production of bile and the cellular structures involved 5. Discuss the different components and histological appearance of the gallbladder 6. Identify the histological features of the pancreas and related functions.
	Histology of Salivary glands (T-2)	<ol style="list-style-type: none"> 1. Classify the salivary glands 2. Describe the general histological features of the exocrine gland and and in relation to this, major and minor salivary glands 3. Identify parotid, submandibular and sublingual salivary glands on the basis of histological appearance and by the types of secretion produced by each gland. 4. Identify excretory ducts of the salivary gland and correlate the structural features of the constituent cells to the functions of these ducts. 5. Describe the stroma of the salivary glands with their cells such as myoepithelial cells and nerves in relation to the acinar cells, and their role in secretory functions.
	SKILLS	

	Lab: Histology of Upper GIS (LAB-2)	<ol style="list-style-type: none"> 1. Distinguish histological features of the oral cavity, tongue and tooth features. 2. Show histological similarities and dissimilarities among the differences of oral mucosae and lip and among the different types of each papillae of the tongue by light microscope. 3. Demonstrate histological features of esophagus with its layers on its wall. 4. Identify the regional variations in the structure of the esophagus.
	Lab: Histology of Lower GIS (LAB-3)	<ol style="list-style-type: none"> 1. Describe the histological characteristics of the layers comprising each segment of the gastrointestinal tract as the stomach, small intestine, large intestine, appendix, rectum and anal region by light microscope 2. Describe the topography of the gastric gland, its component cells, and architectural differences between glands in the three regions of the stomach 3. Describe the structure of the small intestine, how its surface area is maximized, and the cells that comprise its epithelium 4. Describe the topography of the mucosal and submucosal glands, their component cells, and architectural differences between glands in the three regions of the small intestine. 5. Compare the histological appearance of the large intestine from that of the small intestine 6. Show the recto-anal junction region and recognize differences morphological features between rectum and anal region
	Lab: Histology of Salivary glands, liver, pancreas, gall bladder (LAB-2)	<ol style="list-style-type: none"> 1. Describe the histological characteristics of glands of gastrointestinal system as major salivary glands. 2. Show the parenchyma and stroma of the major salivary gland with their specific cells and their excretory ducts.
	Lab: Liver, pancreas, gall bladder (LAB-2)	<ol style="list-style-type: none"> 1. Describe the histological characteristics of glands of gastrointestinal system as liver, pancreas and gall bladder. 2. Show the exocrine and endocrine part of the pancreas and as well as specific structures of the liver such as portal triad, classical lobule of it. 3. Define the layers with their specific features forming wall of the gall bladder.

At the end of this lesson, the student will be able to:		
KNOWLEDGE		
TOPIC	LEARNING OUTCOMES	
IMMUNOLOGY	Adaptive immunity- MHC (T-2)	<ol style="list-style-type: none"> 1. Explain specific cell types and their role in adaptive immunity 2. List and define the main interactions of committed cells 3. Classify the MHC molecules and subgrouping of them 4. Explain MHC related antigen presentation to the specific immune cells 5. Define the ultrastructural production pathways of MHC in different cell types 6. List and define the MHC related abnormal responses
	Humoral Immunity and Antibodies (T-1)	<ol style="list-style-type: none"> 1. Describe the main markers of B-cell 2. Explain the maturation process of B-cell in bone marrow 3. Define the types of B-cell and their functions 4. Explain the antibody production of B-cell 5. Classify the antibody types and features 6. Define the role of antibodies in immune reactions
	Cellular Immunity and T-cells (T-2)	<ol style="list-style-type: none"> 1. Describe the main markers of T-cell 2. Explain the maturation process in thymus 3. List and define the types of T-cell subsets 4. Explain the antigen recognition by T-cell

		<ol style="list-style-type: none"> Define the immune reactions driven by T-cell List and define the types of cellular immunity and essential role of T-cell
	Immun Regulation: Cytokines ((T-1)	<ol style="list-style-type: none"> Describe the <u>main immune regulation mechanism</u> List of the immune cell types involving immune regulation Explain the immunoregulatory roles of cytokines Classify the cytokines according to their main role in the immune system Explain cytokine network and interactions to the cellular level in the immune system Define the specific features of activation, regulation and tolerance of the immune system
	Regional Immunity (T-1)	<ol style="list-style-type: none"> Explain regional immune response Define the types and the cells of regional immunity Discriminate regional immune response from common immune reactions Explain the main mechanism of regional immune response and role of sIgA
	Hypersensitivity Reactions (T-1)	<ol style="list-style-type: none"> Define hypersensitivity reactions Classify them in groups Define the mechanisms of each of them List clinical appearances Define their clinical consequences

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)	<ol style="list-style-type: none"> Explain the basic functions of the gastrointestinal system (GIS) including immune, digestive, reflexive responses. Identify the segments of the gastrointestinal tract and the specialized functions attributed to each. Explain the cellular specialization; mucosa, submucoza, muscularis externa and seroza. Define gastrointestinal motility by means of smooth muscle contraction and releases Ca²⁺ as a result of different stimulations. Explain the role of Cajal cells and electrical activity of GI smooth muscle (slow waves and spikes) on GI motility 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. Explain the regulation of splanchnic blood circulation during the postprandial and fasting time. List the factors that control different mechanisms of GI functions (hormonal, neural, paracrine effects)
	Cephalic phase of digestion (T-2)	<ol style="list-style-type: none"> Explain secretory changes that occur on different segments of the gastrointestinal tract during cephalic, gastric, and intestinal phases. 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. Explain how the brain centers (limbic system, hypothalamus, cortex) influence secretion and the motility of the GI tract Explain the structures of the salivary glands, and their secretory elements; primary and secondary steps of secretion Explain why the saliva is hypotonic comparing to plasma. Define the regulation of saliva under both parasympathetic and sympathetic stimulation. Give example for the effect of the impaired salivary secretion; Sjögren's syndrome. Define working mechanisms of upper and lower esophageal sphincters.

	<ol style="list-style-type: none"> 9. Explain swallowing mechanism and the peristaltic movement of esophagus (primary and secondary peristalsis). 10. Give examples with the paralysis of the swallowing mechanism; under anesthesia, damage to cranial nerves or muscular dystrophies.
Gastric phase of digestion (T-2)	<ol style="list-style-type: none"> 1. Explain the role of stomach on digestion. 2. Explain different stimulus which influence the secretion of gastric acid. 3. Explain the role of other gastric secretory products including intrinsic factor and mucus. 4. Describe the motor activity to mix the secretions and propulsion towards the pyloric sphincter. 5. Explain the coordinated motor activity that regulates the emptying of gastric content into the duodenum (i.e. the enterogastric reflex) 6. Explain the role of the following hormones on gastric acid secretion and motility: gastrin, somatostatin, histamine, gastrin releasing peptides, motilin, CCK, secretin 7. Describe the migrating myoelectric complexes activities during fasting. 8. Describe the structure of parietal cell type and the formation of HCl- mechanism. 9. Describe the meaning of 'Achlorhydria and Hypochlorhydria'.
Digestive Functions of the liver and pancreas (T-2)	<ol style="list-style-type: none"> 1. Explain the major functions of the liver on digestion. 2. Explain the characteristics of the hepatic circulation between canalicular lumen and sinusoids. 3. Explain blood flow properties with the related zone on liver. 4. Explain the bile acid synthesis and enterohepatic circulation of bile salts. 5. Describe the hormonal and neural mechanisms that coordinate gallbladder emptying. 6. Explain the role of the pancreas on digestion. 7. Understand how and when the digestive enzymes of the pancreas become active. 8. Explain the effects CCK and secretin hormones on sphincter of oddi, on gallbladder secretions and gastric & duodenal motility.
Intestinal phase of digestion (T-2)	<ol style="list-style-type: none"> 1. Describe the motility of the small intestine and colon. 2. Explain the effects of hormones, paracrines, and neural pathways on digestion, secretions, and the motility of small intestine 3. Explain the haustration, segmentation, propulsion, mass movement. 4. Explain digestion process of carbohydrate, protein and fat molecules in small intestine 5. Describe the roles of bacterial colonization of colon in digestion and absorption of nutrients 6. Explain the reflex responses in GI tract. 7. Explain the defecation mechanism.
Absorption of nutrients and water (T-2)	<ol style="list-style-type: none"> 1. Describe the absorptive process of monosaccharides that are formed as a result of digestion of carbohydrates 2. Describe mechanisms of absorption of amino acids 3. Describe the role of bile acids in absorption of fats 4. Describe the role of emulsification and micelle formation in absorption of fats 5. Define role of lymphatic system in the absorption of fats 6. Describe mechanisms of nucleic acid absorption 7. Describe mechanisms of vitamins absorption 8. Describe absorptive process of vitamin B12 and name the related proteins 9. Define the role of intestinal flora in the synthesis of vitamin K. 10. Describe mechanisms of mineral (calcium, iron, magnesium) absorption 11. Describe major absorptive processes that take place in the colon

		12. Describe the mechanisms of water absorption
	Regulation of food intake (T-1)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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-3)	<ol style="list-style-type: none"> 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:

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
RADIOLOGIC ANATOMY	Images of the Gastrointestinal System – I (Eosophagus, stomach) (T-2)	<ol style="list-style-type: none"> 1. Provide knowledge in anatomical detail of the eosophagus 2. Depict the esophagus on CT images of upper, middle and lower mediastinum 3. Demonstrate anatomical detail of stomach
	Images of the Gastrointestinal System – II (Intestines) (T-2)	<ol style="list-style-type: none"> 1. Assess the images of oral-contrast and double contrast studies of upper GI 1. Describe the small intestinal anatomical detail 2. Depict the small intestinal mucosal folds, the mesentery shown on radiography, CT, and entroclysis 3. Demonstrate the colonic anatomical detail 4. Evaluate the colon demonstrated on contrast enema and double contrast radiological studies
	Images of the Peritoneal Cavity and the Abdominal Wall (T-2)	<ol style="list-style-type: none"> 1. Depict the muscles of the abdominal wall on CT images 2. Demonstrate competence in knowledge of the peritoneum 3. Show the intra and retroperitoneal organs 4. Understand the Intraabdominal spaces and their connections 4. Evaluate normal plain abdominal radiography
	Images of the liver, biliary system and the pancreas (T-2)	<ol style="list-style-type: none"> 1. Show competence in liver anatomy, liver-segments, and ligaments demonstrated on CT, US 2. Depict gall bladder and bile ducts , shown on US, CT and MRCP 3. Demonstrate knowledge in pancreatic anatomy shown on CT, MRCP

		<ol style="list-style-type: none"> Evaluate blood circulation of GI on CT, angiography Show competence in splenic anatomy
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At the end of this lesson, the student will be able to:

SKILLS		
DEP	TOPIC	LEARNING OUTCOMES
CLINICAL SKILLS	Recovery Position; Heimlich Maneuver (T-1, P-1)	<ol style="list-style-type: none"> Identify when a casualty should be put in the recovery position Place an unresponsive casualty in the recovery position List the signs and symptoms of a choking victim Learn how to perform the Heimlich Maneuver

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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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
MEDICAL ETHICS AND	What is Ethics? Relations-Morality, Ethics, and Law (T-2)	<ol style="list-style-type: none"> Explain the dynamics between ethics and the law. Explain how to implement contemporary ethical principles by examining the difference between ideas (duties). Explain actions (consequences) as they pertain to the principles and principles of ethics.

