### The Hashemite University





الجامعة الهاشمية



Deanship of Academic Development and International Outreach عمادة التطوير الأكاديمي والتواصل الدولي

# Syllabus: Molecular Biology and Histology (111501105) Second Semester 2023 /2024

COURSE INFORMATION			
Course Name:	Molecular Biology and Histology	Course Code: 111501105	
Semester:	Second	Section: All	
Department:	Department of Anatomy,	Core Curriculum: MD Program	
	Physiology, and Biochemistry		
Faculty:	Faculty of Medicine		
Day(s) and Time(	s):	Credit Hours: 3	
Histology Lecture	es:	Prerequisites: None	
Sunday 10:	30am – 11:30am Group A		
Sunday 9:3	0am – 10:30am Group B		
Molecular Biolog	y Lectures:		
Thursday 1	1:30am – 12:30pm Group A		
Thursday 1	2:30pm – 1:30pm Group B		
Histology Lab Sessions (starting from 3 <sup>rd</sup> week):			
Sunday 11:30am – 1:30pm Group A			
Tuesday 11	.:30am — 1:30pm Group B		
Classroom:			
Lectures:			
Halls 301 and 302	2		
Labs: Histology La	abs (Faculty of Medicine, 2 <sup>nd</sup> floor,		
Rooms 3060 and	3061)		
COURSE DESCRIPTION			
Histology is a basic medical science that studies normal microscopic features of tissues, ultra-			

Histology is a basic medical science that studies normal microscopic features of tissues, ultrastructure of cells and their relation to functions. Through class lectures and lab sessions, the students will be made to master the basic knowledge and theory of human histology. Students are also encouraged to train themselves to use the microscope correctly and to refine their abilities to analyze and describe various histological structures. In Molecular Biology, the students are taught about the relationship between macromolecules structure and properties and their biological functions inside the cells.

#### **DELIVERY METHODS**

The course will be delivered through a combination of active learning strategies. These will include:

- PowerPoint lectures and active classroom-based discussion
- Collaborative learning through small groups acting in an interdisciplinary context.
- Relevant films and documentaries
- Video lectures
- E-learning resources: e-reading assignments and practice quizzes through Microsoft Team

	FACULTY INFORMATION		
Name	Dr. Mustafa Saad Yousuf (Histology - Course coordinator)		
Academic Title:	Tutor		
Office Location:	Faculty of Medicine, 2 <sup>nd</sup> floor, Room 3019		
Telephone Number:	5432		
Email Address:	mustafas@hu.edu.jo		
Office Hours:	Sunday To be determined		
	Tuesday To be determined		
	Please send an e-mail (mustafas@hu.edu.jo) to meet at		
	any other time. You can also contact me through Microsoft		
	Teams		
Name	Dr. Jihad Alzyoud (Histology)		
Academic Title:	Associate Professor		
Office Location:	Faculty of Medicine, 1 <sup>st</sup> floor, Room 2041		
Telephone Number:	5602		
Email Address:	jihada@hu.edu.jo		
Office Hours:	Sunday To be determined		
	Monday To be determined		
	Tuesday To be determined		
	Wednesday To be determined		
	Please send an e-mail (jihada@hu.edu.jo) to meet at any		
	other time. You can also contact me through Microsoft		
	Teams		
Name	Dr. Ahmed Salem (Molecular Biology)		
Academic Title:	Assistant Professor		
Office Location:	Faculty of Medicine, Ground floor, Room 1019		
Telephone Number:	5433		
Email Address:	asalem@hu.edu.jo		
Office Hours:	Tuesday To be determined		
	Thursday To be determined		

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	other time.		
Name	Dr. Nebras Melhem (Molecular Biology)		
Academic Title:	Full-time Lecturer		
Office Location:	Faculty of Medicine, Ground floor, Room 1039		
Telephone Number:	N/A		
Email Address:	nebras@hu.edu.jo		
Office Hours:	Sunday To be determined		
	Tuesday To be determined		
	Please send an e-mail (nebras@hu.edu.jo) to meet at any		
	other time.		

