



VII. Assignments:					
No.	Assignments	Week Due	Mark	Proportion of Final Assessment	Aligned CLOs (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:
• <i>Written in the following order: (Author - Year of publication - Title - Edition - Place of publication - Publisher).</i>
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
Wep
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/

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



Republic of Yemen
Ministry of Higher Education & Scientific Research
21 SEPTEMBER UNIVERSITY of MEDICALS & APPLIED
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	Dr\Nawal 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			Credit Hours
		Lecture	Exercise	Practical	
		2	0	2	3
4	Study Level/ Semester at which this Course is offered:	1 st Level / 1 st 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			

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



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
----	--	----

Prepared by: - Dr/Gamil Taher Abdul Mughni	Reviewed by: Dr. Ebtisam Al-Zabedi	Head of the Department: Dr Nawal Al- Henhena	Vice Dean for Quality affairs Dr/Gamil Taher Abdul Mughni	Dean of College: - Associate Prof. Dr. Ebtisam A. Zabedi
---	---------------------------------------	---	--	---



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, practical	Exam practical
C2	Evaluate the potential of immunotherapy for the treatment of disease	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 effectively about immunology to a variety of audiences	Lectures	Exam

Prepared by: - Dr/Gamil Taher Abdul Mughni	Reviewed by: Dr. Ebtisam Al- Zabedi	Head of the Department: Dr Nawal Al Henhena	Vice Dean for Quality affairs Dr/Gamil Taher Abdul Mughni	Dean of College: - Associate Prof. Dr. Ebtisam 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	- evelve 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 h1. h2 c 1,c2,d3
4	Cellular defense mechanism Phagocytosis, Cytotoxicity (NK cells) and inflammation	-Definition -type -Step -Mechanism of killing	1	2	a2,a4.D1,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.D1,b2,c 1,c2,d3

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



		Classical Alternative lectin pathway. -Function -Regulation			
7	Med term exam		1		
	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,c 1,c2,d3
8					
9	Adaptive immunity:	Define Properties Cells mechanisms of humeral and cell-mediated immunity	3	2	a2,a4.b1,b2,c 1,c2,d3
	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,c 1,c2,d3
10					

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

Republic of Yemen

Ministry of Higher Education & Scientific Research

21 SEPTEMBER UMAS

Faculty of Laboratory medicine

Department of Biochemistry and Molecular biology

Unit of Development & Quality assurance

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



الجمهورية اليمنية

وزارة التعليم العالي والبحث العلمي
جامعة ٢١ سبتمبر للعلوم الطبيعية والتطبيقية

كلية الطب المخبري

قسم الكيمياء الحيوية

وحدة التطوير وضمان الجودة

		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	-Define -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	

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

Republic of Yemen

Ministry of Higher Education & Scientific Research

21 SEPTEMBER 2016

Faculty of Laboratory medicine

Department of Biochemistry and Molecular biology

Unit of Development & Quality assurance

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



الجمهورية اليمنية

وزارة التعليم العالي والبحث العلمي
جامعة صنعاء ٢١ سبتمبر للعام الجامعي ١٤٣٧

كلية الطب المخبري

قسم الكيمياء الحيوية

وحدة التطوير وضمان الجودة

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

Prepared by: - Dr\Gamil Taher Abdul Mughni	Reviewed by: Dr. Ebtessam Al-Zabedi	Head of the Department: Dr\Nawal Al- Henhena	Vice Dean for Quality affairs Dr\Gamil Taher Abdul Mughni	Dean of College: - Associate Prof. Dr. Ebtessam 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. 13th Edition, 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>

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

Republic of Yemen
Ministry of Higher Education & Scientific Research
21 SEPTEMBER UNIVERSITY of MEDICALS & APPLIED
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			Credit Hours
		Lecture	Exercise	Practical	
		2	0	2	3
4	Study Level/ Semester at which this Course is offered:	1 st Level / 1 st 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. Ebtessam Al-Zabedi			
13	Date of Approval:	2022-2023			

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



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
----	---	----

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

Republic of Yemen

Ministry of Higher Education & Scientific Research

21 SEPTEMBER UMAS

Faculty of Laboratory medicine

Department of Biochemistry and Molecular biology

Office of Development & Quality assurance

جمهورية اليمن



الجمهورية اليمنية

وزارة التعليم العالي والبحث العلمي
جامعة صنعاء ٢١ سبتمبر العلوم الطبية والتطبيقية

كلية الطب المخبري

قسم الكيمياء الحيوية

وحدة التطوير وضمان الجودة

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

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
- Dr. Ebtessam Mahdi Al-Zabedi	Dr/ DrNawal Al-Henhena	DrNawal Al- Henhena	Dr/Gamil Taber Abdul Raughni	- Associate Prof. Dr. Ebtessam Al-Zabedi



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,

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



		controlling for confounding factors.			dl
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%