		<ol style="list-style-type: none"> 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..
	Medicine in the Middle Ages (Christian World – Europa) (T-2)	<ol style="list-style-type: none"> 1. Explain the Comprehension of the importance of learning the history of science and during medieval time. 2. Explain the Comprehension of the significance of Dark Ages changing the scientific mentality, regression of science and medicine.
	Principles Of Medical Ethics (T-2)	<ol style="list-style-type: none"> 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
	Islamic Medicine Part 2 (T-2)	<ol style="list-style-type: none"> 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

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
PHILOSOPHY	Introduction to the class (T-2)	<ol style="list-style-type: none"> 1. Comprehend the general flow of topics throughout the semester. 2. Explain the general difference between a philosophical approach and other approaches to medicine.
	Health and Disease – I (T-2)	<ol style="list-style-type: none"> 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.
	Health and Disease – II (T-2)	<ol style="list-style-type: none"> 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.
	Death (I) (T-2)	<ol style="list-style-type: none"> 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.

MED 1004: UROGENITAL SYSTEM				
Course Date	27 March – 19 April 2023			
Exam Dates	Practical Exams: 17 April 2023 Theoretical Exam: 18 April 2023, Hour: 10:00-12:00			
Course Coordinator:	HANİFE YASEMİN KESKİN ERGEN			
Academic Unit	Academic Staff	Theoretical hours	Practical hours	Total
Anatomy	Çağatay Barut, Prof. Eren Öğüt, Assist. Prof.	15	8	23
Biophysic	Serdar Durdağlı, Prof. Bircan Dinç, Assist. Prof.	2	-	2
Biochemistry	Yeşim Neğiş, Assoc. Prof. Özlem Unay Demirel, Assist. Prof. Erdem Yılmaz, Assist. Prof.	9	2	11
Evidence Based Medicine and Statistics	Cüneyd Parlayan, Assist. Prof.	4	-	4
Histology and Embryology	Yasemin Ersoy Canıllıoğlu, Assist. Prof. Dila Şener, Assist. Prof.	16	8	24
Physiology	Sema Tülay Köz, Assoc. Prof. Yasemin Keskin Ergen, Assist. Prof. Mehmet Ozansoy, Assist. Prof.	13	1	14
Radiology	Canan Erzen, Prof.	8	-	8
Clinical Skills	Senem Polat, Assist. Prof.	1	1	2
Communication Skills in Medicine	Figen Dağlı, Prof.	Other groups		
TOTAL		68	20	88
Medical Ethics and History of Medicine	Kadircan Keskinbora, Prof.	8		8
Philosophy		8		8
Communication Skills and Academic Reporting		20		
STUDY TIME				34

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	The Anatomy of Genitourinary System: Kidneys, Adrenal gland (T-2)	<ol style="list-style-type: none"> 1. Explain the basic structures and components of the genitourinary system 2. Define the topography of components of the genitourinary system 3. Describe localization, vasculature, innervation and lymphatics of the kidneys in detail 4. Describe localization, vasculature, innervation and lymphatics of adrenal glands in detail 5. Discuss the relationships of these structures with each other 6. Define the functions and clinical significance of kidneys and adrenal gland
	Ureter, Urinary Bladder and Male Urethra (T-2)	<ol style="list-style-type: none"> 1. Describe localization, vasculature, innervation and lymphatics of ureter in detail 2. Describe localization, vasculature, innervation and lymphatics of urinary bladder in detail 3. Describe localization, vasculature, innervation and lymphatics of male urethra in detail 4. Discuss the relationships of these structures with surrounding structures 5. Define functions and clinical significance of ureter, urinary bladder and male urethra
	Scrotum, testis, epididymis, ductus deferens, vesicula seminalis, funiculus spermaticus (spermatic cord) (T-2)	<ol style="list-style-type: none"> 1. Describe localization, layers, vasculature, innervation and lymphatics of scrotum in detail 2. Describe localization, vasculature, innervation and lymphatics of testis in detail 3. Describe localization, vasculature, innervation and lymphatics of epididymis, ductus deferens and vesicula seminalis in detail 4. To describe localization, components, layers of funiculus spermaticus (spermatic cord) in detail 5. Discuss the relationships of these structures with surrounding structures 6. Define the functions and clinical relevance of scrotum, testis, epididymis, ductus deferens, spermatic cord and seminal vesicles
	Prostate, penis (T-1)	<ol style="list-style-type: none"> 1. Describe localization, vasculature, innervation and lymphatics of prostate in detail 2. Describe localization, vasculature, innervation and lymphatics of penis in detail 3. Discuss the relationships of these structures with surrounding structures

		4. Define main functions and clinical relevance of prostate and penis
Ovaries, uterine tubes, Uterus, Vagina (T-2)		<ol style="list-style-type: none"> 1. Describe localization, vasculature, innervation and lymphatics of ovaries in detail 2. Describe localization, vasculature, innervation and lymphatics of uterine tubes in detail 3. Describe localization, vasculature, innervation and lymphatics of uterus in detail 4. Describe localization, vasculature, innervation and lymphatics of vagina in detail 5. Discuss the relationships of these structures with surrounding structures and peritoneum 6. Define main functions and clinical importance of ovaries, uterine tubes, uterus and vagina (female internal genital organs)
Urethra feminina, vestibulum vaginae, clitoris, hymen, glandula vestibularis major and minor, bulbus vestibuli (T-2)		<ol style="list-style-type: none"> 1. Describe localization, vasculature, innervation and lymphatics of urethra feminina in detail 2. Describe localization, vasculature, innervation and lymphatics of vestibulum vaginae, clitoris, hymen, glandula vestibularis major and minor and bulbus vestibuli in detail 3. Discuss the relationships of these structures with surrounding structures and peritoneum 4. Define functions and clinical relevance of female external genital organs
Pelvic floor and ischioanal fossa, common iliac artery, external iliac artery and its branches, lumbosacral plexus and its branches, lumbar and sacral part of the sympathetic system (T-2)		<ol style="list-style-type: none"> 1. Describe the location, morphology, contents, relationships, vessels, nerves and lymphatics related with pelvic floor and ischioanal fossa 2. Describe the location, topography, morphology and relationships of common iliac artery, external iliac artery and its branches, lumbosacral plexus and its branches, lumbar and sacral part of the sympathetic system 3. Define the functions of pelvic floor
Perineum (T-2)		<ol style="list-style-type: none"> 1. Explain the morphologic aspects and localization, vasculature, innervation and lymphatics of the structures of the perineum 2. Explain the muscles of perineum in detail 3. Describe urogenital diaphragm and structures contributing this structure 4. Distinguish the urogenital triangle, anal triangle and contents of each 5. Describe superficial and deep perineal pouch and contents of each in details 6. Differentiate the contents of superficial and deep perineal pouch in both genders.
SKILLS		
Lab: Kidneys, Adrenal gland, Ureter, Urinary Bladder and Male Urethra (P-2)		<ol style="list-style-type: none"> 1. Demonstrate anatomical structures of kidney and adrenal as well as the vessels, nerves and relationships on cadavers and models 2. Demonstrate anatomical structures of ureter, urinary bladder and male urethra as well as the vessels, nerves and relationships on cadavers and models
Lab: Scrotum, testis, epididymis, ductus deferens, vesicula seminalis, funiculus spermaticus (spermatic cord); Prostate, penis (P-2)		<ol style="list-style-type: none"> 1. Demonstrate anatomical structures of scrotum, testis, epididymis, ductus deferens, vesicula seminalis, funiculus spermaticus as well as the vessels, nerves and relationships on cadavers and models 2. Demonstrate anatomical structures of prostate and penis as well as the vessels, nerves and relationships on cadavers and models
Lab: Ovaries, uterine tubes, Uterus, Vagina; Urethra feminina, vestibulum vaginae, clitoris, hymen, glandula vestibularis major and minor, bulbus vestibule (P-2)		<ol style="list-style-type: none"> 1. Demonstrate anatomical structures of ovaries, uterine tubes, uterus and vagina as well as the vessels, nerves and relationships on cadavers and models 2. Demonstrate anatomical structures of urethra feminine, vestibulum vaginae, clitoris, hymen, glandula vestibularis major

		and minor and bulbus vestibuli as well as the vessels, nerves and relationships on cadavers and models
	Lab: Pelvic floor and ischioanal fossa, vessels of pelvic cavity, common iliac artery, internal iliac artery and its branches and accompanying veins, lumbal and sacral part of the sympathetic system; perineum (P-2)	<ol style="list-style-type: none"> 1. Demonstrate pelvic floor and ischioanal fossa, common iliac artery, external iliac artery and its branches, lumbosacral plexus and its branches, lumbar and sacral part of the sympathetic system and their relationships on cadavers and models 2. Demonstrate perineal muscles, vessels, nerves, contents of superficial and deep perineal pouches and their relationships on cadavers and models

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

KNOWLEDGE

DEP.	TOPIC	LEARNING OUTCOMES
BIOPHYSICS	Biophysics of Glomerular Filtration (T-1)	<ol style="list-style-type: none"> 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
	SKILLS	
	LAB: Differential Scanning Calorimeter (DSC) experiment (P-1)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 1. Explain cholesterol structure 2. Describe the reactants and products, their cellular localization, and their tissue distribution of glycogenesis 3. Explain the steps in cholesterol biosynthesis 4. Discuss the regulation of cholesterol biosynthesis 5. Mention the rate limiting enzyme in cholesterol biosynthesis
	Oxidation Of Fatty Acids (T-2)	<ol style="list-style-type: none"> 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
	Ketone Body Formation (T-1)	<ol style="list-style-type: none"> 1. Define ketone body 2. Name different ketone bodies synthesized during the metabolism 3. Describe the conditions in which the ketone bodies are synthesized 4. Describe the role of acetyl CoA in the formation and degradation of ketone bodies 5. Describe the process of ketone body export from the liver

	Pathways of Sugar Metabolism: Pentose Phosphate Pathway, Fructose, and Galactose Metabolism (T-2)	<ol style="list-style-type: none"> 1. Compare and contrast the overall purpose of the pentose phosphate pathway, its reactants and products, and its cellular localization 2. Explain the oxidative and non-oxidative phases of pentose phosphate pathway by specifying enzymes and cofactors 3. Explain the regulatory mechanisms of pentose phosphate pathway 4. Explain the uses of NADPH in metabolism 5. Describe the role of reduced glutathione in the body, and the contribution of NADPH to its formation 6. Explain the biochemical basis of glucose 6-phosphate dehydrogenase deficiency in hemolytic anemia 7. Describe the uronic acid pathway and its importance for synthesis of glucuronic acid 8. Describe the roles of fructokinase and hexokinase in catabolism of fructose and galactose 9. Identify diseases that arise from defects in the metabolism of fructose and galactose
	Integration Of Carbohydrate, Lipid and Protein Metabolism (T-2)	<ol style="list-style-type: none"> 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 metabolism 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
SKILLS		
	Lab: Enzymatic Activity of Salivary Amylase (LAB-2)	<ol style="list-style-type: none"> 1. Explain the factors affecting enzyme activity 2. Describe the structure of starch 3. Explain the process of digestion of starch by salivary amylase 4. Explain how the presence of starch in solution can be detected by using iodine solution as an indicator 5. Explain the effect of temperature and pH on the activity of salivary amylase on starch by using the Iodine test.

