Republic of Yemen

Ministry of Higher Education & Scientific Research

21 SEPTEMBER UNIVERSITY of MEDICALS & APPLIEED

SCIENCES

Faculty of Laboratory Medicine.

Department of Biochemistry and Molecular biology
Course Specification of Advanced Biochemistry II
Course No. (03.11.318)
2022 /2023

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
Dr. Nabil Alowiri	Dr. Ebtesam Al-Zabedi	DrNawal Al- Henhena	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

I. Course Identification and General Information:

1	**Course Title:**	Advanced Biochemistry II			
2	**Course Code & Number:**	**03.11.318**			
3	**Credit Hours:**	**Theory Hours**			
		Lecture	**Exercise**	Practical	**Credit Hours**
		2	0	0	2
4	**Study Level/ Semester at which this Course is offered:**	1st Level / 2nd Semester			
5	**Pre –Requisite (if any):**	None			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Master Degree Biochemistry and Molecular biology			
8	**Language of Teaching the Course:**	English			
9	**Study System:**	Semester			
10	**Mode of Delivery:**	Regular			
11	**Location of Teaching the Course:**	University Campus			
12	**Prepared by:**	Dr. Nabil Alowiri			
13	**Date of Approval:**	2023			

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
Dr. Nabil Alowiri	Dr. Ebtesam Al-Zabedi	DrNawal Al- Henhena	Dr\Gamil Taher Abdul Maghni	- Associate Prof. Dr. Ebtesam Al-Zabedi

II. Course Description:

The focus is on the regulation of sugar and fat metabolism in eukaryotes, with an emphasis on human. The course will begin with a review of carbohydrate and lipid metabolic pathways, particularly pathway integration and regulation. We will then progress to an in-depth analysis of current research in specific areas of nutritional sensing, signaling and metabolic regulation.

III. Alignment Course Intended Learning Outcomes with program outcomes

	III. Course Intended Learning Outcomes (CILOs)	Referenced PILOs
A. Knowledge and Understanding: *Upon successful completion of the course, students will be able to:*		
a1	**Demonstrate** knowledge and understanding of the principles that govern the structures of macromolecules and their metabolic pathways	A1
B. Intellectual Skills: *Upon successful completion of the course, students will be able to:*		
b1	**Explain** the structure, functions, and metabolism of lipids in the living system	B2
C. Professional and Practical Skills: *Upon successful completion of the course, students will be able to:*		
c1	**Apply** theoretical and practical aspects of enzyme kinetics, inhibition, mechanisms, and regulation.	C1
D. Transferable Skills: *Upon successful completion of the course, students will be able to:*		

C. Alignment Course Intended Learning Outcomes with Teaching Strategies and Assessment methods:			
(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
A1	**Demonstrate** knowledge and understanding of the principles that govern the structures of macromolecules and their metabolic pathways	Lectures	Exams
(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
B1	**Explain** the structure, functions, and metabolism of lipids in the living system	Lectures	Exams, Assignments.
C Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
C1	**Apply** theoretical and practical aspects of enzyme kinetics, inhibition, mechanisms, and regulation.	Lectures Practical sessions	Lab reports, Exams
(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies

NO.	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Inborn Errors of Metabolism	Diseases enzymes and genes, defects in enzyme synthesis, genetic heterogeneity, pathogenic mechanism in inherited metabolic diseases, diagnosis of inherited metabolic diseases	4	8	a1,,b1,c1
3	Molecular aspects of signal transduction	Signaling mediated-processes; Intracellular receptors (steroid hormones), cell-surface receptors (cAMP and calcium).	3	6	a1,,b1,c1
4	Regulation of cAMP concentration by hormones	Adenylate cyclase, phosphodiesterase, G-protein, mechanism of action of cAMP, specificity of cAMP-dependent protein kinase, structure and mechanism of action of the protein kinase	2	4	a1,,b1,c1
5	Modulation of cytoplasmic Ca2+ by hormones	Catecholamine's receptors, calcium as second messenger, effect of calcium on liver metabolism, nature of intracellular calcium pool, mechanism of action of Ca2+ as a regulator (Calmodulin its structure and physical properties, effect of calmodulin binding to target enzymes).	2	4	a1,,b1,c1
6	Ca2+ and cellular regulation	Control of calcium levels, its transport across plasma membrane and endoplasmic reticulum, uptake by sarcoplasmic reticulum and its release, mitochondrial calcium uptake and its efflux, sodium-independent efflux, calcium cycling or buffering.	1	2	a1,,b1,c1
7	Interactions between cAMP and Ca2+ as messengers	Levels of interaction, effects of calcium on cAMP metabolism, effect of cAMP on calcium metabolism, interactions at the level of intermediary metabolism.	1	2	a1,,b1,c1
8	Hormone action and phosphatidylinositol turnover	Reactions of phosphatidylinositol metabolism, enzymes of inositol lipid metabolism, possible messenger molecules	2	4	a1,,b1,c1
10	Final Exam		1	2	
Number of Weeks /and Units Per Semester			16	32	

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V. Teaching Strategies of the Course:	
1-	Lectures
2-	Practical session
3-	Self-leaning
4-	**Group research**

VI. Assessment Methods of the Course:

No	Assignment	
1	**Written Exams (Short Essays) and Quizzes**	
2	Written Exams(MCQ)	
3	Structured Oral Exams	
4	Objective Structured Practical Exams (OSPE)	
5	Student presentation	

VII. Assignments:

No.	Assignments	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs (symbols)
2	**Activity**	Throughout the semester	20	20%	**a1,,b1,c1**
5	**Final Exam**		80	80%	**a1,,b1,c1**
Total			**100**		

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Dr. Nabil Alowiri	Dr. Ebtesam Al-Zabedi	DrNawal Al- Henhena	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

Learning Resources:
• *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*
1- Required Textbook(s) (maximum two).
Devlin, T.M., John Wiley & Sons, (2011) , Biochemistry with Clinical Correlations -7th ed., Inc. (New York), ISBN: 978-0-470-28173-4.
2- Essential References.
1- Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN:13: 978-1-4641-0962-1 / ISBN:10:1-4292-3414- 8. 2- Nelson, D.L. and Cox, M.M. Lehninger Principles of Biochemistry (8th Edition, 2021).
3- Electronic Materials and Web Sites *etc.*
1- Metabolism – clinicaland Experimental: https://metabolismjournal.com 2- The World Health Organization (WHO): https://www.who.int:

XI. *Course Policies:*	
1	**Class Attendance:** Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	**Tardiness:** -If the student dose not attend for more than 6 times, the student will be obligated to withdrew from the course
3	**Exam Attendance/Punctuality:** No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	**Assignments & Projects:** Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	**Cheating:** Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	**Forgery and Impersonation:** Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	**Other policies:** The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration

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Dr. Nabil Alowiri	Dr. Ebtesam Al-Zabedi	DrNawal Al- Henhena	Dr\Gamil Taher Abdul Mughari	- Associate Prof. Dr. Ebtesam Al-Zabedi

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Republic of Yemen

Ministry of Higher Education & Scientific Research

21 SEPTEMBER UNIVERSITY of MEDICALS & APPLIEED SCIENCES

Faculty of Laboratory medicine..

Department of Biochemistry and Molecular biology

Course Specification of Advanced Clinical Biochemistry

Course No. (03.11. 319)

2022/2023

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
Ass.Pr. Dr. Ebtesam Al-Zabedi	Dr Nawal Al-Henhena	Dr Nawal Al-Henhena	Dr Qamil Taher Abdul Mughni	Ass.Pr. Dr. Ebtesam Al-Zabedi

I. Course Identification and General Information:

1	**Course Title:**	Advanced Clinical Biochemistry			
2	**Course Code & Number:**	03.11. 319			
3	**Credit Hours:**	**Theory Hours**			
		Lecture	**Exercise**	Practical	**Credit Hours**
		2	0	0	2
4	**Semester at which this Course is offered:**	1st Level /2nd Semester			
5	**Pre –Requisite (if any):**	Analytical Biochemistry I,Advanced Biochemistry I			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Master degree of Clinical Biochemistry & Molecular Biology			
8	**Language of Teaching the Course:**	English			
9	**Study System:**	Semester			
10	**Mode of Delivery:**	Regular			
11	**Location of Teaching the Course:**	University Campus			
12	**Prepared by:**	Dr.Ebtesam Mahdi Al- Zabed			
13	**Date of Approval:**	2022-2023			