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



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- Park K. (2007) eighteenth edition: Environment and Health at Park's textbook of preventive and social medicine. Ms Banarsidas Bhanot, ., India.
- 3- 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:

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

Prepared by: - Dr. Ebtessam Mahdi Al-Zabedi	Reviewed by: Dr/Dr Nawal Al-Henhena	Head of the Department: Dr/Nawal Al-Henhena	Vice Dean for Quality affairs Dr/Gamil Taher Abdul Mughaz	Dean of College: - Associate Prof. Dr. Ebtessam Al-Zabedi
--	--	--	--	--

Republic of Yemen

Ministry of Higher Education & Scientific Research

21 SEPTEMBER UMAS

Faculty of Laboratory medicine

Department of Biochemistry and Molecular biology

Unit of Development & Quality assurance

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



الجمهورية اليمنية

وزارة التعليم العالي والبحث العلمي
جامعة ٢١ سبتمبر للعلوم الطبية والتطبيقية

كلية الطب المخبري

قسم الكيمياء الحيوية

وحدة التطوير وضمان الجودة

	- 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

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

Republic of Yemen
Ministry of Higher Education & Scientific Research
21 SEPTEMBER UNIVERSITY of MEDICALS & APPLIED
SCIENCES



Faculty of Laboratory Medicine.

Department of Biochemistry and Molecular biology
Course Specification of Analytical Biochemistry II
Course No. (03.11.317)
2022/2023

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



I. Course Identification and General Information:

1	Course Title:	Analytical Biochemistry II			
2	Course Code & Number:	03.11.317			
3	Credit Hours:	Theory Hours			Credit Hours
		Lecture	Exercise	Practical	
		2	0	2	3
4	Study Level/ Semester at which this Course is offered:	1 st 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:				
13	Date of Approval:	2023			

Prepared by: Dr. Nawal Al- Henhena	Reviewed by: Dr. Nabil Alowizi	Head of the Department: Dr. Nawal Al- Henhena	Vice Dean for Quality affairs: Dr. Gamil Taher Abdul Mughni	Dean of College: - Associate Prof. Dr. Ebtessam Al-Zabedi
---------------------------------------	-----------------------------------	--	--	--

Republic of Yemen

Ministry of Higher Education & Scientific Research

21 SEPTEMBER UMAS

Faculty of Laboratory medicine

Department of Biochemistry and Molecular biology

Unit of Development & Quality assurance

الجمهورية اليمنية



الجمهورية اليمنية

وزارة التعليم العالي والبحث العلمي
جامعة ٢١ سبتمبر للعلوم الطبية والتطبيقية

كلية الطب المخبري

قسم الكيمياء الحيوية

وحدة التطوير وضمان الجودة

II. Course Description:

Course Description: This course is an advanced study of the principles and techniques used to analyze biological molecules. Topics covered include: Chromatography, Spectroscopy, Mass spectrometry, Immunoassays, and Biosensors.

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:

ai	Understanding of instruments techniques and principles of chromatography, electrophoresis, mass spectrometry, nuclear magnetic resonance spectroscopy, biosensors, and imaging techniques	A1
----	---	----

B. Intellectual Skills:

Upon successful completion of the course, students will be able to:

b1	Interpret analytical data	B1
----	---------------------------	----

C. Professional and Practical Skills:

Upon successful completion of the course, students will be able to:

c1	Perform a wide variety of biochemical and molecular techniques	C1
----	--	----

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	
----	--	--

Prepared by: Dr/ Nawal Al- Henhena	Reviewed by: Dr. Nabil Alowiri	Head of the Department: Dr/Nawal Al- Henhena	Vice Dean for Quality affairs Dr/Gamil Taher Abdul Mughni	Dean of College: - Associate Prof. Dr. Ebtessam Ad Zuhedi
---------------------------------------	-----------------------------------	---	--	--



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	Understanding of instruments techniques and principles of chromatography, electrophoresis, mass spectrometry, nuclear magnetic resonance spectroscopy, biosensors, and imaging techniques	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 analytical data	Lectures Laboratory practical	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
ci	Perform a wide variety of biochemical and molecular techniques	Lectures Laboratory practical	Exam Lectures Laboratory 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		