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
EVIDENCE BASED MEDICINE AND STATISTICS	Research (T-1)	<ol style="list-style-type: none"> 5. Discuss the meaning of research 6. List the objectives of research 7. Explain the significance of research 8. Explain the difference between research method and methodology
	Research Process (T-1)	<ol style="list-style-type: none"> 1. List the steps of research process in correct order 2. Explain the each step of research process briefly 3. Explain the criteria of good research
	Types of scientific publications (T-1)	<ol style="list-style-type: none"> 1. Define the meaning of primary, secondary and tertiary scientific publications (literature) and give examples of them. 2. Explain the different types of publications in scientific journals. 3. Explain the different types of book publications and contributions to book publications. 4. Define the gray literature and give examples of it
	Structure of a scientific paper (T-1)	<ol style="list-style-type: none"> 1. Explain the basic structure of a manuscript in correct order

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
HISTOLOGY AND EMBRYOLOGY	Histology of Urinary system (T-2)	<ol style="list-style-type: none"> 1. Describe the structural organization of a kidney as cortex and medulla with their specific structures. 2. Describe the components of a nephron with organization of the renal corpuscle, tubules and the cells present within their. 3. Describe the filtration barrier between blood and urine in the renal corpuscle. 4. Describe the various components of the juxtaglomerular apparatus. 5. Compare the structure of the proximal and distal convoluted and collecting tubules. 6. Describe the blood supply of the kidney. 7. Describe what structures are involved in regulation of blood pressure. 8. Describe the transitional epithelium and interpret the structure-function relationships in it. 9. Interpret what structural changes the urinary system undergoes due to diseases.
	Histology Of The Testis And Spermatogenesis (T-2)	<ol style="list-style-type: none"> 1. Describe the histological structure and organization of the testis 2. Outline the process of the spermatogenesis occurring in the germinal epithelium of the seminiferous tubule from the intrauterine life to adult. 3. Recognize germ cells at different steps of spermatogenesis in the seminiferous tubule, and explain which steps involve meiosis, and which involve cellular differentiation into sperm (spermiogenesis). 4. Recognize sertoli cells and leydig cells, and explain their roles in the production of sperm and regulation of the male reproductive system with their hormonal regulation. 5. Explain the cellular components and functional significance of the blood-testis barrier 6. Recognize some key pathological symptoms related to testis and spermatogenesis
	Histology Of Male Reproductive System (T-2)	<ol style="list-style-type: none"> 1. Describe the histological structure and function of the intra-extratesticular duct system during sperm production, maturation and ejaculation. 2. Identify the histological appearance and functions of the accessory sex glands such as seminal vesicles, prostate and bulbourethral gland. 3. Explain the contribution of each part to the production of semen for the final ejaculate. 4. Identify the histological features of the penis and define the role of its components in erection and detumescence. 5. Count the flow of the spermatozoa through the male reproductive tract from site of production to site of ejaculation. 6. Recognize some key pathological symptoms related to the tubes and glands of the male reproductive system.
	Histology Of Ovary And Oogenesis (T-2)	<ol style="list-style-type: none"> 1. Describe the histological structure and organization of the ovary 2. Outline the processes of the oogenesis from the intrauterine life throughout adult life. 3. Recognize follicle development of the ovary 4. Describe the processes of ovulation and formation of corpus luteum 5. Describe the cyclic changes in the ovaries, at the same time changes in levels of estrogen and progesterone 6. Explain how estrogen is produced by cells of the theca interna and zone granulosa.

<p>The Histology Of Female Reproductive System (T-2)</p>	<ol style="list-style-type: none"> 1. Define the basically developmental stages of the female reproductive system 2. Describe the histological structure and regional variations of the uterine tube, uterus and vagina. 3. Distinguish the cyclical alterations and functional changes in the uterine endometrium, cervix, oviduct and vagina and understand their hormonal bases during the menstrual cycle and pregnancy. 4. Identify the histological features of the external genitalia of the female reproductive system. 5. Recognize some key pathological symptoms related to female reproductive system.
<p>Ovulation And Fertilization (T-1)</p>	<ol style="list-style-type: none"> 1. Explain the ovulation process with changes occurring in the ovary 2. Define the necessary steps which lead to spermatozoa being ready with specific reactions and changes of the female reproductive tract before reaching the oocyte. 3. Count the layers covering oocyte and describe how the spermatozoon penetrates into the oocyte 4. Describe the process whereby a zygote is formed 5. Identify the results of the fertilization
<p>Plasenta And Fetal Membranes (T-2)</p>	<ol style="list-style-type: none"> 1. Name the fetal membranes and cavities together with their components and functions 2. Describe the initial formation and expansion of the amnion and chorion. 3. Describe a chorionic villus. 4. Define how placenta is formed and identify its functions 5. Describe the macroscopic morphology of the placenta 6. Describe the placental barrier and maternal and fetal blood flow in the placenta and distinguish between the maternal and fetal parts of the placenta 7. Describe the pathologies of embryonic development in connection with the fetal membranes and placenta
<p>Histology Of Mammary Gland (T-1)</p>	<ol style="list-style-type: none"> 1. Explain the histologic components of the mammary gland associated with the nipple and the areola, the overall organization into lobes and lobules, as well as secretory alveoli (acini), lactiferous ducts and sinuses and the intralobular and interlobular connective tissue 2. Describe the mammary gland structure in the newborn, puberty 3. Define histological differences between the mammary gland in adult females prior to pregnancy (inactive), during pregnancy and during lactation (active)
<p>Teratology (T-2)</p>	<ol style="list-style-type: none"> 1. List the principles of teratology 2. Define the critical periods of development 3. Describe the frequency and significance of major and minor congenital malformations and the importance of developmental timing of exposure. 4. Recognize the most frequent genetic and environmental causes of congenital malformation syndromes and exposures to be avoided during and prior to pregnancy
SKILLS	
<p>Lab: Microscopic structures of the urinary system (LAB-2)</p>	<ol style="list-style-type: none"> 1. Distinguish microscopic components of the renal cortex and medulla 2. Identify the structural components of the nephron 3. Identify and distinguish the proximal tubule, distal tubule, and collecting duct by light microscope 4. Identify the component cells of the juxtaglomerular apparatus 5. Distinguish the important histological characteristics of the ureter, bladder, and urethra by light microscope

	Lab: Microscopic Structures Of Male Reproductive System (LAB-2)	<ol style="list-style-type: none"> 1. Distinguish histological organization of the testis and discriminate between the different cells forming the germinal epithelium of the seminiferous tubules. 2. Compare the histological features of the intratesticular ducts and the extratesticular ducts in order to differentiate them from each other. 3. Define the histological features of accessory glands and penis by light microscope
	Lab: Microscopic Structures Of Female Reproductive System (LAB-2)	<ol style="list-style-type: none"> 1. Distinguish histological organization of the ovary as cortex and medulla with their histologic features 2. Identify histologic sections of the ovary, uterine tubes, uterus, vagina. 3. Identify the stages of the follicular growth (primary, secondary and tertiary) and corpus luteum with their specific cells such as granulosa cells, theca cells, interstitial gland cells, granulosa lutein cells 4. Classify the epithelium in the uterine tubes, uterus, and vagina. 5. Identify the regional variations in the structure of the oviduct, uterus and vagina with their layers
	Lab: Placenta And Mammary Gland (LAB-2)	<ol style="list-style-type: none"> 1. Describe the morphologic organization of the placenta including the placental barrier. 2. Define the histological features of the mammary gland with parenchymal and stromal regions of it by light microscope in the active and inactive stages.

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)	<ol style="list-style-type: none"> 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-3)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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

	<ol style="list-style-type: none"> Describe control mechanisms that regulate water intake and water output in urine Describe the renin-angiotensin II – aldosterone system and its effects on fluid – electrolyte balance of the body Explain the regulation of antidiuretic hormone (ADH) secretion and the effects of ADH on body fluid composition Describe the function of atrial natriuretic peptide (ANP) and other natriuretic peptides Describe the mechanisms involved in regulation of sodium balance, blood volume and pressure Give examples for conditions in which the body has a deficiency in water and/or electrolyte balance
Female Reproductive System Physiology (T-2)	<ol style="list-style-type: none"> Describe hormonal changes that take place during female puberty. Describe the roles of hypothalamus and the anterior pituitary gland in regulation of ovarian cycle. Describe the function of the gonadotropic hormones. Name main hormones secreted from corpus luteum and graft follicles. Describe the changes that occur in female reproductive organs during menstrual cycle. Describe the synthesis, transport and physiological functions of progesterone. Describe the synthesis, transport and physiological functions of estrogens. Describe hormonal changes that take place during female menopause. Define hypogonadism and hypergonadism. Define hormonal system that is required for female fertility.
Acid - Base Balance (T-1)	<ol style="list-style-type: none"> List the major sources of acids in the body Name the three major chemical buffer systems of the body and describe how they resist pH changes Describe the influence of the respiratory system on acid-base balance Describe how the kidneys regulate hydrogen and bicarbonate ion concentrations in the blood Distinguish between acidosis and alkalosis resulting from respiratory and metabolic factors. Describe the mechanisms of respiratory and renal compensations to acid base disturbances.
Pregnancy, Labor, And Lactation (T-1)	<ol style="list-style-type: none"> Describe hormonal changes that take place in embryogenesis, implantation, pregnancy and labor Describe physiological effects of hormones during the processes of embryogenesis, implantation, pregnancy and labor Define role of placenta in pregnancy Name the placental hormones and describe their functions Explain the process of lactation Describe the hormones that regulate lactation
Male Reproductive System Physiology (T-2)	<ol style="list-style-type: none"> List the endocrine glands involved in male reproductive system. List the key hormones secreted from Leyding and Sertoli cells. Explain the regulation of hormone secretions by hypothalamic and pituitary hormones. Explain the process of spermatogenesis, including its time course, spatial distribution, and role of supporting cells and hormones. Explain the morphological and functional features of a mature spermatozoon. Outline the role of chromosomes, hormones, and related factors in sex determination and development. Summarize the hormonal changes that occur at puberty in males. Explain the mechanisms that produce erection and ejaculation. Describe the general structure of testosterone, and explain its biosynthesis, transport, metabolism, and actions.