II. Course Description:

-This course provides an in-depth study of the clinical biochemistry. Topics include clinical enzymology, clinical hematology, clinical lipidology, blood gases and electrolytes disorders

III. Alignment Course Intended Learning Outcomes with program outcomes

III. Course ntended Learning Outcomes (CILOs)		Referenced PILOs
A. Knowledge and Understanding: *Upon successful completion of the course, students will be able to:*		
a1	**Understand** the basic principles of clinical biochemistry	A1
a2	**Describe** examples of the technologies used to measure clinical biomarkers, critique and evaluate their usage.	A2
B. Intellectual Skills: *Upon successful completion of the course, students will be able to:*		
b1	**Interpret and explain** results of Clinical Biochemistry and Molecular Biology and effectively to clinicians.	B1
C. Professional and Practical Skills: *Upon successful completion of the course, students will be able to:*		
c1	**Evaluate and compare** different diagnostic and monitoring techniques used in clinical biochemistry.	C3
D. Transferable Skills: *Upon successful completion of the course, students will be able to:*		
d1	**Communicate** scientific concepts and findings effectively in written and oral formats	D1

IV. Alignment Course Intended Learning Outcomes with Teaching Strategies and Assessment methods :

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1	**Understand** the basic principles of clinical biochemistry	Lectures	Exam
a2	**Describe** examples of the technologies used to measure clinical biomarkers, critique and evaluate their usage.	Lectures	Exam

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1	**Interpret and explain** results of Clinical Biochemistry and Molecular Biology and effectively to clinicians	Lectures Laboratory reports . Case study analysis Presentations	Exam Laboratory reports Case study analysis Presentations

C Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1	**Evaluate and compare** different diagnostic and monitoring techniques used in clinical biochemistry	Lectures Practical	Exam Practical

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
D1	**Communicate** scientific concepts and findings effectively in written and oral formats	Lectures Laboratory reports Case study analysis Presentations	Exam Laboratory reports Case study analysis Presentations

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
Ass.Pr. Dr. Ebtesam Al-Zabedi	Dr Nawal Al-Henhena	Dr Nawal Al-Henhena	Dr Gamil Taher Abdul Mughni	Ass.Pr. Dr. Ebtesam Al-Zabedi

Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes
1	Clinical Enzymology	- Abnormal of Plasma enzymes in diseases .kidney diseases, liver, heart, and malignancy - Variation of enzymes result and factors affecting the results.	2	4	a1,a2,b1,c3,d1
2	Clinical hematology	Luekemia, anemia, myloma, Coagulopatheis, haemochromatosism, myloploroliferatives	3	6	a1,a2,b1,c3,d1
3	Blood gases	Types of blood gases (O2), (CO), (H2S), (CH4	1	2	a1,a2,b1,c3,d1
4	Clinical lipidology	Advanced Lipoprotein Metabolism and Genetic disorders, exchang of apolipoproteins, factors affecting plasmaLDL, LCAT and ACAT system, clinical manifestation of hyperlipidaemia. Obesity, Diabetes Mellitus, and the Metabolic Syndrome	3	6	a1,a2,b1,c3,d1
5	Disorders of Electrolytes	Body water, sodium, potassium, acid base balance and their pathophysiology Role of kidneys in homeostasis	2	4	a1,a2,b1,c3,d1
6	Disorders of GIT	Gastric and peptic ulcer. Acute and chronic pancreatitis, malapsorbtion	2	4	a1,a2,b1,c3,d1
7	Final exam		1	2	a1,a2,b1,c3,d1
Number of Weeks /and Units Per Semester			16	**32**	

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B - Practical Aspect: (if any)