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



NO.	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Electrophoretic techniques	General principle, factors affecting electrophoresis, (electrical field, sample, buffer, sampling medium), low voltage (paper, cellulose acetate, thin-layer electrophoresis), high voltage (gel, SDS, isoelectric focusing, preparative electrophoresis), detection, recovery, estimation	3	6	a1,b1,c1,d1
2	Spectroscopic techniques	General principle, Types of spectra and their biochemical usefulness, UV spectra, Infra-red, spectrofluorimetry, Luminometry, Atomic and flame spectrophotometry, Electron spin resonance spectrometry, NMR, Mass spectroscopy	3	6	a1,b1,c1,d1
3	Radioisotope Techniques	The nature of radioactivity , types of radioactive decay, rate of radioactive decay interaction of radioactivity with matter, detection and measurement of radioactivity (based upon gas ionization, based upon excitation), types of scintillation counting, advantages & disadvantages of scintillation counting, determination of counting efficiency applications of radioisotopes in the biological sciences, analytical applications, Safety aspects of the use of radioisotopes.	3	6	a1,b1,c1,d1
4	Electrochemical techniques	The range of electrochemical techniques, reference electrodes, measurement of pH by glass electrodes, ion-selective electrodes and gas sensors, oxidation-reduction potentials, the oxygen electrode, biosensors, electrochemical detectors.	3	6	a1,b1,c1,d1
5	Cell culture techniques	Advantages of cell culture, primary culture cells Vs. cell lines, types of established cell lines, requirements and type of cell culture media, assessing cell cultures, sub-culturing cells.	3	6	a1,b1,c1,d1
5	final exam		1	2	a1,b1,c1,d1
Number of Weeks /and Units Per Semester			16	32	

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



V. Teaching Strategies of the Course:

1-	Lectures
2-	Seminars

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

VII. Assignments:

No.	Assignments	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs (symbols)
2	Activity	Throughout the semester	20	20%	a1,b1,c1,d1
5	Final Exam		80	80%	a1,b1,c1,d1
Total			100		

Prepared by: Dr. Nawal Al- Henhena	Reviewed by: Dr. Nabil Alowiri	Head of the Department: Dr. Nawal Al- Henhena	Vice Dean for Quality affairs: Dr. Gamil Taher Abdul Mughni	Dean of College: - Associate Prof. Dr. Ebtessam 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).

Handbook of Christen Medical Association, India (CMAI) Medical Laboratory Technology-Robert H. Carman. 2nd Edn. CMAI, New Delhi

2- Essential References.

- Text book of Medical Laboratory Technology, P.B. Godkar 2nd Edn. Bhalani Publication.
- Handbook of Biochemistry by M. A. Siddique 8th Edn. Vijay Bhagat Scientific Book

Wep

1. Ebook link-
https://www.cartercenter.org/resources/pdfs/health/epi/ii/library/lecture_notes/health_science_students/medicalbiochemistry.pdf
2. Ebook link-
https://books.google.co.in/books?id=Je_pJfb2r0cC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
3. Ebook link-
https://books.google.co.in/books?id=csPcDAAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
4. Ebook link-
https://books.google.co.in/books?id=2FkXAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
Dr\ Nawal Al- Henhena	Dr. Nabil Alowiri	Dr\Nawal Al- Henhena	Dr\Gamil Taher Abdul Mughami	- Associate Prof. Dr. Ebtessam Al-Zahedi

Republic of Yemen

Ministry of Higher Education & Scientific Research

21 SEPTEMBER UMAS

Faculty of Laboratory medicine

Department of Biochemistry and Molecular biology

Unit of Development & Quality assurance

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



الجمهورية العربية اليمنية

وزارة التعليم العالي والبحث العلمي
جامعة ٢١ سبتمبر للعلوم الطبية والتطبيقية
كلية الطب المخبري
قسم الكيمياء الحيوية
وحدة التطوير وضمان الجودة

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:
Dr\ Nawal Al- Henhena	Dr. Nabil Alowiri	Dr\Nawal Al- Henhena	Dr\Gamil Taher Abdul Maghni	- Associate Prof. Dr. Ebiesam Al Zabedi

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 I
Course No. (03.11.312)
2022/2023

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



I. Course Identification and General Information:					
1	Course Title:	Advanced Biochemistry I			
2	Course Code & Number:	03.11.312			
3	Credit Hours:	Theory Hours			
		Lecture	Exercise	Practical	Credit Hours
		2	0	0	2
4	Study Level/ Semester at which this Course is offered:	1 st Level / 1 st 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: Dr. Nabil Alowiri	Reviewed by: Dr. Ebtesam Al-Zabedi	Head of the Department: Dr. Nawal Al- Henhena	Vice Dean for Quality affairs Dr/Gamil Taher Abdul Mughni	Dean of College: - 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:

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

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

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

NO.	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CLOs)
1	Carbohydrate metabolism in muscle, adipose tissue and liver	<ul style="list-style-type: none"> - Glycolysis, various forms of fermentations in micro-organisms, citric acid cycle, its function in energy generation and biosynthesis of energy rich bond, pentose phosphate pathway and its regulation. - Gluconeogenesis, glycogenesis and glycogenolysis, glyoxylate and Gamma aminobutyrate shunt pathways, Cori cycle, anaplerotic reactions, Entner-Doudoroff pathway, glucuronate pathway. - Metabolism of disaccharides. - Hormonal regulation of carbohydrate metabolism. - Energetics of metabolic cycle. - Carbohydrates metabolic disorders 	5	10	a1,b1,c1
2	lipid metabolism in adipose tissue and	<ul style="list-style-type: none"> - Introduction, hydrolysis of tri-acylglycerols, α-, β-, ω- oxidation of fatty acids. - Oxidation of odd numbered fatty acids – fate of propionate, role of carnitine, degradation of complex lipids. - Fatty acid biosynthesis, Acetyl CoA carboxylase, fatty acid synthase, ACP structure and function, Lipid biosynthesis, biosynthetic pathway for tri-acylglycerols, phosphoglycerides, sphingomyelin and prostaglandins. - Metabolism of cholesterol and its regulation. - Energetics of fatty acid cycle 	5	10	a1,b1,c1
3	Protein metabolism and Nucleic acid metabolism	<ul style="list-style-type: none"> - General reactions of amino acid metabolism = Transamination, decarboxylation, oxidative & non- 	5	10	a1,b1,c1

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

		oxidative deamination of amino acids. - Special metabolism of methionine, histidine, phenylalanine, tyrosine, tryptophan, lysine, valine, leucine, isoleucine and polyamines. Urea cycle and its regulation. - Biosynthesis and degradation of purine and pyrimidine ribonucleotides, formation of deoxy ribonucleotides and their regulation			
4	Final Exam		1	2	
	Number of Weeks /and Units Per Semester		16	32	

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
2	Written Exams(MCQ)
3	Structured Oral Exams
4	Objective Structured Practical Exams (OSPE)
5	Student presentation

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

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		

Learning Resources:	
<ul style="list-style-type: none"> 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.	
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.	
3- Electronic Materials and Web Sites etc.	
1- Metabolism – clinical and 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 does not attend for more than 6 times, the student will be obligated to withdraw from the course

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



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

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 Comparative Biochemistry

Course No. (03.11. 313)

2022/2023

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



I. Course Identification and General Information:				
1	Course Title:	Comparative Biochemistry		
2	Course Code & Number:	03.11. 313		
3	Credit Hours:	Theory Hours		
		Lecture	Exercise	Practical
		2	0	0
4	Study Level/ Semester at which this Course is offered:	1 st Semester		
5	Pre -Requisite (if any):	None		
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:	Lecture		
11	Location of Teaching the Course:	University Campus		
12	Prepared by:	Dr. Ebtessam Al- Zabedi		
13	Date of Approval:	2023		

Prepared by: - Dr. Ebtessam Mahdi Al-Zabedi	Reviewed by: Dr. Dr. Nawal Al-Henhena	Head of the Department: Dr. Nawal Al-Henhena	Vice Dean for Quality affairs Dr. Gamil Taher Abdul Mughnif	Dean of College: - Associate Prof. Dr. Ebtessam Al-Zabedi
--	--	---	--	--



A. II. Course Description:
This course provides an in-depth study of the major structure of plasma membrane, Carbohydrates lipid proteins ,types of transport across the membrane and membrane variations and pathology

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	Undestaand the basic structure and function of plasma membrane, types of transport, electrochemical gradient of protons and ATP synthesis, genetic variation and genetic diseases, drugs that act on the membrane	A1
B. Intellectual Skills: Upon successful completion of the course, students will be able to:		
b1	Explain the mechanism of detoxification of lipid soluble substances	B1
C. Professional and Practical Skills: Upon successful completion of the course, students will be able to:		
c1	Perform diagnostic laboratory tests in clinical biochemistry and genetic molecular	C1
D. Transferable Skills: Upon successful completion of the course, students will be able to:		
d1	Demonstrate oral and written effective communication skills	a1,a4,b1,b3,c2,d3

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



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	Understand the basic structure and function of plasma membrane, types of transport, electrochemical gradient of protons and ATP synthesis, genetic variation and genetic diseases, drugs that act on the membrane	Lectures	Exams
A2	Discuss the genetic variation and genetic diseases, drugs that act on the membrane	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 mechanism of detoxification of lipid soluble substances	Lectures	Exams, Assignments
B2	Describe the different types of toxins and venoms and their sources	Lectures	Exams, Assignments, Lab reports

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 diagnostic laboratory tests in clinical biochemistry and genetic molecular	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
D1	Demonstrate oral and written effective communication skills		

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



III. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	week	contact hours	Learning Outcomes
1	General structure and composition of plasma membrane	Crbohydrates, lipid and protein ,mosaic model of structure, Cytoskelatole structures, Ion distribution, Electro-chemical gradient of protons, electron transport in mitochondrial membrane & ATP production	5	10	a1,a2,b1,b2,c1,c2,d1
2	Lysosomes, secretion, exocytosis & endocytosis	Protein trafficking mechanism, Processing and packaging of products Membrane interaction during exocytosis, Other mechanisms ..phagocytosis, pinocytosis, lysosomes	4	8	a1,a2,b1,b2,c1,c2,d1
3	Membrane variation	- Variable between membranes, genetic variability - Cell proliferation & differentiation, membrane fusion, Detoxification of heavy metals, lipid-soluble materials - Blood detoxification by membrane - Venom's and toxins	4	8	a1,a2,b1,b2,c1,c2,d1
4	membrane pathology	Genetic diseases of membrane Laddle's syndrome, cystic fibrosis, thalasemia, transport defect, lysosomal storage diseases, erythrocyte disorders, spectrine and protein abnormalities, Duchene muscular dystrophy and other defects	3	6	a1,a2,b1,b2,c1,c2,d1
14	Final exam				
	Number of Weeks /and Units Per Semester		16	32	