### **REFERENCES AND LEARNING RESOURCES**

### <u>Histology</u>

### Required Textbook:

 Anthony L. Mescher. Junqueira's Basic Histology: Text and Atlas (McGraw-Hill Education. 15<sup>th</sup> edition: 2018). ISBN: 978-1260026177

### Suggested Additional Resources:

- Michael H. Ross and Wojciech Pawlina, *Histology: A Text and Atlas, with Correlated Cell and Molecular Biology* (Lippincott Williams & Wilkins. 8<sup>th</sup> edition: 2018). ISBN: 978-1496383426
- Victor P. Eroschenko, Atlas of Histology with Functional Correlations (Lippincott Williams & Wilkins. 13<sup>th</sup> edition: 2017). ISBN: 978-1496316769

### Useful Web Resources:

Histology Guide – virtual microscopy laboratory - <a href="https://histologyguide.com/">https://histologyguide.com/</a>

### <u>Molecular Biology</u>

### **Required Textbook:**

 Victor W. Rodwell, David A. Bender, Kathleen M. Botham, Peter J. Kennelly, P. Anthony Weil. *Harper's Illustrated Biochemistry* (McGraw-Hill Education / Medical. 31<sup>st</sup> edition: 2018). ISBN-13: 978-1259837937, ISBN-10: 1259837939

### Suggested Additional Resources:

- Thomas M. Devlin. *Textbook of Biochemistry with Clinical Correlations* (John Wiley & Sons. 7<sup>th</sup> edition: 2010). ISBN-10: 0470281731, ISBN-13: 978-0470281734
- D. M. Vasudevan, S. Sreekumari, Kannan Vaidyanathan. *Textbook of biochemistry for medical students.* (Jaypee Brothers Medical publishers. 2019). ISBN-10: 9350905302, ISBN-13: 978-9350905302

## STUDENT LEARNING OUTCOMES MATRIX

Program Learning Outcomes	Course Objectives	Course Student Learning Outcomes	Assessment Method
	Histology:		
D1 D5 E2	1. Introduction: Understand the main principles of microscopy and tissue preparation.	<ul> <li>1.1 Study the main parts of light microscopes and the function of each.</li> <li>1.2 Understand the principles of light and electron microscopy and atomic force microscopes.</li> <li>1.3 Know the steps used in the routine preparation of tissues for histological study and the justification for each step.</li> <li>1.4 Understand the principles of tissue staining.</li> <li>1.5 Comprehend the principles of various special techniques used in tissue preparation.</li> <li>1.6 Recognize problems that may occur during the process of tissue preparation.</li> </ul>	• Exams
D1 D5 E2	2. Epithelial tissue: Recognize the structure, types, and functions of epithelial tissues.	<ul> <li>2.1 Define epithelial tissue and recognize its main features.</li> <li>2.2 Classify epithelium and understand the bases behind the classification.</li> <li>2.3 Identify the main functions and locations of the different types of epithelia.</li> <li>2.4 Understand the various methods to classify glands. Know examples of each type.</li> <li>2.5 Define cell polarity.</li> <li>2.6 Identify the specialized features of the different regions of a cell.</li> <li>2.7 Correlate function with appearance.</li> </ul>	• Exams
D1 D5 E2	3. Connective tissue: Recognize the structure, types, and functions of connective tissues.	<ul> <li>3.1 Define connective tissue and recognize its main features.</li> <li>3.2 Enumerate the various types of cells of the connective tissue and recognize their main features and functions.</li> <li>3.3 Define the extracellular matrix and know its main components.</li> <li>3.4 Classify connective tissue and understand the bases behind the classification.</li> <li>3.5 Identify the main features and functions of the various types of proper connective tissue.</li> <li>3.6 Define cartilage. Know the types of cartilage and the main features, locations, and functions of each type.</li> <li>3.7 Define bone. Recognize the main features and functions of bone cells. Classify bone into its types. Define the epiphyseal plate. Understand the process of ossification.</li> <li>3.8 Define blood. Know the components of blood. Identify the main features and functions of blood.</li> <li>Identify the main features and functions of blood.</li> </ul>	• Exams