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
1	Introduction to diagnostic techniques of tumors	3	6	a1,a2,b1,c3,d1
2	Diagnostic test for heart and liver diseases	3	6	a1,a2,b1,c3,d1
3	ELISA techniques	2	4	a1,a2,b1,c3,d1
Number of Weeks /and Units Per Semester				

V. Teaching Strategies of the Course:

1-	Lectures
2-	Practical session
3-	Self leaning
4-	**Group discussion**
	Case study analysis

VI. Assessment Methods of the Course:

No	Assignment
1	**Written Exams (Essays) and Quizzes**
2	Structured Oral Exams
4	Objective Structured Practical Exams (OSPE)
5	Student presentation
6	Case study analysis

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
Ass.Pr. Dr. Ebtesam Al-Zabedi	Dr Nawal Al-Henhena	Dr Nawal Al-Henhena	Dr Gamil Taher Abdul Mughni	Ass.Pr. Dr. Ebtesam Al-Zabedi

VII. Assignments:

No.	Assignments	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs (symbols)
2	Activity	Throughout the semester	10	10%	a1,a2,b1,c3,d1
3	Practical Report	Throughout the semester	10	10 %	a1,a2,b1,c3,d1
4	Practical exam	12	20	20%	a1,a2,b1,c3,d1
5	Final Exam	14	60	60%	a1,a2,b1,c3,d1
Total					

Learning Resources:

- *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

1- Required Textbook(s) (maximum two).

Clinical Biochemistry: An Integrated Approach, 7th Edition by William M. Brown and David A. Marks

Clinical Chemistry: A Laboratory Handbook, 7th Edition by John W. Baynes and Michael J. Dominiczak

2- Essential References.

Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, 6th Edition by Burt Hirschhorn and Robert A. McPherson

Devlin's Textbook of Biochemistry with Clinical Correlations · Martin D. Snider John Wiley & Sons, Incorporated, Oct 9, 2024 - 1448 pages

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1- http://www.biology.arizona.edu/biochemistry/biochemistry.html

2- **GENERAL BIOCHEMISTRY:**
http://web.indstate.edu:80/thcme/mwking/

3- **MEDICAL BIOCHEMISTRY**
http://www.kumc.edu/research/medicine/biochemistry/bioc800/opening.html

4- https://pubmed.ncbi.nlm.nih.gov/

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Ass.Pr. Dr. Ebtesam Al-Zabedi	Dr Nawal Al-Henhena	Dr Nawal Al-Henhena	Dr Gamil Taher Abdul Mughni	Ass.Pr. Dr. Ebtesam Al-Zabedi

XI. *Course Policies:*	
1	**Class Attendance:** Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	**Tardiness:** -if the student dose not attend for more than 6 times, the student will be obligated to withdrew from the course
3	**Exam Attendance/Punctuality:** No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed
4	**Assignments & Projects:** Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	**Cheating:** Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	**Forgery and Impersonation:** Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	**Other policies:** The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
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Republic of Yemen

Ministry of Higher Education & Scientific Research

21 SEPTEMBER UNIVERSITY of MEDICALS & APPLIEED

SCIENCES

Faculty of Laboratory medicine..

Department of Biochemistry and Molecular biology

Course Specification of Advance Immunology

Course No. (03.11. 315)

2022/2023

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
- Dr\Gamil Taher Abdul Mughni	Dr. Ebtesam Al-Zabedi	DrNawal Al- Henhena	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

I. Course Identification and General Information:

1	**Course Title:**	**Advance Immunology**			
2	**Course Code & Number:**	03.11. 315			
3	**Credit Hours:**	**Theory Hours**			
		Lecture	**Exercise**	Practical	**Credit Hours**
		2	0	2	3
4	**Study Level/ Semester at which this Course is offered:**	1st Level / 1st Semester			
5	**Pre –Requisite (if any):**	None			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Master Degree Biochemistry and Molecular biology			
8	**Language of Teaching the Course:**	English			
9	**Study System:**	Semester			
10	**Mode of Delivery:**	Regular			
11	**Location of Teaching the Course:**	University Campus			
12	**Prepared by:**				
13	**Date of Approval:**	2022-2023			