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



V. Teaching Strategies of the Course:

1-	Lectures
2-	Seminars

VI. Assessment Methods of the Course:

No	Assignment
1	Written Exams (Essays) and Quizzes
3	Oral Exams
5	Student presentation

VII. Assignments:

No.	Assignments	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs (symbols)
2	Activity	Throughout the semester	20	20%	a2,a4.b1,b2,c1,c2,d3
5	Final Exam		80	80%	a2,a4.b1,b2,c1,c2,d3
Total			100		

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

IX. Learning Resources:

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

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

- 1- Devlin-Textbook of Biochemistry with Clinical Correlations-John Wiley & Sons (2010)
- 2- Harper's Illustrated Biochemistry 32 edition

2- Essential References.

- 1- Lehninger-Principles-of-Biochemistry fourth edition- David L. Nelson & Michael M.Cox
Molecular Biology of the Cell: Bruce Alberts, Alexander Johnson, Julian Lewis, David Morgan, Martin Raff, Keith Roberts, and Peter Walter, 2014,6 edition

3- Electronic Materials and Web Sites etc.

- 1- The National Center for Biotechnology Information (NCBI) –
<https://www.ncbi.nlm.nih.gov/>
- 2- The Protein Data Bank (PDB)
- <https://www.rcsb.org/>
- 3- The European Molecular Biology Laboratory (EMBL)
- <https://www.embl.org/>
- 4- The American Society for Biochemistry and Molecular Biology (ASBMB)
- <https://www.asbmb.org/>

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

Republic of Yemen
Ministry of Higher Education & Scientific Research
21 SEPTEMBER UMAS
Faculty of Laboratory medicine
Department of Biochemistry and Molecular biology
Unit of Development & Quality assurance



الجمهورية اليمنية
وزارة التعليم العالي والبحث العلمي
جامعة ٢١ سبتمبر للعلوم الطبية والتطبيقية
كلية الطب المخبري
قسم الكيمياء الحيوية
وحدة التطوير وضمان الجودة

Republic of Yemen
Ministry of Higher Education & Scientific Research
21 SEPTEMBER UNIVERSITY of MEDICALS & APPLIED
SCIENCES



Faculty of Laboratory Medicine.

Department of Biochemistry and Molecular biology
Course Specification of Cellular and Molecular Biology
Course No. (03.11.314)
2022/2023

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
- Dr. Nabil Alawiri	Dr/ Nawal Al-Henhena	Dr/ Nawal Al-Henhena	Dr/Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtessam Al Zabedi



I. Course Identification and General Information:					
1	Course Title:	Cellular and Molecular Biology			
2	Course Code & Number:	03.11.314			
3	Credit Hours:	Theory Hours			
		Lecture	Exercise	Practical	Credit Hours
		2	0	2	3
4	Study Level/ Semester at which this Course is offered:	1 st Level / 1 st 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: - Dr. Nabil Alowiri	Reviewed by: Dr/ Nawal Al- Henhena	Head of the Department: Dr/ Nawal Al- Henhena	Vice Dean for Quality affairs Dr/Gamil Taher Abdul iyangari	Dean of College: - Associate Prof. Dr. Ebtesam Al-Zakedi
-------------------------------------	--	---	---	--



II. Course Description:

This course provides an introduction to the principles and techniques of molecular biology and genetics. Topics covered include DNA structure and replication, gene expression, regulation of gene expression, DNA repair, mutagenesis, cloning, and genetic engineering.

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 principles of molecular biology and genetics	A1
a2	Describe the different methods of molecular cloning and different methods of genetic engineering	A2

B. Intellectual Skills:

Upon successful completion of the course, students will be able to:

b1	Design and carry out molecular biology and genetic experiments	B1
----	--	----

C. Professional and Practical Skills:

Upon successful completion of the course, students will be able to:

c1	Isolate and purify DNA and RNA from different sources, check of purity of isolated DNA and RNA, restriction fragmentation and separation of oligos by agarose electrophoresis, RAPD analysis of DNA, cDNA synthesis using PCR, Southern and Northern blotting experiments.	C1
----	--	----