	4. Nervous tissue:	4.1 Identify the characteristic features of neurons.	Exams
	Recognize the main	4.2 Enumerate the types of glia cells. Know the main	Examp
	features of the nervous	features, location, and functions of each type.	
D1	tissue	4.3 Understand the histology of the main parts of the	
		central nervous system.	
D5		4.4 Identify the components of the blood-brain	
		barrier.	
E2		4.5 Understand the basic histology of peripheral	
		nerves and ganglia.	
		4.6 Correlate function with appearance.	
	5 Muscular tissue:	5.1 Recognize the main histological features of skeletal	Frams
	Becognize the structure	muscle tissue	C EXCITIS
D1	types and functions of	5.2 Identify the various components of sarcomeres	
	muscular tissues	5.3 Recognize the main histological features of cardiac	
D5	muscular tissues.	muscle tissue	
		5 4 Recognize the main histological features of smooth	
E2		muscle tissue	
		5.5 Correlate function with annearance	
	6 Practical Histology:	6.1 Recognize the various types of enithelial tissues	Evams
	Gain the ability to	from microsconic slides	
	recognize basic body	6.2 Recognize the various types of connective tissues	
D1	tissues from microscopic	from microscopic slides	
DI	slides	6.3 Recognize the various types of neurons and glia	
D5	311023	cells and the main parts of the pervous system from	
55		microsconic slides	
E2		6.4 Recognize the various types of muscular tissues	
LZ		from microscopic slides	
		6.5 Apply knowledge of features to practice	
		6.6 Correlate function with annearance	
		of conclute function with appearance.	
	Molecular Biology		
	7. Carbohydrates of	7.1 Define carbohydrates and list their classification.	<ul> <li>Exams</li> </ul>
	biological importance:	7.2 Recognize the structure and functions of	
	Develop an	monosaccharides.	
	understanding of	7.3 List the important monosaccharides and their	
	carbohydrates of	derivatives and point out their importance.	
	biological importance	7.4 List the important disaccharides, recognize their	
D1		structure and mention their importance.	
		7.5 Define glycosides and mention biologically	
D5		important examples.	
		7.6 State examples of homopolysaccharides and	
E2		describe their structure and functions.	
		7.7 Classify glycosaminoglycans, mention their	
		constituents and their biological importance.	
		7.8 Define proteoglycans and point out their	
		functions.	
		7.9 Differentiate between glycoproteins and	
		proteoglycans.	
	8. Lipids of biological	8.1 Define and identify the major classes of lipids in	• Exams
D1	importance:	the human body and in our diet.	
	Develop an	8.2 Classify the fatty acids and recognize their general	
D5	understanding of lipids	structure and importance in the body.	
	of biological importance	8.3 List the types and functions of eicosanoids.	
E2		8.4 Define simple lipids and classify them into two	
		main subgroups.	

		8.5 Recognize the components and properties of triacylglycerol.	
		8.6 Illustrate the basic structure of the different	
		classes of compound lipids and recognize their	
		importance.	
		8.7 Identify the types and function of different	
		steroids.	
	9. Proteins of biological importance:	9.1 List and name the 20 amino acids that commonly occur in proteins and classify them according to	<ul> <li>Exams</li> </ul>
	Develop an	chirality, polarity, size, and charge.	
	understanding of protein	9.2 Define essential, conditionally essential, and	
	structure	nonessential amino acids, and list them accordingly.	
D1		9.3 Describe the bonds and forces (peptide, disulfide,	
		and hydrogen bonds; hydrophobic, dipole-dipole, van	
D5		der Waals, and electrostatic interactions) that	
		contribute to the conformation of proteins and the	
E2		interaction of proteins with other biomolecules.	
		9.4 Define and discuss the following terms:	
		peptide bond, peptide backbone, N-terminus, C-	
		terminus, disulfide bridges	
		9.5 Discriminate between primary, secondary, tertiary,	
		and quaternary protein structure.	

#### ACADEMIC SUPPORT

It is The Hashemite University policy to provide educational opportunities that ensure fair, appropriate and reasonable accommodation to students who have disabilities that may affect their ability to participate in course activities or meet course requirements. Students with disabilities are encouraged to contact their instructor to ensure that their individual needs are met. The University through its Special Need section will exert all efforts to accommodate for individual's needs.