II. Course Description:

Advanced Immunology is provides an in-depth understanding of the immune system. The course covers a wide range of topics, including: The structure and function of the immune system, cellular and molecular mechanisms of immunity, Antigen processing and presentation, Tissue-specific immune responses,Immune-mediated pathologies and Vaccination

III. Alignment Course Intended Learning Outcomes with program outcomes

III. Course Intended Learning Outcomes (CILOs)		Referenced PILOs
A. Knowledge and Understanding: *Upon successful completion of the course, students will be able to:*		
a1	**Describe** the structure and function of the immune system.	A2
a2	**Discuss** the immune responses to infection, tumors, allergens, and autoimmunity	a4
B. Intellectual Skills: *Upon successful completion of the course, students will be able to:*		
b1	**Explain** the cellular and molecular basis of immunity	B1
b2	**Illustrate** the immune responses damage and potential immunotherapy for the treatment of disease	B2
C. Professional and Practical Skills: *Upon successful completion of the course, students will be able to:*		
c1	**Perform** different immunological diagnostic assay such as agglutination, precipitation, Enzyme-linked immunosorbent assay, Western blotting etc.	C1
c2	**Evaluate** the potential of immunotherapy for the treatment of disease	C2
D. Transferable Skills: *Upon successful completion of the course, students will be able to:*		
d1	**Communicate** effectively about immunology to a variety of audiences	D1

IV. Alignment Course Intended Learning Outcomes with Teaching Strategies and Assessment methods :

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1	**Describe** the structure and function of the immune system.	Lectures	Exam
	Discuss the immune responses to infection, tumors, allergens, and autoimmunity	Lectures	Exam

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1	**Explain** the cellular and molecular basis of immunity	Lectures	Exam
B2	**Illustrate** the immune responses damage and potential immunotherapy for the treatment of disease	Lectures	Exam

C Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1	**Perform** different immunological diagnostic assay such as agglutination, precipitation, Enzyme-linked immunosorbent assay, Western blotting etc.	Lectures, pactical	Exam pactical
C2	**Evaluate** the potential of immunotherapy for the treatment of disease	Lectures pactical	Exam pactical

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1	**Communicate** effectively about immunology to a variety of audiences	Lectures	Exam

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- Dr\Gamil Taher Abdul Mughni	Dr. Ebtesam Al-Zabedi	DrNawal Al Henhena	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

Course Content:

A – Theoretical Aspect

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes
1	Introduction of Immunology	- eveiwe Historical background about the development of the discipline of immunology -Definition immunology Definition immunological terms -Classification of immune system	1	2	a2.a4 b1.b2.c 1,c2,d3
2	Organs and Cells of the immune system	-Describe the organs, tissue, cells of the immune system - Cells innate immune response - Antigen presenting cells and large granular lymphocytes - Cells Adaptive immune response	1	2	a2,a4.b1,b2,c 1,c2,d3
3	Innate or Natural immunity	Definition 1-Components and functions of the natural immune defense system. Differentiate between the main features of natural and adaptive immunity Recognize (PAR)	1	2	a2.a4 b1.b2.c 1,c2,d3
4	**Cellular defense mechanism** Phagocytosis, Cytotoxicity (NK cells) and inflammation	**-Definition** **-Type** **-Step** **-Mechanism of killing**	1	2	a2,a4.b1,b2,c 1,c2,d3
5	Antigens	**Definition** : Antigen Immunogen Adjuvant Hapten. – Types and properties of antigen,	1	2	a2,a4.b1,b2,c 1,c2,d3
6	**Complement system**	**-Definition** **-Properties** -Aactivation pathways:	1	2	a2,a4.b1,b2,c 1,c2,d3