D. Transferable Skills:

Upon successful completion of the course, students will be able to:

d1	Demonstrate oral and written effective communication skills	
----	---	--

Prepared by: - Dr. Nabih Alowari	Reviewed by: Dr/ Nawal Al-Henhena	Head of the Department: Dr/ Nawal Al-Henhena	Vice Dean for Quality affairs Dr/Gamil Iaher Abdul Mughni	Dean of College: - Associate Prof. Dr. Ebtessam Al-Zabedi
-------------------------------------	--------------------------------------	---	--	--

Republic of Yemen

Ministry of Higher Education & Scientific Research

21 SEPTEMBER 2015

Faculty of Laboratory medicine

Department of Biochemistry and Molecular biology

Unit of Development & Quality assurance

الجمهورية اليمنية



الجمهورية اليمنية

وزارة التعليم العالي والبحث العلمي
جامعة صنعاء ٢١ سبتمبر للعام الجامعي ١٤٣٦

كلية الطب المخبري

قسم الكيمياء الحيوية

وحدة التطوير وضمان الجودة

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	Understand the basic principles of molecular genetics and genetic disorders	Lectures	Exams
A2	Discuss the genetic variation and genetic diseases, drugs that act on the membrane	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	Design and carry out molecular genetic experiments	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	Isolate and purify DNA and RNA from different sources, check of purity of isolated DNA and RNA, restriction fragmentation and separation of oligos by agarose electrophoresis, RAPD analysis of DNA, cDNA synthesis using PCR, Southern and Northern blotting experiments..	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
D1	Demonstrate oral and written effective communication skills	Lectures Practical sessions	Lab reports, Exams

Prepared by: - Dr. Nabil Alowiri	Reviewed by: Dr/ Nawal Al-Henhena	Head of the Department: Dr/ Nawal Al- Henhena	Vice Dean for Quality affairs Dr/Gamil Taher Abdul Magharia	Dean of College: - Associate Prof. Dr. Ebtessam A. Zabedi
-------------------------------------	--------------------------------------	--	--	--



NO.	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CLOs)
1	Introduction to Cell	<ul style="list-style-type: none"> - An overview of the cell and cell structure - Membrane biology - Major cell functions - Regulation of cell functions 	1	2	a1,a2,b1,c1,d1
2	Nucleic acids	<ul style="list-style-type: none"> - Types of nucleic acids - DNA structure and function - RNA structure, types, and function 	1	2	a1,a2,b1,c1,d1
3	Genome organization: from nucleotides to chromatin	<ul style="list-style-type: none"> - Eukaryotic genome - Bacterial genome and Plasmids - Bacteriophages and mammalian DNA viruses - Mitochondrial genome - Definition of a gene, gene structure, chromosomal organization of genes and noncoding DNA 	1	2	a1,a2,b1,c1,d1
4	DNA replication	<ul style="list-style-type: none"> - Models of replication - Initiation of replication - Elongation of replication - Termination of replication - Proofreading of DNA - DNA replication in prokaryotes and Eukaryotes 	1	2	a1,a2,b1,c1,d1
5	Gene expression - Transcription	<ul style="list-style-type: none"> - Transcription in prokaryotes and eukaryotes - Regulatory region and transcriptional unit of Gene - Inhibitors of transcription - Reverse transcription. - Post-transcriptional processing of RNA: splicing, cap addition and polyadenylation - Polynucleotide phosphorylase. 	1	2	a1,a2,b1,c1,d1
6	Gene expression	<ul style="list-style-type: none"> - General features of the genetic code 	1	2	a1,a2,b1,c1,d1

Prepared by: - Dr. Nabil Alowiri	Reviewed by: Dr/ Nawal Al-Henhena	Head of the Department: Dr/ Nawal Al- Henhena	Vice Dean for Quality affairs Dr/Gamil Taher Abdul Mansour	Dean of College: - Associate Prof. Dr. Ebtesam Al-Zahedi
-------------------------------------	--------------------------------------	--	--	--