Special Needs Section: Student Services and Care Unit Tel: 053903333 ext. 4132 / 4583 / 5023 Location: Deanship of Students Affairs Email: <u>stydent@hu.edu.jo</u>

#### **COURSE REGULATIONS**

#### Participation

Class participation and attendance are important elements of every student's learning experience at The Hashemite University, and the student is expected to attend all classes. A student <u>should not miss more than 15%</u> of the classes during a semester. *Those exceeding this limit of 15% will receive a failing grade regardless of their performance*. It is a student's responsibility to monitor the frequency of their own absences. Attendance record begins on the first day of class irrespective of the period allotted to drop/add and late registration. It is a student's responsibility to sign-in; failure to do so will result in a non-attendance being recorded.

In exceptional cases, the student, with the instructor's prior permission, could be exempted from attending a class provided that the number of such occasions does not exceed the limit allowed by the University. The instructor will determine the acceptability of an absence for being absent. A student who misses more than 25% of classes and has a valid excuse for being absent will be allowed to withdraw from the course.

### Plagiarism

Plagiarism is considered a serious academic offence and can result in your work losing marks or being failed. The Hashemite University expects its students to adopt and abide by the highest standards of conduct in their interaction with their professors, peers, and the wider University community. As such, a student is expected not to engage in behaviours that compromise his/her own integrity as well as that of the Hashemite University.

Plagiarism includes the following examples and it applies to all student assignments or submitted work:

- Use of the work, ideas, images or words of someone else without his/her permission or reference to them.
- Use of someone else's wording, name, phrase, sentence, paragraph or essay without using quotation marks.
- Misrepresentation of the sources that were used.

### <u>The instructor has the right to fail the coursework or deduct marks where plagiarism is</u> <u>detected</u>

#### Student Complaints Policy

Students at The Hashemite University have the right to pursue complaints related to faculty, staff, and other students. The nature of the complaints may be either academic or non-academic. For more information about the policy and processes related to this policy, you may refer to the students' handbook.

#### Absences from exams

If a student misses an examination, then he/she has the opportunity to do a make-up examination, according to the University Regulations. A student is not allowed to have a makeup exam unless he/she presents a valid excuse within 72 hours of the scheduled exam or when the excuse is lifted. The excuses are presented to the Excuse Committee, which has the right to accept or refuse the excuse. Only a student with an accepted excuse will be able to take the make-up exam. (The time and date of the makeup exams will be announced at the appropriate times).

### Health and safety procedures

College members and students must at all times, conform to Health and Safety rules and procedures.

### COURSE ASSESSMENT

#### **Course Calendar and Assessment**

Students will be graded through the following means of assessment and their final grade will be calculated from the forms of assessment as listed below with their grade weighting taken into account.

Assessment	Grade Weighting	Approximate Time
Mid Exam	40%	To be determined
Practical Exam	20%	To be determined
Final Exam	40%	To be determined

#### **Description of Exams**

Test questions will predominately come from the material presented in the lectures. The exam will consist of multiple-choice questions for the regular exams and short essay questions for makeup exams (for students with accepted excuses, only documented absences will be considered as per the Hashemite University guidelines).

Grades are not negotiable and are awarded according to the following criteria:

Letter Grade	Description	Grade Points
A+	Excellent	4.00
А		3.75
A-		3.50
B+	Very Good	3.25
В		3.00
B-		2.75
C+	Good	2.50
С		2.25
C-		2.00
D+	Pass	1.75
D	Pass	1.50
F	Fail	0.00
I.	Incomplete	-