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		Classical Alternative lectin pathway. -Function **-Regulation**			
7	Med term exam		1		
8	Antibodies structural	**Definition** : Immunoglobulin (Ig) **Describe** the structure and function of the Immunoglobulin **-Evaluate** the components of Ig molecule in relation to its function. -Explain the components of Ig molecule and classification into classes and subclasses of Immunoglobulins. Illustrate the components of Ig which interaction with antigens , interaction with receptors on inflammatory cells and other molecules Immunoglobulins in disease process.	1	2	a2,a4.b1,b2,c1,c2,d3
9	Adaptive immunity:	Define Properties Cells mechanisms of humeral and cell-mediated immunity	3	2	a2,a4.b1,b2,c1,c2,d3
10	Humoral	Define Properties Cells T-dependent T- independent in the activation of B lymphocytes Describe the transformation of activated B cells into plasma cells recognize that plasma cells are the cells that synthesize Immunoglobulins (antibodies). describe the control mechanism of antibody mediated response.	1	2	a2,a4.b1,b2,c1,c2,d3

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		know techniques of Immunoglobulins measurement			
11	cellular	Define Properties Cells understand the activation of different T lymphocyte subpopulations and subsets. Compare T Cell Receptor (TCR) and B Cell Receptor (BCR) to show similarity and dissimilarity in relation to function. To describe the mechanism of cytotoxicity by cytotoxic T lymphocyte (CTL) and other cell. To understand the control mechanism of CMI response.	2	6	a2,a4.b1,b2,c 1.c2,d3
12	Cytokine	-Definition the different terms for cytokines nomenclature -Classification and function of different cytokines. -Mode of action and effects on immune functions. -chmokinyes function. -role of cytokines in health and disease.	1	2	a2,a4.b1,b2,c 1.c2,d3
13	Vaccines	-Difine -Type -	1	2	a2,a4.b1,b2,c 1,c2,d3
14	Final exam		1	2	
Number of Weeks /and Units Per Semester			**16**	**32**	

B - Practical Aspect: (if any)

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
1	Introduction of Antigen-Antibody Interactions and Immunodiagnostic			a2,a4.b1,b2,c1,c2,d3
2	Immuno-agglutination technique			a2,a4.b1,b2,c1,c2,d3
3	Precipitation technique			a2,a4.b1,b2,c1,c2,d3
4	ELISA technique			a2,a4.b1,b2,c1,c2,d3
5	Serodiagnosis of Hepatitis B Virus and Hepatitis C Virus.			a2,a4.b1,b2,c1,c2,d3
Number of Weeks /and Units Per Semester				

V. Teaching Strategies of the Course:

1-	Lectures
2-	Practical session
3-	Self learning
4-	Group research

VI. Assessment Methods of the Course:

No	Assignment	
1	Written Exams (Short Essays) and Quizzes	a2,a4.b1,b2,c1,c2,d3
2	Written Exams(MCQ)	a2,a4.b1,b2,c1,c2,d3
3	Structured Oral Exams	a2,a4.b1,b2,c1,c2,d3
4	Objective Structured Practical Exams (OSPE)	a2,a4.b1,b2,c1,c2,d3
5	Student presentation	a2,a4.b1,b2,c1,c2,d3

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- Dr\Gamil Taher Abdul Mughni	Dr. Ebtesam Al-Zabedi	DrNawal Al- Henhena	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

VII. Assignments:

No.	Assignments	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs (symbols)
1	Midterm Exam	7	15	15%	a2,a4.b1,b2,c1,c2,d3
2	Activity	Throughout the semester	5	5%	a2,a4.b1,b2,c1,c2,d3
3	Practical Report	Throughout the semester	10	10 %	a2,a4.b1,b2,c1,c2,d3
4	Practical exam	12	20	20%	a2,a4.b1,b2,c1,c2,d3
5	Final Exam	14	50	50%	a2,a4.b1,b2,c1,c2,d3
Total					

Learning Resources:

- *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

1- Required Textbook(s) (maximum two).

1- lecture note
2- Kuby Immunology, 10th Edition,2019:Jenni Punt; Sharon Stranford; Patricia Jones; Judy Owen

2- Essential References.

1-Roitt's Essential Immunology, 13th Edition. 13thEdition, Peter J. Delves et al., Wiley-Blackwell, 2017.
2-Cellular and Molecular Immunology 10th edition, Abul K. Abbas, ELSVIEVER, 2021.