Republic of Yemen

Ministry of Higher Education & Scientific Research

21 SEPTEMBER UMAS

Faculty of Laboratory medicine

Department of Biochemistry and Molecular biology

Unit of Development & Quality assurance



الجمهورية اليمنية

وزارة التعليم العالي والبحث العلمي
جامعة ٢١ سبتمبر للعلوم الطبية والتطبيقية

كلية الطب المخبري

قسم الكيمياء الحيوية

وحدة التطوير وضمان الجودة

	<ul style="list-style-type: none">- Translation and Post-translational modifications	<ul style="list-style-type: none">- Ribosome as the site of protein synthesis- Activation of amino acids- Initiation, elongation and termination of protein synthesis in prokaryotes and eukaryotes- Fidelity of protein synthesis- Bioenergetics of protein synthesis- Control of translation.- Post-translational processing of the polypeptide chains- Acylation, methylation, phosphorylation and glycosylation.			
7	DNA repair and mutations	<ul style="list-style-type: none">- General classes of DNA damage- Mechanisms of DNA repair- Types of mutations and their phenotypic consequences	1	2	a1,a2,b1,c1,d1
8	Molecular biology techniques <ul style="list-style-type: none">- Analysis of Individual DNA and RNA Sequences	<ul style="list-style-type: none">- Molecular Cloning- Restriction Enzymes- Vectors- Plasmids- Libraries- Screening Libraries with Nucleic Acid- Probes	2	4	a1,a2,b1,c1,d1
9	Molecular biology techniques <ul style="list-style-type: none">- Methods of Nucleic Acid Analysis and Proteins	<ul style="list-style-type: none">- Southern Blotting- Northern or RNA Blotting- Western Blot Analysis of Proteins	1	2	a1,a2,b1,c1,d1
10	Molecular biology techniques <ul style="list-style-type: none">- The Polymerase Chain Reaction (PCR)	<ul style="list-style-type: none">- Conventional PCR- Modifications of PCR method- RT-PCR- Gel Electrophoresis- Real time PCR (qPCR)- Primers and primer Design- Applications of PCR	2	2	a1,a2,b1,c1,d1
11	Molecular biology techniques	<ul style="list-style-type: none">- Introduction- Sequencing Methods and	2	4	a1,a2,b1,c1,d1

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

Republic of Yemen

Ministry of Higher Education & Scientific Research

21 SEPTEMBER UMAS

Faculty of Laboratory medicine

Department of Biochemistry and Molecular biology

Units of Development & Quality assurance

جمهورية اليمن



الجمهورية اليمنية

وزارة التعليم العالي والبحث العلمي

جامعة ٢١ سبتمبر للعلوم الطبية والتطبيقية

كلية الطب المخبري

قسم الكيمياء الحيوية

وحدة التطوير وضمان الجودة

	- DNA Sequence Analysis	Terminology - Sanger Sequencing - Second/Next Generation Sequencing - Pyrosequencing			
12	Molecular biology techniques - Advanced Techniques	- Fluorescence in Situ Hybridization - Comparative Genome Hybridization - RNA Expression Arrays	1	2	a1,a2,b1,c1,d1
13	Final Exam		1	2	
	Number of Weeks /and Units Per Semester		16	32	

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

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



VII. Assignments:					
No.	Assignments	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs (symbols)
2	Activity	Throughout the semester	20	20%	a2,a4.b1,b2,c1,c2,d3
5	Final Exam		80	80%	a2,a4.b1,b2,c1,c2,d3
Total			100		

Learning Resources:	
<ul style="list-style-type: none"> Written in the following order: (Author - Year of publication - Title - Edition - Place of publication - Publisher). 	
1- Required Textbook(s) (maximum two).	
Lizabeth A. Allison - 2007 - Textbook of Fundamental molecular biology - Blackwell Publishing Ltd	
2- Essential References.	
1- WILLIAM B. COLEMAN and GREGORY J. TSONGALIS - 2010 - MOLECULAR DIAGNOSTICS - SECOND EDITION - SPRINGER NEW YORK DORDRECHT HEIDELBERG LONDON	
2- Asklepios Bratislava - 2010 - INTRODUCTION TO MEDICAL AND MOLECULAR BIOLOGY -	
3- Electronic Materials and Web Sites etc.	
1- Harvard Molecular & Cellular Biology	
2- Kimball's Biology Pages	
3- Genetic Engineering and Biotechnology News	

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:			
Prepared by: - Dr. Nabil Alowiri	Reviewed by: Dr/ Nawal Al-Henhena	Head of the Department: Dr/ Nawal Al- Henhena	Vice Dean for Quality affairs Dr/Gamil Taher Abdul Mughni	Dean of College: - Associa Prof. Dr. Ebesau Al Zabedi

Republic of Yemen

Ministry of Higher Education & Scientific Research

21 SEPTEMBER UMAS

Faculty of Laboratory medicine

Department of Biochemistry and Molecular biology

Unit of Development & Quality assurance



الجمهورية اليمنية

وزارة التعليم العالي والبحث العلمي

جامعة صنعاء ٢١ سبتمبر ٢٠١٥

كلية الطب المخبري

قسم الكيمياء الحيوية

وحدة التطوير وضمان الجودة

	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: - Dr. Nabil Alowiri	Reviewed by: Dr\ Nawal Al- Henhena	Head of the Department: Dr/ Nawal Al- Henhena	Vice Dean for Quality affairs Dr\Gamil Taher Abdul Mughani	Dean of College: - Associate Prof. Dr. Ebtessam Al-Zabedi
-------------------------------------	--	--	--	---

Republic of Yemen
Ministry of Higher Education & Scientific Research
21 SEPTEMBER UMAS
Faculty of Laboratory medicine
Department of Biochemistry and Molecular biology
Unit of Development & Quality assurance



الجمهورية اليمنية
وزارة التعليم العالي والبحث العلمي
جامعة 21 سبتمبر للعلوم الطبية والتطبيقية
كلية الطب المخبري
قسم الكيمياء الحيوية
وحدة التطوير وضمان الجودة