		<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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
RADIOLOGY	Imaging Of Urinary System (T-2)	<ul style="list-style-type: none"> 1. Learn the application of Urography 2. Demonstrate the anatomical detail on Urography 3. Assess the vesicular structures of the kidney on DSA
	Imaging Of Female Reproductive System (T-2)	<ul style="list-style-type: none"> 1. Describe MRI images of the female reproductive system : Topographic anatomy 2. Show uterus and the ligaments 3. Show uterus on pelvic ultrasound images 4. Show Ovaries on pelvic ultrasound and CT images 5. Show Ovarien ligaments on CT 6. Show Hysteriosalpingography performance and images
	Imaging Of Male Reproductive System (T-2)	<ul style="list-style-type: none"> 1. Assess the the scrotum, spermatic cord 2. Demonstrate the testes, epididymis 3. Show the seminal vesicles, prostate, bulbourethral glands 4. Understand the anatomy of -the penis and urethra 5. Demonstrate the method of TRUS
	Ultrasound Imaging And Mammography (T-2)	<ul style="list-style-type: none"> 1. Understand the method of US and evaluation of images 2. Assess the general US applications and limitations 3. Know the types of US modalities 4. Demonstrate the Doppler US and its applications 5. Understand the mammography method and importance 6. Demonstrate the breast anatomy on mammography 7. Depict thypes of normal breast on mammography 8. Assess the breast cancer images and statistics

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

SKILLS

DEP	TOPIC	LEARNING OUTCOMES
CLINICAL SKILLS	Basic Life Support, Defibrillation (T-1) (P-1)	<ul style="list-style-type: none"> 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
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COMMUNICATION SKILLS IN MEDICINE	Introduction to Communication Skills	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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
MEDICAL ETHICS AND HISTORY OF MEDICINE	Seljuk Civilization and Medicine - Part 2 (T-2)	<ol style="list-style-type: none"> 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
	European Medicine in RENAISSANCE (Renaissance Medicine – Part 1) (T-2)	<ol style="list-style-type: none"> 1. Explain how far existing ideas were challenged by new discoveries 2. Explain the influence of Leonardo da Vinci on anatomic interest 3. Explain the influence of Andreas Vesalius 4. Explain the other anatomists and anatomy education 5. Explain the influence of other scholars
	Medicine in RENAISSANCE (Renaissance Medicine – Part 2) (T-2)	<ol style="list-style-type: none"> 1. Explain the influence of other discoveries 2. Define and explain how changing many old ideas about anatomy and physiology 3. Explain how the printing press spread these ideas faster and cheaper than before. 4. Explain the influence of knowledge via printing press

	Ethics and Deontology (T-2)	<ol style="list-style-type: none"> 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. 8. Define National and international documents, legal regulations and ethical codes related to medicine and health 9. Explain Professional values, professional identity development and historical perspective, continuous openness to professional and individual development (10. Explain Professional dominance, organization, autonomy 11. Explain Health and Occupational defense
	ETHICS - Moral Philosophy - Major Areas of Ethics Part 1 (T-2)	<ol style="list-style-type: none"> 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

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
PHILOSOPHY	Death II (T-2)	<ol style="list-style-type: none"> 1. Comprehend the relationship between death and harm. 2. Distinguish between different objections against the harm thesis. 3. Explain each of these objections.
	Causes And Explanations in Medicine (T-2)	<ol style="list-style-type: none"> 1. Distinguish between deductive and inductive inferences. 2. Distinguish between correlation and causation. 3. Explain the concept of a confounder. 4. Comprehend how to use observational data in research.
	Randomized Controlled Trials And Evidence-Based Medicine (T-2)	<ol style="list-style-type: none"> 1. Distinguish between reductionism and holism in medicine. 2. Explain what evidence based medicine is. 3. Explain what a randomized controlled trial is. 4. Comprehend the criticisms against randomization
	Ethics of Medical Trials on Animals (T-2)	<ol style="list-style-type: none"> 1. Comprehend the concept of moral standing. 2. Distinguish between different defenses of why humans might have a higher moral standing than animals. 3. Explain why each of these defenses fails. 4. Explain which types of experiments on animals should be allowed and which should not be allowed.

MED 1006: NERVOUS SYSTEM				
Course Date	April 24 – May 26 2023			
Exam Dates	Practical Exams: May 25 2023 Theoretical Exam: May 26 2023, Hour: 10:00-12:00			
Course Coordinator:	YEŞİM NEĞİŞ			
Academic Unit	Academic Staff	Theoretical hours	Practical hours	Total
Anatomy	Çağatay Barut, Prof Eren Öğüt, Assist. Prof.	24	12	36
Behavioural Science	Sibel Çakır, Prof	4	-	4
Biophysic	Serdar Durdağı, Prof. Bircan Dinç, Assist. Prof. Berna Doğan, Assist. Prof. Enes Kotil, Assist. Prof.	4	1	5
Biochemistry	Yeşim Neğiş, Assoc. Prof. Özlem Unay Demirel, Assist. Prof.	10	2	12
Evidence Based Medicine and Statistics	Cüneyd Parlayan, Assist. Prof.	2	-	2
Histology and Embryology	Yasemin Ersoy Canıllıoğlu, Assist. Prof. Dila Şener, Assist. Prof.	3	2	5
Physiology	Sema Tülay Köz, Assoc. Prof. Yasemin Keskin Ergen, Assist. Prof. Mehmet Ozansoy, Assist. Prof.	28	-	28
Radiologic Anatomy	Canan Erzen, Prof.	10	-	10
Clinical Skills	Demet Koç, Assist. Prof.	1	1	2
Communication Skills in Medicine	Figen Dağlı, Prof.	Other groups		
TOTAL		86	18	104
Medical Ethics and History of Medicine	Kadircan Keskinbora, Prof.	10	-	10
Philosophy		10	-	10
Communication Skills and Academic Reporting		20		20
STUDY TIME				40

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	Introduction to nervous system; embryonic development of nervous system, spinal cord and formation of spinal nerves (T-2)	<ol style="list-style-type: none"> 1. Explain the overall organization of the nervous system 2. Define the basics of the embryonic development of the nervous system 3. Identify the types of cells found in the nervous system and describe their general functions 4. Define the types of neurons according to size, function and extensions and give an example for each type 5. Explain a synapse 6. Explain a sensory receptor and discuss the types of receptors 7. Discuss the organization, localization and subdivisions of the central nervous system 8. Explain anatomy of the spinal cord, including the arrangement of white and gray matter within the cord 9. Discuss the general arrangement of the spinal cord including the curvatures 10. Describe the meninges, arteries and veins of the spinal cord 11. Define the main functions of spinal cord and spinal nerves
	Bulbus, pons (T-2)	<ol style="list-style-type: none"> 1. Explain the location, external structures and relationships of bulbus in detail 2. Explain the location, external structures and relationships of pons in detail 3. Describe the internal structures of bulbus, pons in detail 4. Discuss the internal structures of bulbus, pons on cross sections at certain different levels 5. Discuss the relationships of the external structures of brainstem subdivisions with each other 6. Define the main functions of brainstem
	Mesencephalon and rhomboid fossa (T-2)	<ol style="list-style-type: none"> 1. Explain the location, external structures and relationships of mesencephalon in detail 2. Describe the internal structures of mesencephalon in detail 3. Discuss internal structures of mesencephalon on cross sections at certain levels 4. Describe the localization and relationships of the fossa rhomboidea 5. Discuss the relationships of the external structures of brainstem subdivisions with each other
	Cerebellum, IV. Ventricle (T-2)	<ol style="list-style-type: none"> 1. Explain the location, external structures and relationships of cerebellum in detail 2. Describe the internal structures of cerebellum in detail 3. Describe the internal structures of cerebellum on cross sections

	<ol style="list-style-type: none"> 4. Discuss the connections of cerebellum with higher and lower parts of the central nervous system in terms of pathways 5. Describe the localization and relationships of the iv. Ventricle 6. Discuss the relationships of the external structures of cerebellum with surrounding structures 7. Define main functions of cerebellum 8. Describe clinical conditions related to the cerebellar dysfunction and iv. Ventricle
Diencephalon, hypothalamus, epithalamus, limbic system, III. Ventricle (T-2)	<ol style="list-style-type: none"> 1. Explain the location, external structures and relationships of diencephalon in detail 2. Describe the location, connections and nuclei of hypothalamus and epithalamus in detail 3. Describe the internal structures of subdivisions diencephalon on cross sections 4. Discuss the connections of diencephalon and its subdivisions with higher and lower parts of the central nervous system in terms of pathways 5. Describe limbic system parts and connections 6. Describe the localization and relationships of the iii. Ventricle 7. Discuss the relationships of the external structures of diencephalon with surrounding structures 8. Define main function and clinical relevance of diencephalon and iii.ventricle
Telencephalon: sulcus, gyrus and lobes, cortical centers, subcortical nuclei (T-2)	<ol style="list-style-type: none"> 1. Explain the location, external structures and relationships of telencephalon in detail 2. Describe the sulci, gyri and lobes of telencephalon in detail 3. Explain cortical centers and their basic functional concepts 4. Describe the white matter of telencephalon in detail 5. Discuss the connections of cortical center within telencephalon and with lower parts of the central nervous system in terms of pathways 6. Describe the location, connections subcortical nuclei and describe their basic functions 7. Define main functions of telencephalon
Descending tracts of central nervous system, extrapyramidal system (T-2)	<ol style="list-style-type: none"> 1. Describe localization of origin and destination structures of the descending tracts 2. Describe course and connections of the descending tracts of the central nervous system within different parts of the central nervous system in detail 3. Identify the relationships and connections of descending tracts within different subdivisions of the central nervous system 4. Describe localization, course and connections of the extrapyramidal system in detail 5. Discuss functions of the descending tracts and the extrapyramidal system in detail 6. Discuss basics of signs and symptoms that can eventually result from dysfunctions of the descending tracts and extrapyramidal system
Ascending tracts of central nervous system (T-2)	<ol style="list-style-type: none"> 1. Describe localization of origin and destination structures of the ascending tracts 2. Describe course and connections of the ascending tracts of the central nervous system within different parts of the central nervous system in detail 3. Identify the relationships and connections of ascending tracts within different subdivisions of the central nervous system 4. Discuss functions of the ascending tracts in detail 5. Discuss basics of signs and symptoms that can eventually result from dysfunctions of the ascending tracts
Meninges of the brain; vessels and nerves, dural venous sinuses, ventricular system of the brain: an overview (T-2)	<ol style="list-style-type: none"> 1. Explain the location, external structures and relationships of meninges of the central nervous system in detail 2. Describe the vessels and nerves of the meninges of the central nervous system in detail 3. Explain the dural venous sinuses and their connections

	<ol style="list-style-type: none"> Describe the ventricular system parts and connections Distinguish the parts of the ventricular system and circulation of cerebrospinal fluid Discuss functions of meninges of the brain, dural venous sinuses and ventricular system Discuss basics of signs and symptoms that can eventually result from dysfunctions of the dural venous sinuses and ventricular system Demonstrate the dural venous sinuses and its connections as well as relationships on cadavers, preserved brain specimens and models Demonstrate the ventricular system of brain and its connections as well as relationships on cadavers, preserved brain specimens and models
Vessels of the central nervous system (T-2)	<ol style="list-style-type: none"> Define the extracranial course of the internal carotid artery and vertebral artery Describe the branches of the internal carotid artery Distinguish the structures supplied by each branch of the internal carotid artery Describe the branches of the vertebral artery Distinguish the structures supplied by each branch of the vertebral carotid artery Describe the formation of circle of Willis
Introduction to autonomic nervous system and divisions sympathetic nervous system (T-2)	<ol style="list-style-type: none"> Define the overall organization of the autonomic nervous system Describe the differences and similarities of the subdivisions of the autonomic nervous system Identify the sympathetic ganglia and sympathetic trunk, splanchnic nerves and sympathetic nerves Demonstrate the overall organization of the autonomic nervous system on cadavers and models Discuss the functions of sympathetic nervous system Discuss the basics of signs and symptoms that can eventually result from dysfunctions of the sympathetic nervous system
Parasympathetic nervous system and its parts (T-2)	<ol style="list-style-type: none"> Identify the parasympathetic cranial nerves and ganglia Describe the sacral part of the parasympathetic nervous system in detail Describe the location, morphology and relationships, of parasympathetic nervous system Discuss the functions of parasympathetic nervous system Discuss the basics of signs and symptoms that can eventually result from dysfunctions of the parasympathetic nervous system
SKILLS	
Lab: Spinal cord (P-2)	<ol style="list-style-type: none"> Demonstrate the overall organization of the nervous system on cadavers and models Demonstrate the organization, localization and subdivisions of the central nervous system on cadavers and models Demonstrate anatomy of the spinal cord; the meninges, arteries and veins of the spinal cord on cadavers and models
Lab: Bulbus, pons, mesencephalon and fossa rhomboidea (P-2)	<ol style="list-style-type: none"> Demonstrate anatomical structures of bulbus and pons as well as relationships on cadavers, preserved brain specimens and models Demonstrate anatomical structures of mesencephalon and fossa rhomboidea as well as relationships on cadavers, preserved brain specimens and models
Lab: Cerebellum, IV. Ventricle, Diencephalon, hypothalamus, epithalamus, III. Ventricle (P-2)	<ol style="list-style-type: none"> Demonstrate anatomical structures of cerebellum and IV. Ventricle as well as relationships on cadavers, preserved brain specimens and models Demonstrate anatomical structures of diencephalon, hypothalamus and epithalamus and III. Ventricle as well as relationships on cadavers, preserved brain specimens and models