3- Electronic Materials and Web Sites *etc.*

1- https://www.youtube.com/results?search_query=Dr.+Saleh+Bahaj
2-https://onlinelearning.hms.harvard.edu/hmx/courses/immunology/
3- https://www.edx.org/learn/immunology
4- https://onlinelearning.hms.harvard.edu/hmx/courses/hmx-immunology/
-https://immunology.utoronto.ca/online-learning

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XI. *Course Policies:*	
1	**Class Attendance:** Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	**Tardiness:** -If the student dose not attend for more than 6 times, the student will be obligated to withdrew from the course
3	**Exam Attendance/Punctuality:** No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	**Assignments & Projects:** Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	**Cheating:** Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	**Forgery and Impersonation:** Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	**Other policies:** The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration

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Republic of Yemen

Ministry of Higher Education & Scientific Research

21 SEPTEMBER UNIVERSITY of MEDICALS & APPLIEED

SCIENCES

Faculty of Laboratory medicine..

Department of Biochemistry and Molecular biology

Course Specification of Biomedical Statistics & Epidemiology

Course No. (03,11,116)

2022/2023

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
- Dr. Ebtesam Mahdi Al-Zabedi	Dr\ DrNawal Al-Henhena	DrNawal Al- Henhena	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

I. Course Identification and General Information:

1	**Course Title:**	Biomedical Statistics & Epidemiology			
2	**Course Code & Number:**	03,11,016			
3	**Credit Hours:**	**Theory Hours**			
		Lecture	**Exercise**	**Practical**	**Credit Hours**
		2	0	2	3
4	**Study Level/ Semester at which this Course is offered:**	1st Level / 1st Semester			
5	**Pre –Requisite (if any):**	None			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Master Degree Biochemistry and Molecular biology			
8	**Language of Teaching the Course:**	English			
9	**Study System:**	Semester			
10	**Mode of Delivery:**	Regular			
11	**Location of Teaching the Course:**	University Campus			
12	**Prepared by:**	- Associate Prof. Dr. Ebtesam Al-Zabedi			
13	**Date of Approval:**	2022-2023			

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
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II. Course Description:

This course provides an advanced introduction to the statistical and epidemiological methods used in public health research. Topics include descriptive statistics, probability distributions, parameter estimation, hypothesis testing, sampling techniques, analysis of variance, and correlation. It provides basic training in statistical analysis using statistical software

III. Alignment Course Intended Learning Outcomes with program outcomes

	III. Course Intended Learning Outcomes (CILOs)	Referenced PILOs
A. Knowledge and Understanding: ***Upon successful completion of the course, students will be able to:***		
a1	**Understand** the basic concepts of epidemiology and statistical reasoning to public health research	A1
B. Intellectual Skills: ***Upon successful completion of the course, students will be able to:***		
b1	**Interpret and explain** appropriate statistical methods to analyze data	B1
b3	**Design** and conduct research studies.	B3
C. Professional and Practical Skills: ***Upon successful completion of the course, students will be able to:***		
c1	**Interpret** the results of statistical analyses	C1
c2	**Perform** statistical software to analyze data	C3
D. Transferable Skills: ***Upon successful completion of the course, students will be able to:***		
d1	Communicate the results of statistical analyses to others	D1

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IV. Alignment Course Intended Learning Outcomes with Teaching Strategies and Assessment methods :

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1	**understand** and apply the basic concepts of epidemiology and statistical reasoning to public health research	Lecture	Exam

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1	**Identify** and assess causal relationships between exposures and outcomes	Lecture	Exam
B2	**Design** and conduct research studies.	Lecture	Exam

C Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1	**Interpret** the results of statistical analyses	Lecture Discussion Presentation	Exam Discussion Presentation
C2	**Perform** statistical software to analyze data	Lecture Discussion Presentation	Exam Discussion Presentation

(D Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies.