## WEEKLY LECTURE SCHEDULE AND CONTENT DISTRIBUTION

Week	Lecture / Lab	Торіс	Chapter of Recommended Book*
Week 1	Histology Lecture 1	<ul><li>Microscopy</li><li>Tissue preparation</li></ul>	Junqueira's Chapter 1
	Molecular Biology Lecture 1	Classification & Forms of     Isomerism of monosaccharides	Harper's Illustrated Biochemistry: Chapter 15
Week 2	Histology Lecture 2	Epithelium I: Definition Classification	Junqueira's Chapter 4
	Molecular Biology Lecture 2	<ul> <li>Importance of monosaccharides &amp; Monosaccharides derivatives</li> </ul>	Harper's Illustrated Biochemistry: Chapter 15
Week 3	Histology Lecture 3	<ul> <li><u>Epithelium II:</u></li> <li>Simple epithelium</li> <li>Stratified epithelium</li> <li>Glandular epithelium</li> </ul>	Junqueira's Chapter 4
	Molecular Biology Lecture 3	<ul> <li>Disaccharides, Oligosaccharides &amp; Homogeneous polysaccharides</li> </ul>	Harper's Illustrated Biochemistry: Chapter 15
Week 4	Histology Lecture 4	<ul> <li><u>Epithelium III:</u></li> <li>Epithelial cell polarity</li> </ul>	Junqueira's Chapter 4
Week 4	Molecular Biology Lecture 4	Heteropolysaccharides I	Harper's Illustrated Biochemistry: Chapter 15
Wook 5	Histology Lecture 5	Connective tissue I: Definition Cells	Junqueira's Chapter 4
	Molecular Biology Lecture 5	Heteropolysaccharides II	Harper's Illustrated Biochemistry: Chapter 15
	Histology Lecture 6	<ul> <li><u>Connective tissue II:</u></li> <li>Extracellular matrix</li> <li>Classification of connective tissue</li> <li>Proper connective tissue</li> </ul>	Junqueira's Chapter 4
Week 6	Molecular Biology Lecture 6	<ul> <li>Definition, importance and classification of lipids</li> <li>Fatty Acids: - Nomenclature, classifications and examples of fatty acids</li> </ul>	Harper's Illustrated Biochemistry: Chapter 21
Week 7	Histology Lecture 7	<u>Connective tissue III:</u> <ul> <li>Adipose tissue</li> <li>Blood</li> </ul>	Junqueira's Chapter 6 Junqueira's Chapter 12
	Molecular Biology Lecture 7	<ul> <li>properties of fatty acids, TAG and waxes</li> </ul>	Harper's Illustrated Biochemistry: Chapter 21
Week 8	Histology Lecture 8	Connective tissue IV: • Cartilage	Junqueira's Chapter 7
	Molecular Biology Lecture 8	<ul> <li>Compound Lipids: Types and importance of phospholipids &amp; glycolipids part I</li> </ul>	Harper's Illustrated Biochemistry: Chapter 21
Week 9	Histology Lecture 9	Connective tissue V: • Bone (part 1)	Junqueira's Chapter 8

	Molecular Biology Lecture 9	<ul> <li>Compound Lipids: Types and importance of phospholipids &amp; glycolipids part II</li> </ul>	Harper's Illustrated Biochemistry: Chapter 21
Week 10	Histology Lecture 10	Connective tissue VI: • Bone (part 2)	Junqueira's Chapter 8
	Molecular Biology Lecture 10	<ul> <li>Derived Lipids - Classification and importance of steroids (sterols, bile acids and steroid hormones)</li> </ul>	Harper's Illustrated Biochemistry: Chapter 21
Week 11	Histology Lecture 11	Nervous tissue I: Neurons Glia cells	Junqueira's Chapter 9
	Molecular Biology Lecture 11	<ul> <li>Chemical and nutritional classification of amino acids I</li> </ul>	Harper's Illustrated Biochemistry: Chapter 3
Week 12	Histology Lecture 12	<ul> <li><u>Nervous tissue II:</u></li> <li>Central nervous system</li> <li>Peripheral nervous system</li> </ul>	Junqueira's Chapter 9
	Molecular Biology Lecture 12	Chemical and nutritional classification of amino acids II	Harper's Illustrated Biochemistry: Chapter 3
Week 13	Histology Lecture 13	Muscular tissue: • Skeletal muscle tissue • Cardiac muscle tissue • Smooth muscle tissue	Junqueira's Chapter 10
	Molecular Biology Lecture 13	• Properties of amino acids & biologically important peptides	Harper's Illustrated Biochemistry: Chapter 3
Week 14	Molecular Biology Lecture 14	Structure & classification of proteins	Harper's Illustrated Biochemistry: Chapters 4, 5

\* Refer to 'References and Learning Resources' section above for the full title of the recommended books

"Lecture hours and weeks are approximate and may change as needed"