Lab: Telencephalon: sulcus, gyrus and lobes, cortical centers, subcortical nuclei (P-2)	1. Demonstrate anatomical structures of telencephalon: sulcus, gyrus and lobes, cortical centers, subcortical nuclei as well as relationships on cadavers, preserved brain specimens and models
Lab: Meninges of the brain; vessels and nerves, dural venous sinuses, ventricular system of the brain: an overview; Vessels of the central nervous system (P-2)	1. Demonstrate the meninges and associated spaces of the brain and spinal cord as well as relationships on cadavers, preserved brain specimens and models 1. Demonstrate the internal carotid artery and vertebral artery and branches of the these two arteries on cadavers, preserved brain specimens and models
Lab: Sympathetic and parasympathetic system (P-2)	1. Demonstrate the sympathetic ganglia and sympathetic trunk, splanchnic nerves and sympathetic nerves and their relationships on cadavers and models 2. Demonstrate parasympathetic ganglia, parasympathetic nervous system structures and their relationships on cadavers and models

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

KNOWLEDGE		
DEP.	TOPIC	LEARNING OUTCOMES
BEHAVIOURAL SCIENCES	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
	Psychodynamic basis of behavior: conscious and unconscious, id, ego, superego (T-1)	1. Explain the two fundamental hypothesis of the psychoanalysis 2. Describe the topographic and structural models 3. Discuss the difference between unconscious and conscious processes and explain the ways uncounscious processes appear in daily life 4. Explain functions of ego 5. Explain the psychosexual development stages
	Self defence mechanisms (T-1)	1. Have a knowledge on different schools of psychoanalysis 2. Discuss main ideas behind ego psychology 3. Define defence mechanism term 4. Explain the function of mechanisms of defence

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 ; Neurotransmitters (T-1)	1. Describe synapse, presynaptic and postsynaptic terms 2. Discuss the differences between electrical and chemical synapses 3. Explain the role and importance of neurotransmitters 4. Describe the different types of receptors that neurotransmitters could bind and their effect of differences of receptors in signal transductions 5. Define synaptic potentials, excitatory postsynaptic potential (EPSP) and inhibitory postsynaptic potential (IPSP) 6. Describe the structures of muscle nerve junctions and how they function 7. 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)	<ol style="list-style-type: none"> 1. Explain what graded potentials are and what they depend on 2. Define convergence and divergence of neurons in neuronal pools 3. Describe how graded potential summate 4. Distinguish between spatial and temporal summation 5. Describe transmitter receptor interactions 6. Discuss dose response relationships for neurotransmitters and drugs that target their receptors
	Biophysical principles of electroencephalogram (EEG) (T-1)	<ol style="list-style-type: none"> 1. Explain EEG electrodes, international 10-10, 10-20 system, 2. Demonstrate anterior-posterior bipolar montage, common average reference montage 3. Distinguish common EEG patterns, gamma, alpha, beta, theta, delta waves 4. Describe rhythmic patterns at characteristic frequencies 5. Describe basic components of EEG 6. Define position of electrodes and polarity 7. Explain diagnostic yield of EEG
	Information in Biological Systems (T-1)	<ol style="list-style-type: none"> 1. Explain information processing, signal and signal processing in biological systems 2. Explain storage of information and biomolecular information 3. Define signal transmissions and channel capacity in information transmission 4. Distinguish operations on biological signals 5. Information processing and channel capacity in the ear, eye and brain
SKILLS		
	Biophysics Lab: Voltage Clamp- Patch Clamp Technique (LAB-1)	<ol style="list-style-type: none"> 1. Demonstrate measuring membrane potential 2. Measure the electrical changes of the cell membrane 3. 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	Biosynthesis of Nonessential amino acids (T-2)	<ol style="list-style-type: none"> 1. Explain the dynamics of the free amino acid pool 2. Describe factors affecting nitrogen balance in health and disease 3. Define essential, conditionally essential, and nonessential amino acids, and list them accordingly. 4. Integrate amino acid synthesis with specific precursors from glycolysis, citric acid cycle and the pentose phosphate pathway. 5. List ketogenic and glucogenic amino acids 6. Define nitrogen fixation and explain the importance in amino acid synthesis 7. Explain the synthesis of glutamate by two different reaction pathways. 8. Explain the synthesis and degradation of glutamine and define its central role in metabolism 9. Describe transamination reaction and explain its role in amino acid synthesis 10. Describe the synthesis pathway of each nonessential amino acid 11. Describe the roles of folic acid, VitB12 and S-adenosylmethionine (SAM) in the transfer of one carbon units between molecules
	Conversion of Amino Acids to Specialized Products (T-1)	<ol style="list-style-type: none"> 1. Cite examples of how amino acids participate in a variety of biosynthetic processes other than protein synthesis. 2. Describe the structure of porphyrin and heme and explain the basic precursors used in heme synthesis, define the rate-limiting step 3. Explain the role of glycine the biosynthesis of heme, purines, creatine and in excretion of metabolites 4. Outline how arginine participates in the biosynthesis of creatine, nitric oxide, putrescine and spermine 5. Explain the synthesis of catecholamines and thyroid hormones from tyrosine

		<ol style="list-style-type: none"> 6. Explain the synthesis of serotonin from tryptophan 7. Explain the synthesis of histamine from histidine 8. Identify the role of tetrahydrobiopterin in amino acid metabolism
	Catabolism of the carbon skeletons of amino acids (T-2)	<ol style="list-style-type: none"> 1. List glucogenic and ketogenic amino acids 2. List the amino acids converted to pyruvate 3. List the amino acids converted to Acetyl CoA 4. Explain the reactions of Phenylalanine and tyrosine metabolism 5. List the amino acids converted to alpha-keto glutarate 6. List the amino acids converted to Succinyl CoA 7. Explain the degradation of branched chain amino acids 8. List the amino acids converted to oxaloacetate
	Catabolism of proteins and amino acid nitrogen (T-2)	<ol style="list-style-type: none"> 1. Explain amino acid structure 2. Categorize the oxidative deamination of amino acids 3. Explain the conditions in which amino acids undergo oxidation 4. Define the phases of amino acid oxidation 5. Discuss transamination reactions 6. List the reactants, cofactor and enzymes in transamination reactions 7. Explain the role of transamination in oxidation of amino acids 8. Discuss the role of glutamine and glutamate as carriers of amino groups 9. Explain the ammonia transport during oxidation of amino acids
	Regulation of urea cycle (T-1)	<ol style="list-style-type: none"> 1. Mention the rate limiting enzyme in urea cycle 2. Explain the role of N-acetylglutamate in urea cycle regulation 3. Explain the biosynthesis of N-acetylglutamate in the formation of urea 4. Discuss the role of carbamoyl phosphate in the regulation of urea
	Urea Cycle (T-2)	<ol style="list-style-type: none"> 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
SKILLS		
	Biochemistry-Lab-Determination of Serum Lipids (LAB-2)	<ol style="list-style-type: none"> 1. List lipids that are measured in serum 2. Tell normal, intermediate and high values of serum lipids 3. Tell how LDL can be calculated by Friedewald equation 4. Explain Colorimetric Cholesterol and Triglyceride Assay Principle 5. Describe how cholesterol and triglyceride tests are applied and the concentrations present in the samples can be calculated

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
EVIDENCE BASED MEDICINE AND STATISTICS	Reviewing the Literature (T-1)	<ol style="list-style-type: none"> 1. Explain the steps in conducting a literature review 2. Explain the place of literature review in research process 3. Explain the functions of literature review as a part of research process
	Abstract and Index Databases (Web of Knowledge, Scopus, Google Scholar); Statistical Evaluation of Bibliographical Data: Evaluation of Journals and Scientists (T-1)	<ol style="list-style-type: none"> 1. Define abstract and index 2. List the major abstract and index online databases 3. Explain how to measure the importance of scientific publication (impact factor and etc.) 4. ,Explain h index (strengths and criticisms of h index)

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
HISTOLOGY AND EMBRYOLOGY	Histology of the nervous system (T-2)	<ol style="list-style-type: none"> Describe the embryologic origin, histological features of cerebrum, cerebellum and medulla spinalis and the relationship of structure and function Describe the histological features of the peripheral nervous system and the relationships of structure and function. Describe the process of myelination, and the function of myelin, including nodes of ranvier in the central and peripheral nervous system and explain the role of the oligodendrocyte and schwann cell, with respect to both myelinated and unmyelinated neurons. Describe the organization of connective tissue in a nerve. Identify some important pathological situations
	Nervous Tissue Histology (T-1)	<ol style="list-style-type: none"> Explain structure and function of the neuronal and neuroglial cells of the nervous system
	SKILLS	
	Lab: Histology of Nervous System (T-2)	<ol style="list-style-type: none"> Show the histological features of cerebrum, cerebellum and medulla spinalis. Demonstrate a neuron and label its key histological and structural features. Explain the microscopic structure of a nerve fiber, including the structure of the myelin sheath and connective tissue organization. Show the histological features of ganglion.