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1	**Communicate** the results of statistical analyses to others	Lecture Discussion Presentation	Exam Discussion Presentation
	Apply ethical and legal principles to the use of epidemiologic data	Lecture Discussion Presentation	Exam Discussion Presentation

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V. Course Content:

A – Theoretical Aspect:

NO.	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	introduction to statistics AND basic statistical concepts	- Overview of biostatistics and epidemiology - Data types and measurement scales - Sampling and bias - Study designs in epidemiology	1	2	a1,b1,b2, b3,c1,c4, d1
2	Descriptive study	Measures of central tendency Measures of dispersion	2	4	
3	Estimation of population	Parametric tests and non-parametric tests, variables, variance			
4	Linear Regression Analysis	- Simple linear regression - Multiple linear regression - Model selection and assumptions - Generalized linear models	2	4	a1,b1,b2, b3,c1,c4, d1
5	Logistic Regression Analysis (	- Binary logistic regression - Multinomial and ordinal logistic regression - Model selection and interpretation - Goodness-of-fit and diagnostics	1	2	a1,b1,b2, b3,c1,c4, d1
8	MED TERM		1	2	a1,b1,b2, b3,c1,c4, d1
9	Introduction to epidemiologic methods	Definition Important	1	2	a1,b1,b2, b3,c1,c4, d1
10	**Descriptive epidemiology:**	Distribution of diseases in populations. measures of disease frequency incidence prevalence methods for describing the distribution of disease in space and time.	3	6	a1,b1,b2, b3,c1,c4, d1
11	**Analytic epidemiology:**	methods for assessing the association between exposures and outcomes, and for	3	6	a1,b1,b2, b3,c1,c4,

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		controlling for confounding factors.			d1
16	FINAL THEORTICAL				
			16	0	

V. Teaching Strategies of the Course:	
1-	Lectures
2-	Practical session
3-	Seminars
4	Discussion

VI. Assessment Methods of the Course:

No	Assessment
1	**Written Exams (Short Essays) and Quizzes**
2	Written Exams(MCQ)
3	Structured Oral Exams
4	Objective Structured Practical Exams (OSPE)
5	Student presentation

VII. Assignments:

No.	Assessment Method	Week Due	Mark	Aligned Course Learning Outcomes	
1	**Midterm Exam**	7	20	20%	
2	**Practical exam**	12	30	30%	
3	**Final Exam**	14	50	50%	
4					
	Total		100	100%	

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X. Learning Resources:	
· *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*	
1- Required Textbook(s) (maximum two).	
1-	Biostatistics: A Foundation for Analysis in the Health Sciences, 6th Edition by John P. Kleinbaum, Leslie L. Kupper, and Hal Morgenstern.
2-	Epidemiology: Beyond the Basics, 2nd Edition by Moyses Szklo and F. Javier Nieto.
2- Essential References.	
1-	Maxcy-Rosenau (2010): Public health and preventive medicine, Prentice- Hall International Inc. 15th edition
2-	o Park K. (2007) eighteenth edition: Environment and Health at Park's textbook of preventive and social medicine. Ms Banarsidas Bhanot, ., India.
3-	o R. Beaglehole , R.Bonita and T Kjellström (2006): Basic Epidemiology .
3- Electronic Materials and Web Sites *etc.*	
1-	International Journal of epidemiology
2-	□□ECMA periodicals
3-	□□www. Who. Int
4-	□□www.cdc.org □□www. BMJ.com Centers for Disease Control and Prevention (.gov) https://www.cdc.gov

XI. *Course Policies:*	
1	**Class Attendance:**
	-If the student dose not attend for more than 6 times, the student will be obligated to withdrew from the course
2	**Tardy:**

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	- If the student is late for the lectures for the 2nd time, he will not be allowed to attend this lecture
3	Exam Attendance/Punctuality:
	- If any student does not attend the exam in the scheduled day, it will consider as a fail for him
4	**Assignments & Projects:**
	- Any student dose not submithis assignment,he will lose its grade.
5	**Cheating:** - ANY STUDENT TRY TO CHEAT IN ANY QUIZ OR EXAM, HE WILL NOT BE ALLOWED TO CONTINUE THE EXAM AND IT WILL CONSIDER AS A FAIL FOR HIM
6	**Plagiarism:**
	- If any student try to plagiarism another student identity, both of them will be convertedto investigation and they might be expelled from the program
7	**Other policies:**
	- Undelivered requirement will not be marked
	- You should leave your dental Chair as clean as possible