Republic of Yemen
Ministry of Higher Education & Scientific Research
21 SEPTEMBER UNIVERSITY of MEDICALS & APPLIED
SCIENCES



Faculty of Laboratory medicine.
Department of Biochemistry and Molecular biology
Course Specification of Analytical Biochemistry I
Course No. (03.11.311)
2022/2023

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

I. Course Identification and General Information:

1	Course Title:	Analytical Biochemistry I			
2	Course Code & Number:	03.11.311			
3	Credit Hours:	Theory Hours			
		Lecture	Exercise	Practical	Credit Hours
		2	0	0	2
4	Study Level/ Semester at which this Course is offered:	1 st Level / 1 st 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:	2023			

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



II. Course Description:

Course Description: This course is an advanced study of the principles and techniques used to analyze biological molecules. Topics covered include: Chromatography, Spectroscopy, Mass spectrometry, Immunoassays, and Biosensors.

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	Understanding of instruments techniques and principles of chromatography, electrophoresis, mass spectrometry, nuclear magnetic resonance spectroscopy, biosensors, and imaging techniques	A1
----	---	----

B. Intellectual Skills:

Upon successful completion of the course, students will be able to:

b1	Interpret analytical data	B1
----	---------------------------	----

C. Professional and Practical Skills:

Upon successful completion of the course, students will be able to:

c1	Perform a wide variety of biochemical and molecular techniques	C1
----	--	----

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
----	--	----

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

Republic of Yemen

Ministry of Higher Education & Scientific Research

21 SEPTEMBER UMAS

Faculty of Laboratory medicine

Department of Biochemistry and Molecular biology

Unit of Development & Quality assurance

جمهورية اليمن



الجمهورية اليمنية

وزارة التعليم العالي والبحث العلمي
جامعة صنعاء ٢١ سبتمبر للتعليم الطبي والتطبيقية

كلية الطب المخبري

قسم الكيمياء الحيوية

وحدة التطوير وضمان الجودة

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	Understanding of instruments techniques and principles of chromatography, electrophoresis, mass spectrometry, nuclear magnetic resonance spectroscopy, biosensors, and imaging techniques	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 analytical data	Lectures Laboratory practical	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 a wide variety of biochemical and molecular techniques	Lectures Laboratory practical	Exam Lectures Laboratory 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		

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



NO.	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	General principles of biochemical investigations	Overview of Biochemical Investigations, Introduction to Biochemical Analyzing Instruments	2	4	a1,b1,c1,d1
2	Centrifugation technique	Basic principles of sedimentation, Density gradient centrifugation, Preparative centrifugation (differential centrifugation, Density gradient centrifugation), Analytical subcellular fractions, Some application of analytical ultracentrifugation.	2	4	a1,b1,c1,d1
3	Enzyme techniques	Enzyme classification, units, protein estimation, purification, enzyme kinetics, enzyme assays, spectroscopic, luminescence, radioisotope, immobilized enzymes.	3	6	a1,b1,c1,d1
4	Immunochemical techniques	Antibody structure, types, definitions, Ab's production, polyclonal, monoclonal, qualitative and quantitative analysis of antigens, immunodiffusion one & two dimensional, immunoelectrophoresis, radioimmunoassay, ELISA, fluorescence IA, particle counting IA.	4	8	a1,b1,c1,d1
5	Chromatographic Techniques	General principle, Column chromatograph, TLC, Paper chromatography, Adsorption chromatography, Partition chromatography, GLC, Ion-exchange chromatography, Exclusion chromatography, Affinity chromatography, HPLC.	3	6	a1,b1,c1,d1
7	Final Exam		1	2	a1,b1,c1,d1
Number of Weeks /and Units Per Semester			15	30	

V. Teaching Strategies of the Course:

1-	Lectures
2-	Seminars

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

VI. Assessment Methods of the Course:

No	Assignment
1	Written Exams (Essays) and Quizzes
3	Oral Exams
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,d1
5	Final Exam		80	80%	a1,b1,c1,d1
Total			100		

Learning Resources:

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

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

Handbook of Christen Medical Association, India (CMAI) Medical Laboratory Technology-Robert H. Carman. 2nd Edn. CMAI, New Delhi

2- Essential References.

- Text book of Medical Laboratory Technology, P.B. Godkar 2nd Edn. Bhalani Publication.
- Handbook of Biochemistry by M. A. Siddique 8th Edn. Vijay Bhagat Scientific Book

Wep

Ebook link-

https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/health_science_students/medicalbiochemistry.pdf

Ebook link-

https://books.google.co.in/books?id=Je_pJfb2r0cC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=

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



[onepage&q&f=false](#)

Ebook link-

https://books.google.co.in/books?id=csPcDAAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

Ebook link-

https://books.google.co.in/books?id=2FkXAAwAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

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