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)	<ol style="list-style-type: none"> Define the general organization of nervous system by explaining its subdivisions as central vs. peripheral; somatic vs. autonomic nervous system; motor vs. sensory divisions Describe the location and constitution of the Central Nervous System (CNS) Define the functions of the various cell types in the nervous system Describe synaptic transmission by giving examples Describe post-synaptic potentials by giving examples Name the main neurotransmitters of the nervous system with their main functions Explain in which ways the neurotransmitter action terminates
	Sensory receptors & receptor potentials (T-1)	<ol style="list-style-type: none"> Define somatic (general) and special senses Describe common features of the sensory receptors Classify sensory receptors based on anatomical position and based on their sensitivity to specific stimulus modalities Describe the basic components of the sensory pathways Explain receptor potential Describe receptive field by giving examples Explain adaptation to a sensory stimuli Explain the differences between rapidly adapting and slowly adapting receptors with their functions Explain the relationship between receptor potential and the number of action potential that sensory neuron is producing
	Sense of touch (T-1)	<ol style="list-style-type: none"> Describe the location, type, and function of receptors that mediate the sensations of touch Describe the steps involved in sensory transduction and action potential generation in cutaneous mechanoreceptors. Differentiate cutaneous receptors based on their location, receptive field, receptor sensitivity, and receptor adaptation. 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-2)	<ol style="list-style-type: none"> 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-2)	<ol style="list-style-type: none"> 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 6. Describe the neural pathways carrying proprioceptive information from periphery to the central nervous system 7. Define the role of cerebellum in proprioception 8. Explain the role of vestibular system in proprioception
Medulla spinalis and ascending pathways (T-2)	<ol style="list-style-type: none"> 1. Describe the structure of the spinal cord 2. Describe the reflex functions carried out by the spinal cord 3. Define the importance of the posture and the locomotion reflexes that are executed by the spinal cord. 4. Define the neuronal circuitry of posture and locomotion and identifies the names of reflexes associated with the posture and locomotion. 5. Describe reciprocal innervation and reciprocal inhibition 6. Defines the effect of shock and decerebration on the functions of the spinal cord 7. Define the effect of the spinal shock process on the autonomic reflexes which are executed by the spinal cord and define the order to the return toward the normal level of these reflexes.
Cerebro-spinal-fluid and the blood-brain-barrier (T-2)	<ol style="list-style-type: none"> 1. Describe regulation of cerebral blood flow 2. Describe characteristics of cerebral microcirculation 3. Describe general properties of cerebrospinal fluid system 4. Describe the functions of anatomical structures that secrete, absorb containing cerebrospinal fluid 5. Describe formation, flow and absorption of cerebrospinal fluid 6. Define the composition of cerebrospinal fluid 7. Describe the characteristics of both blood-cerebrospinal fluid and blood-brain barriers 8. Name diseases that may be related to cerebrospinal fluid and cerebral circulation 9. Describe brain metabolic rate, use of oxygen and nutrients by the neurons

<p>Organization of Cerebral Cortex (T-2)</p>	<ol style="list-style-type: none"> 1. Name the brain lobes 2. Describe white matter and grey matter 3. Describe the 6-layer organization of cerebral cortex by explaining their features and connections 4. Explain 5 major functional divisions of cerebral cortex 5. Localize primary sensory areas, primary motor area, unimodal association areas and multimodal association areas of the cerebral cortex 6. Describe general functions of primary areas, unimodal association areas and multimodal association areas of the cerebral cortex 7. Discuss possible methods that can be used to create functional map of cerebral cortex
<p>Functions of cerebellum and basal ganglia (T-2)</p>	<ol style="list-style-type: none"> 1. Define the functional organization of cerebellum 2. Explain the neural connections of cerebellum with other central nervous system centers 3. Describe the physiological roles of deep cerebellar nuclei 4. Explain the functions of different cell types in cerebellar cortex 5. State the functional organization of basal ganglia 6. Describe the roles of neurons located in different parts of basal ganglia in terms of neurotransmitters 7. Define the role of putamen circuit in motor activities 8. Explain the role of caudate circuit in motor activities
<p>Electroencephalography (T-1)</p>	<ol style="list-style-type: none"> 1. Describe how electroencephalogram (EEG) can be recorded 2. Explain the origin of the EEG signal 3. Describe the primary types of rhythms and their properties that can be observed in an EEG recording 4. List the main clinical uses of the EEG
<p>Control of body movements from reflex to complex motor control (T-2)</p>	<ol style="list-style-type: none"> 1. Define the general principles of central organization of motor pathways 2. Explain the motor functions of spinal cord 3. Describe the roles of motor neurons located in the spinal cord 4. Explain the neural circuitry of stretch reflex and its clinical importance 5. State the neural circuitry of crossed extensor reflex 6. Describe the functional organization of motor cortex in voluntary motor actions 7. Define the roles of corticospinal and corticobulbar tracts in motor actions 8. Explain the function of red nucleus and corticorubrospinal pathway in motor activities 9. Describe the roles of cerebellum, basal ganglia and motor cortex in the execution of voluntary motor actions in an integrated manner
<p>Thalamus, brain stem and reticular formation (T-2)</p>	<ol style="list-style-type: none"> 1. Define physiologic anatomy of the brain stem, the reticular activating system and the thalamus 2. Describe major effects of pontine reticular nuclei on spinal cord and cerebral cortex 3. Describe major effects of medullary reticular nuclei on spinal cord and cerebral cortex 4. Describe major effects of vestibular nuclei in modulation of the RAS 5. Name the brain stem nuclei that synthesise major excitatory / inhibitory neurohormones which are important for control of brain activities 6. Describe major physiological effects of neurohormones in different brain regions 7. Name functions of the thalamic nuclei
<p>Different states of brain and Sleep (T-2)</p>	<ol style="list-style-type: none"> 1. Describe the spectrum of brain states ranging from coma to normal consciousness 2. Differentiate wakefulness from awareness

		<ol style="list-style-type: none"> Describe the behavioral and EEG characteristics of the stages sleep and the mechanisms responsible for their production. Discuss the circadian rhythm and the role of the suprachiasmatic nuclei (SCN) in its regulation. Describe the diurnal regulation of synthesis of melatonin in the pineal gland.
	Autonomic Nervous System and Central Organization of Visceral Functions (T-2)	<ol style="list-style-type: none"> 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
	Limbic system (T-2)	<ol style="list-style-type: none"> List the primary structures involved in the limbic system (the hypothalamus, hippocampus, amygdala and cingulate gyrus) and describe the general functions of each of these structures Describe the vegetative, endocrine and behavioral functions of hypothalamic nuclei Describe the dysfunctions resulting from destruction of hypothalamic nuclei Describe the neural structures involved in reward and punishment, and the role of reward and punishment in learning and memory Define role of hippocampus in learning and memory Describe the role of amygdala in behavior, and behavioral disorders resulting from destruction of amygdala Name the functions of the limbic cortex
	Physiological basis of cognitive functions (learning, memory, attention, language) (T-2)	<ol style="list-style-type: none"> Define anatomical and functional relations of the cerebral cortex to the thalamus and other brain areas Describe the role of the association areas of the cerebral cortex in intellectual functions Describe and differentiate short-term memory, long-term memory and working memory List the forms of memory based on their content by giving examples Describe the mechanisms involved in formation and storage of different forms of memories Explain the anatomical and molecular changes that occur during the formation of different types of memory. Explain the role of prefrontal cortex in working memory and other intellectual functions Describe attention and attention related brain areas Describe the brain areas related with language ability Differentiate the brain areas that are responsible for the comprehension and production of speech

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
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<p>Images of the Medulla Spinalis (T-2)</p>	<ol style="list-style-type: none"> 1. Know the spinal cord anatomy and function 2. Assess the spinal meninges on MRI myelogram 3. Demonstrate spinal nerves and the cord on cross sectional imaging 4. Learn the terms cauda equina, conus medullaris and filum terminale and show them on imaging 5. Understand the concept of the lumbar-sacral nerves existing below corresponding lomber level 6. Learn the method of X-ray and CT myelography 7. Know the spinal segments
<p>Images of the Brainstem (T-1)</p>	<ol style="list-style-type: none"> 1. Learn the parts, contents and location of the brainstem and show them on MRI 2. Show Cerebral peduncle, Substantia nigra, Substantia rubra, Superior colliculus, Inferior colliculus, Aquaductus cerebri of the mesencephalon on MRI 3. Show CN III and IV on MRI 4. Describe the pons and show nucleus of CN V, 4.th Ventricule, Superior cerebellar peduncle, Medial longitudinal fasciculus, Corticospinal tracts on MRI 5. Demonstrate CN VI, CN VII, CN VIII, Cerebellopontin angle sistern, basilar artery, MAI, inner ear structures on MRI 6. Show Cochlear nucleus, Vestibular nucleus, Inferior cerebellar peduncle 7. Demonstrate Medulla oblongata: OLİVA, MEDULLARY PYRAMİD, Glossopharyngeal and Vagus nerves extending to Jugular foramen, Rootlets of CN XI, CN X 8. Show CN XII rootlets emerge from the anterior-lateral sulcus
<p>Images of Cerebellum (T-1)</p>	<ol style="list-style-type: none"> 1. Assess the structures of the posterior cranial fossa on MRI 2. Show 4. th ventricle, Cerebellar tonsil, Foramen magnum, Primary fissure, Tentorium cerebelli on images 3. Demonstrate anterior, posterior and flocculonodular lobes, nodulus, vermis on images 4. Assess the deep nuclei of the cerebellum 5. Describe the cerebellar peduncles on MRI
<p>Images of the Diencephalon, Ventricular System (T-2)</p>	<ol style="list-style-type: none"> 1. Appretiate the anatomy of the ventricular system and the cerebrospinal fluid. 2. Comprehend the anatomy of the dura, arachnoidea, pia-mater 3. Show the epidural, subdural and subarachnoid spaces 4. Depict the cisterns of the cerebrum on MRI images 5. Appretiate the borders of the midbrain, pons, and medulla 6. Show the parts of the mesencephalon, and the traces of the 3rd and 4th cranial nerves and their nuclei on MRI 7. Demonstrate the pons and the 5th, 6th cranial nerves and their nuclei on MRI 8. Depict the borders and parts of the medulla on MRI 9. Show the course of the 7th, 8th, 9 th, 10, 11th, 12 th cranial nerves and their nuclei on MRI
<p>Images of the Telencephalon and the Tractie (T-2)</p>	<ol style="list-style-type: none"> 1. Demonstrate the central sulcus and the pre-postcentral gyri 2. Discern the cingulate sulcus, corpus callosum, cingulate gyrus 3. Appreciate the sulci and gyri of the frontal lob in 3 dimentionions on MRI 4. Appreciate the sulci and gyri of the parietal lob in 3 dimentionions on MRI 5. Demonstrate the sulci and gyri of the temporal lob in 3 dimentionions on MRI 6. Discern the locations of the primary and secondary visual-auditory, motor, somatosensory cortices
<p>Parasympathetic and Sympathetic Nervous System (T-2)</p>	<ol style="list-style-type: none"> 1. Differentiate the basal ganglia on MRI images 2. Appretiate the function of different basal ganglia 3. Depict the structures of the mesencephalon, the nuclei of the 3rd and 4th cranial nerves on MR images 4. Comprehend the inputs and outputs to the basal ganglia 5. Know the blood supply to the basal ganglia

		<ol style="list-style-type: none"> Differentiate the parts of the diencephalus on MR images Appretiate parts of the thalamus and their general function
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At the end of this lesson, the student will be able to:

SKILLS		
DEP	TOPIC	LEARNING OUTCOMES
CLINICAL SKILLS	Applying a cervical collar (T-1) (P-1)	<ol style="list-style-type: none"> Identify indications for cervical collar use Describe the different types of cervical collars Summarize complications of cervical collars Demonstrate how to apply a cervical collar Recall considerations when caring for a patient with a cervical collar

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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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
MEDICAL ETHICS	ETHICS - Moral Philosophy - Major Areas of Ethics -Part 2 (T-2)	<ol style="list-style-type: none"> Define instrumental and principle based ethics Define the other ethical rules Define why ethics necessary for organizations. Give some examples which discussed interactively during the lectures Explain the coordination of the health service delivery process (cases that require cooperation and team service

		in preventive, treatment and rehabilitative services) and ethics
	How To Approach An Ethical Dilemma (T-2)	<ol style="list-style-type: none"> 1. Explain legal and ethical divergences and dilemmas in medical practice 2. Define the solution steps of the ethical dilemma as: <ol style="list-style-type: none"> 1. Step 1: Recognise the situation as one that raises an ethical dilemma 2. Step 2: Break the dilemma into its component parts 3. Step 3: Seek additional information, including the patient's viewpoint 4. Step 4: Identify any relevant law or professional guidance 5. Step 5: Subject the dilemma to critical analysis 6. Step 6: Be able to justify the decision with sound arguments
	Ethic Dilemma; Human Rights, Ethics-Part – 1 (T-2)	<ol style="list-style-type: none"> 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' Rights and Responsibilities 6. Explain Physicians' Rights and Responsibilities
	Ethic Dilemma; Human Rights, Ethics-Part – 2 (T-2)	<ol style="list-style-type: none"> 1. Define the foundations of medical ethics 2. Define the principles of solution for ethical dilemma 3. Define legal conditions 4. Define Ethical issues in medical record, prescription and report writing 5. Define how to make decisions about ethical issues 6. Define Ethical states regarding the beginning and end of life 7. Define Legal and ethical issues in forced treatment

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

KNOWLEDGE

DEP	TOPIC	LEARNING OUTCOMES
PHILOSOPHY	Well-being – I (T-2)	<ol style="list-style-type: none"> 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.
	Well-being – II (T-2)	<ol style="list-style-type: none"> 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.

MED 1008: SENSORY ORGANS AND ENDOCRIN SYSTEM				
Course Date	May 29 – June 23 2023			
Exam Dates	Practical Exams: June 22 2023 Theoretical Exam: June 23 2023, Hour: 10:00-12:00			
Course Coordinator:				
Academic Unit	Academic Staff	Theoretical hours	Practical hours	Total
Anatomy	Çağatay Barut, Prof Eren Öğüt, Assist. Prof.	19	10	29
Behavioural Sciences	Sibel Çakır, Prof. Asil Budaklı, Assist. Prof.	8		8
Biochemistry	Yeşim Neğiş, Assoc. Prof. Özlem Unay Demirel, Assist. Prof. Erdem Yılmaz, Assist. Prof.	8	2	10
Biophysics	Serdar Durdağı, Prof. Bircan Dinç, Assist. Prof. Enes Kotil, Assist. Prof.	6	1	7
Evidence Based Medicine and Statistics	Cüneyd Parlayan, Assist. Prof.	4	-	4
Histology and Embryology	Yasemin Ersoy Canıllıoğlu, Assist. Prof. Dila Şener, Assist. Prof.	8	8	16
Physiology	Sema Tülay Köz, Assoc. Prof. Yasemin Keskin Ergen, Assist. Prof. Mehmet Ozansoy, Assist. Prof.	19	1	20
Radiologic Anatomy	Canan Erzen, Prof.	6	-	6
Clinical Skills	Demet Koç, Assist. Prof.	1	1	2
Communication Skills in Medicine (Group 8)	Figen Dağlı, Prof.	Other groups		
TOTAL		79	23	102
STUDY TIME				38

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
	Olfactory nerve (I), Optic nerve (II), Oculomotor nerve (III) and Trochlear nerve (IV) (T-2)	<ol style="list-style-type: none"> 1. Define cranial nerves I, II, III and IV 2. Describe the location, course, relationships and function of olfactory nerve (I) 3. Identify the olfactory bulb and olfactory tracts 4. Describe the location, course, relationships and function of optic nerve (II) 5. Identify optic chiasm and optic tracts 6. Describe the location, course, relationships and function of oculomotor nerve (III) 7. Describe the location, course, relationships and function of trochlear nerve (IV) 8. Differentiate the nuclei of oculomotor nerve (III) and trochlear nerve (IV) in the brainstem 9. Distinguish the rootlets of oculomotor nerve (III) and trochlear nerve (IV) as they arise from the brainstem 10. List structural features of cranial nerves I, II, III, IV (motor, sense, parasympathetic) 11. Explain clinical aspects of pathologies in terms of anatomy
ANATOMY	Trigeminal nerve (V), Abducens nerve(VI) (T-2)	<ol style="list-style-type: none"> 1. Define Cranial Nerves V And VI 2. Describe The Location, Course, Relationships And Function Of Trigeminal Nerve (V) 3. Identify The Trigeminal Ganglion 4. Describe The Branches Of Trigeminal Nerve: Ophthalmic (V1), Maxillary (V2) And Mandibular (V3) Nerves 5. Identify The Course, Further Branches, Relationships And Distribution Of Each Branch Of Trigeminal Nerve (V) 6. Describe The Location, Course, Relationships And Function Of Abducens Nerve (VI) 7. Differentiate The Nuclei Of Trigeminal Nerve (V) And Abducens Nerve (VI) In The Brainstem 8. Distinguish The Rootlets Of Trigeminal Nerve (V) And Abducens Nerve (VI) As They Arise From The Brainstem 9. List Structural Features Of Cranial Nerves V, VI (Motor, Sense, Parasympathetic) 10. Explain Clinical Aspects Of Pathologies In Terms Of Anatomy
	Facial nerve (VII) and Vestibulocochlear nerve (VIII) (T-2)	<ol style="list-style-type: none"> 1. Define cranial nerves VII and VIII 2. Describe the location, course, relationships and function of facial nerve (VII) 3. Identify the ganglion geniculi 4. Describe the branches of facial nerve 5. Identify the course, further branches, relationships and distribution of each branch of facial nerve (VII)

		<ol style="list-style-type: none"> Describe the location, course, relationships and function of vestibulocochlear nerve (VIII) Differentiate the nuclei of facial nerve (VII) and vestibulocochlear nerve (VIII) in the brainstem Distinguish the rootlets of facial nerve (VII) and vestibulocochlear nerve (VIII) as they arise from the brainstem List structural features of cranial nerves VII, VIII (motor, sense, parasympathetic) Explain clinical aspects of pathologies in terms of anatomy
Glossopharyngeal nerve (IX) and Vagus nerve(X) (T-2)		<ol style="list-style-type: none"> Define cranial nerves IX and X Describe the location, course, relationships and function of glossopharyngeal nerve (IX) Identify the superior and inferior ganglion of glossopharyngeal nerve (IX) Describe the branches of glossopharyngeal nerve Identify the course, further branches, relationships and distribution of each branch of glossopharyngeal nerve (IX) Describe the location, course, relationships and function of vagus nerve (X) Identify the superior and inferior ganglion of vagus nerve (X) Differentiate the nuclei of glossopharyngeal nerve (IX) and vagus nerve (X) in the brainstem Distinguish the rootlets of glossopharyngeal nerve (IX) and vagus nerve (X) as they arise from the brainstem List structural features of cranial nerves IX, X (motor, sense, parasympathetic) Explain clinical aspects of pathologies in terms of anatomy
Accessory nerve (XI) and Hypoglossal nerve (XII) (T-2)		<ol style="list-style-type: none"> Define cranial nerves XI and XII Describe the location, course, relationships and function of accessory nerve (XI) Identify the spinal and cranial roots of accessory nerve (XI) Describe the branches of accessory nerve (XI) Identify the course, further branches, relationships and distribution of each branch of accessory nerve (XI) Describe the location, course, relationships and function of hypoglossal nerve (XII) Differentiate the nuclei of accessory nerve (XI) and hypoglossal nerve (XII) in the brainstem Distinguish the rootlets of accessory nerve (XI) and hypoglossal nerve (XII) as they arise from the brainstem List structural features of cranial nerves XI, XII (motor, sense, parasympathetic) Explain clinical aspects of pathologies in terms of anatomy
Endocrine glands: Adrenal gland, thymus and paraganglions Endocrine glands: Thyroid gland and parathyroid gland (T-2)		<ol style="list-style-type: none"> Describe localization, relationships, vessels and innervation of adrenal gland Describe localization, relationships, vessels and innervation of thymus Describe localization, relationships, vessels and innervation of paraganglions Discuss functions of the adrenal gland, thymus and paraganlions in relation to anatomy of these structures Discuss basics of signs and symptoms that can eventually result from dysfunctions these structuresDescribe localization, relationships, vessels and innervation of thyroid gland Describe localization, relationships, vessels and innervation of parathyroid gland Discuss functions of the thyroid gland and parathyroid gland in relation to anatomy of these structures Discuss basics of signs and symptoms that can eventually result from dysfunctions these structures
Endocrine Glands: Pituitary (hypophysis) gland and pineal gland (T-1)		<ol style="list-style-type: none"> Describe localization, relationships, vessels and connections of pituitary gland Describe localization, relationships, vessels and connections of pineal gland

	<ol style="list-style-type: none"> Discuss functions of the pituitary (hypophysis) gland and pineal gland in relation to anatomy of these structures Discuss basics of signs and symptoms that can eventually result from dysfunctions these structures
Organ of Senses: Organ of Vision (Organum visus) (T-2)	<ol style="list-style-type: none"> Define location and relationships of the eyeball Describe the subdivisions of the eyeball Identify the accessory structures associated with vision Differentiate the structures inside the orbit Discuss the functions of organ of vision
Organ of Senses: Organ of Taste, Organ of Smell, Organ of Touch (Organum gustus, organum olfactus, organum tactus) (T-2)	<ol style="list-style-type: none"> Identify the organ of taste, its relationships, vessels and connections. Describe the organ of smell, its relationships, vessels and connections Describe the organ of smell, its relationships, vessels and connections Discuss the functions of organ of taste, smell, touch Discuss basics of signs and symptoms that can eventually result from dysfunctions of the organ of taste, smell and touch
Organ of Senses: Organ of Hearing and Equilibrium (Organum vestibulocochleare) (T-2)	<ol style="list-style-type: none"> Identify the organ of hearing and equilibrium Describe the location, subdivisions, relationships, vessels and connections of the organ of hearing and equilibrium in detail Discuss the functions of organ of hearing and equilibrium Discuss the basics of signs and symptoms that can eventually result from dysfunctions of the organ of hearing and equilibrium
SKILLS	
Lab 1 :Cranial Nerves I-VI (P-2)	<ol style="list-style-type: none"> Demonstrate the location, course and relationships of cranial nerves I, II, III and IV on cadavers and models Demonstrate The Location, Course And Relationships And Branches Of Cranial Nerves V And VI On Cadavers And Models
Lab 2:Cranial Nerves VII-XII (P-2)	<ol style="list-style-type: none"> Demonstrate the location, course and relationships and branches of cranial nerves VII and VIII on cadavers and models Demonstrate the location, course and relationships and branches of cranial nerves IX and X on cadavers and models Demonstrate the location, course and relationships and branches of cranial nerves XI and XII on cadavers and models
Lab 3 :Organ of Hearing and Equilibrium; Organ of Taste, Organ of Smell (P-2)	<ol style="list-style-type: none"> Demonstrate the location, subdivisions, relationships, vessels and connections of the organ of hearing and equilibrium on cadavers and models Demonstrate organ of taste, organ of smell, organ of touch and their relationships on cadavers and models
Lab 4 :Organ of Vision, Organ of Touch (P-2)	<ol style="list-style-type: none"> Demonstrate the eyeball and its subdivisions, accessory structures associated with vision and structures inside the orbit and their relationships on cadavers and models. Demonstrate organ of touch and their relationships on cadavers and models
Lab 5 :Endocrine Glands: Thyroid gland and parathyroid gland; Adrenal gland, thymus and paraganglions; Pituitary (hypophysis) gland and pineal gland (P-2)	<ol style="list-style-type: none"> Demonstrate adrenal gland, thymus and paraganglions and their relationships on cadavers and models Demonstrate thyroid gland and parathyroid gland and their relationships on cadavers and models Demonstrate pituitary (hypophysis) gland and pineal gland and their relationships on cadavers and models

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

KNOWLEDGE

DEP.	TOPIC	LEARNING OUTCOMES
BEHAVIOURAL SCIENCES	Personality development-1: Basic concepts of psychosexual development theory; Personality development-2: Basic concepts of psychosocial development theory (T-2)	<ol style="list-style-type: none"> 1. Define personality 2. Evaluate and compare different theories in personality
	Psychosocial development periods: eight stages of human and integration (T-2)	<ol style="list-style-type: none"> 1. Examine the eight stages of human emotional and psychological development
	Principles of patient-doctor relationship and psychiatric interview (T-2)	<ol style="list-style-type: none"> 1. Discuss the goals of the psychiatric interview 2. Summarize the key components of a psychiatric interview
	Mental state examination: Symptoms and signs (T-2)	<ol style="list-style-type: none"> 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	Mechanism of hormone action (T-2)	<ol style="list-style-type: none"> 1. Categorize the hormones in terms of mechanism of action 2. Explain the type of receptors that hormones use 3. Determine the different ways of action of hormones that bind to receptors on/in target cells 4. Classify hormones receptors according to localization 5. Discuss the basic model for the action of peptide hormones, catecholamines and other membrane active hormones 6. Explain the factors effecting the target cell response by means of upregulation and downregulation 7. Define permissive, synergistic and antagonistic effect 8. Define agonist and antagonist in terms of hormones 9. Discuss properties of hormone receptor interactions 10. List the hormones that bind to intracellular receptors 11. Explain the pathways involving cell membrane hormone receptors
	Male sex hormones and regulation (T-2)	<ol style="list-style-type: none"> 1. List male sex hormones 2. Identify the structure of male sex hormones 3. Describe the hypothalamic, pituitary and gonadal axis of male hormones 4. Describe the structure of LH and FSH 5. Discuss the feedback regulation of Gonadotropin releasing hormone, LH and FSH in males 6. Describe the main effects of testosterone, anti müllerian hormone 7. Explain the testosterone, antimüllerian hormone 8. Discuss the catabolism of testosterone
	Female sex hormones and regulation (T-2)	<ol style="list-style-type: none"> 1. List female sex hormones 2. Identify the structure of female sex hormones 3. Describe the hypothalamic, pituitary and gonadal axis of female 4. Describe the structure of LH and FSH 5. Discuss the feedback regulation of Gonadotropin releasing hormone, LH and FSH 6. Explain the physiological menstrual cycle in terms of hormones 7. Describe the main effects of estrogens and progesterone 8. Explain the estrogen and progesterone biosynthesis 9. Explain the two cell theory of estrogen production in the ovary 10. Discuss the catabolism of estrogen and progesterone

Placenta, amnion fluid and cord blood's biochemistry (T-2)	<ol style="list-style-type: none"> 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 fetoprotein 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
SKILLS	
Determination of serum protein (P-2)	<ol style="list-style-type: none"> 1. Explain the basic principles of different methods (e.g. biuret, Lowry, Bradford, Bicinchoninic acid, spectrophotometric) used for protein measurement 2. Compare each protein measurement method in terms of sensitivity, time and interferences. 3. Tell the normal level of serum proteins and comments on clinical significance of serum protein levels 4. Describe how serum protein is measured by Bradford assay 5. Explain how the total protein concentration is calculated in samples

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

KNOWLEDGE

DEP.	TOPIC	LEARNING OUTCOMES
	Understanding biological systems using physical chemistry. Signal transductions (T-1)	<ol style="list-style-type: none"> 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
BIOPHYSICS	Olfactory System and sense of taste (T-1)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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 (LAB-1)	<ol style="list-style-type: none"> 1. Measure the propagation time t of a sound pulse in air at room temperature as a function of the distance s between 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:

KNOWLEDGE

DEP.	TOPIC	LEARNING OUTCOMES
HISTOLOGY AND EMBRYOLOGY	Histology Of Endocrine Organs (T-2)	<ol style="list-style-type: none"> 1. Recognize histologic features of each of the endocrine organs (pituitary, epiphysis, thyroid, parathyroid and adrenal glands) and relate their structure to function and explain the close proximity of the vasculature in the endocrine organs. 2. Describe the relations, embryological origin and the histological appearance of the pituitary, thyroid, parathyroid and adrenal glands. 3. Describe structural and functional relationships between the hypothalamus and the pituitary gland 4. Discuss the structure of the anterior and posterior pituitary and describe the effects of their hormones 5. Name the cell types that produce the various hormones of the anterior pituitary and know whether they are acidophils or basophils. 6. Know the products of the organs and how their synthesis and release are controlled. 7. Explain how structures seen in the thyroid gland are involved in the production of thyroglobulin, its storage, and its subsequent breakdown to yield thyroid hormones and explain what is unique about the structure of the thyroid gland. 8. Compare the structure of the thyroid with that of the parathyroid. 9. Name and describe the different layers of the cortex of the adrenal gland, as well as the blood supply to this gland. 10. Recognize the adrenal medulla in histological section and explain the functional similarity of its cells to those of the sympathetic nervous system. 11. Identify islets of Langerhans within pancreatic tissue and explain the relative positions of alpha and beta cells.
	Histology Of Eye (T-2)	<ol style="list-style-type: none"> 1. Describe the three layers of the wall of the eye and the main structural elements of each layer 2. Identify the embryologic origin of the eye 3. Understand the morphologic organization and functions of the various components of the eyelid and conjunctiva. 4. Describe the specialized structures associated with the functions of all structures forming the eye 5. Explain the production and flow of the aqueous humor, the origin and function of this fluid

		<ol style="list-style-type: none"> Describe the structure and function of the retinal epithelium and identify relationship between this epithelium and the outer segments of the rods and cones Compare the structure and function of the rods and cones Describe the fovea, optic disk, and where blood vessels are located in the retina.
	<p>Histology Of Ear (T-2)</p>	<ol style="list-style-type: none"> Describe the overall organization of the ear, and the histologic components of the external and middle ear regions with their characteristics features of them and explain the embryologic origin of them. Identify the structural differences between the outer, middle and inner ear and what their functions are Recognize the location and structure of the cochlea and its compartments and the location and formation of endolymph. Identify the structure and function of hair cells in the cochlear organ of corti and the vestibular portions of the inner ear. Describe what sensory hair cells are and explain how they differ (in appearance and function) from neurons of the spiral ganglion.
	<p>Histology Of Skin And Adnex (T-2)</p>	<ol style="list-style-type: none"> Identify the epidermis and discuss its embryological origin, organization and functions with its cells Describe the dermis and hypodermis and discuss their embryological origins, organization and functions. Distinguish two types of the skin with their features and functions Describe a variety of skin adnexa and determine their function Identify the skin sensorial receptor with their morphological features. Recognize some key pathological examples affecting skin and epidermal derivatives
SKILLS		
	<p>LAB: Microscopic Structures of Endocrine Organs (LAB-2)</p>	<ol style="list-style-type: none"> Show and describe the cellular organization of the major organs of the endocrine system. Distinguish the different types of pituitary cells using the light microscope Recognize the thyroid and parathyroid gland in histological section and identify follicular, parafollicular cells in the thyroid gland and the chief cells and oxyphil cells in the parathyroid gland. Name and describe the different layers of the adrenal gland with their specific histological features. Recognize the adrenal medulla in histological section with its histological features.
	<p>Lab: Microscopic Structures of Ear (LAB-2)</p>	<ol style="list-style-type: none"> Show the structural differences between the outer, middle and inner ear and recognize them at the light microscope levels. Distinguish the auditory parts of the inner ear from those of the vestibular system. Show the components of the organ of corti
	<p>Lab: Microscopic Structures of Eye (LAB-2)</p>	<ol style="list-style-type: none"> Distinguish three layers of the eye with their morphologic features Show the retinal epithelium with their cells by light microscope Demonstrate the layers of the cornea and say histologic features.
	<p>Lab: Microscopic Structures of Skin And Adnex (LAB-2)</p>	<ol style="list-style-type: none"> Distinguish two types of the skin by light microscope Name and distinguish the five layers of the epidermis by light microscope Identify the two layers of the dermis and hypodermis Show the skin sensorial receptor and say their morphological features.

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

KNOWLEDGE

DEP.	TOPIC	LEARNING OUTCOMES
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PHYSIOLOGY	Introduction To Endocrine System (T-2)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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
	Parathyroid Hormone And Bone Metabolism (T-2)	<ol style="list-style-type: none"> 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

		<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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-2)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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-3)	<ol style="list-style-type: none"> 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 (Lab-1)	<ol style="list-style-type: none"> 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 10. State the usage of Weber-Rinne test for assessing auditory problems
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At the end of this lesson, the student will be able to:

KNOWLEDGE		
DEP.	TOPIC	LEARNING OUTCOMES
RADIOLOGIC ANATOMY	Images Of The Endocrine System (T-2)	<ol style="list-style-type: none"> 1. Demonstrate pituitary images on MRI 2. Know the shape, dimensions, function and neighbours of the pituitary gland 3. Evaluate the thyroid gland on US and CT 4. Know the function, dimensions of the thyroid gland 5. Depict the parathyroid glands on CT and know its function 6. Demonstrate the adrenal glands on CT and know its function
	Radiological Imaging Of The Ear And The Eye (T-2)	<ol style="list-style-type: none"> 1. Depict all the anatomical structures of the middle and inner ear on CT images. 2. Evaluate the 7th and 8th cranial nerves on MRI 3. Demonstrate the cochlea and ventricles on 3D images 4. Depict the orbital bones on radiography and CT 5. Show the orbital muscles on MRI 6. Know the compartments of the eye 7. Demonstrate the optic nerve and optic tract on MRI
	Cranial Nerves- Radiological Anatomy (T-2)	<ol style="list-style-type: none"> 1. Differentiate between the motor and sensory nuclei of the cranial nerves in the brain stem 2. Depict the traces of CN I, CN II 3. Show the nuclei and the course of CN III, CN IV, CN V, CN VI 4. Follow the CN VII to the face 5. Differentiate the nuclei of CN IX, CN X, CN XI, CN XII and follow their course

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

SKILLS		
DEP	TOPIC	LEARNING OUTCOMES
CLINICAL SKILLS	Oropharyngeal Airway Insertion (T-1) (P-1)	<ol style="list-style-type: none"> 1. Explain the characteristics of an oropharyngeal airway 2. Describe the selection process of an appropriate sized oropharyngeal airway 3. Describe the technique to insert an oropharyngeal airway 4. Identify the appropriate safety precautions to be taken when using an oropharyngeal airway

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

SKILLS		
DEP	TOPIC	LEARNING OUTCOMES
EVIDENCE BASED MEDICINE AND STATISTICS	Identifying variables (T-1)	<ol style="list-style-type: none"> 1. Explain what variables and concepts are and how they are different 2. Explain how to turn concepts into operational variables 3. Explain the types of variables from the viewpoint of: <ol style="list-style-type: none"> a) Causation b) The study design
	Types of measurement scale (T-1)	<ol style="list-style-type: none"> 1. Explain the nominal or classificatory scale 2. Explain the ordinal or ranking scale 3. Explain the interval scale
	Measures of central tendency and dispersion, asymmetry (T-2)	<ol style="list-style-type: none"> 1. Explain the essential understanding of data and information 2. Understand how data is dispersed and by which factors and parameters are effecting the data distribution 3. Learn how data input is plotted or laid out on graphical settings and what are reason of symmetricity and asymmetry

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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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