

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



الجمهورية اليمنية
وزارة التعليم العالي والبحث العلمي
جامعة ٢١ سبتمبر العلوم 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 Biotechnology and Bioinformatics
Course No. (03.11.321)
2022/2023

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



I. Course Identification and General Information:					
1	Course Title:	Biotechnology and Bioinformatics			
2	Course Code & Number:	03.11.321			
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:				
13	Date of Approval:	2022-2023			

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



II. Course Description:

The students are introduced to the biological and Bioinformatics revolutions in this field. The course is intended to provide students with a comprehensive overview of the most advanced methodologies used in the field of biotechnology, with a special focus on genetics (Genomics, Proteomics, and Epigenetics) to solve real-world problems.

III. Alignment Course Intended Learning Outcomes with program outcomes

III. Course Intended Learning Outcomes (CII.Os)		Referenced PII.Os
A. Knowledge and Understanding: <i>Upon successful completion of the course, students will be able to:</i>		
a1	Understand the acquired knowledge for tackling certain biotechnology-related problems.	A1
B. Intellectual Skills: <i>Upon successful completion of the course, students will be able to:</i>		
b1	Explain modern, state-of-the-art methodologies used in the field of biotechnology, with a special focus on genetics.	B1
b2	Interpret analytical data and communicate their findings to others.	
C. Professional and Practical Skills: <i>Upon successful completion of the course, students will be able to:</i>		
c1	Apply molecular genetic techniques to solve biological problems	C1
D. Transferable Skills: <i>Upon successful completion of the course, students will be able to:</i>		
d1		D1
d2		

Prepared by: - Dr/ DrNawal Al-Henhena	Reviewed by: Dr. Nabil Alowiri	Head of the Department: DrNawal Al- Henhena	Vice Dean for Quality affairs DrGamil Taher Abdul Mughni	Dean of College: - Associate Prof. Dr Ebtessam Al-Zabedi
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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 the acquired knowledge for tackling certain biotechnology-related problems	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	Explain modern, state-of-the-art methodologies used in the field of biotechnology, with a special focus on genetics.	Lecture	Exam
B2	Interpret analytical data and communicate their findings to others.	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	Apply molecular genetic techniques to solve biological problems	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
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Prepared by: - Dr/DrNawa/Al-Henhena	Reviewed by: Dr. Nabil Alowiri	Head of the Department: DrNawa/Al- Henhena	Vice Dean for Quality affairs Dr/Gamil Taher Abdul Mughni	Dean of College: - Associate Prof. Dr. Ebtesam Al Zabedi
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NO.	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CLOs)
1	Principles of Biotechnology	Overview of DNA, and DNA modifying enzymes and vectors Molecular markers and their applications General application of biotechnology in Medicine	1	2	A1,b1,c1
2	Biochemical Techniques	Preparation of buffers and reagents	1	2	A1,b1,c1
3	Genomics and Transcriptomics	Structural genomics: Classical ways of genome analysis, large fragment genomic libraries; Physical mapping of genomes; Genome sequencing, sequence assembly and annotation; Comparative genomics Functional genomics: DNA chips and their use in transcriptome analysis; Mutants and RNAi in functional genomics; Metabolomics and ionomics for elucidating metabolic pathways, etc. Applications of genomics in human health and industry.	2	4	A1,b1,c1
5	Proteomics	Proteomics – Protein structure, function and purification; Introduction to basic proteomics technology; Bio-informatics in proteomics; Proteome analysis, etc. Applications of proteomics in human health and industry.	2	4	A1,b1,c1
6	Biosafety, IPR and Bioethics	Biosafety and risk assessment issues; Regulatory framework; National biosafety policies and law, The Cartagena protocol on biosafety, WTO and other international agreements related to biosafety, Cross border movement of germplasm; Risk management issues - containment. General principles for the laboratory and environmental biosafety; Health aspects; toxicology, allergenicity, antibiotic resistance, etc; Impact on environment: gene flow in natural and artificial ecologies; Sources of gene escape, tolerance of target organisms, creation superweeds/superviruses, etc.	1	2	A1,b1,c1
7	Molecular immunology diagnostics	Antibody diversity; antigens, haptens, antigens-antibody interactions; immuno-regulation and	2	4	A1,b1,c1

Prepared by: - Dr/ DrNawal 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. Ebtessam Al-Zabedi
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		tolerance; Allergies and hypersensitive response; Immunodeficiency; Vaccines; Immunological techniques. Introduction to the basic principles of molecular technology and techniques used in pathogen detection Principles of ELISA and its applications in viral detection			
8	Nano-Biotechnology	The modern concepts to describe the conformation and dynamics of biological macromolecules Preparation and characterization of nanoparticles; Nanoparticulate carrier systems; Micro- and Nano-fluidics; Drug and gene delivery system; Microfabrication, Biosensors, Chip technologies, Nano- imaging, Metabolic engineering and Gene therapy	3	6	A1,b1,c1
9	Introduction and Principle of Bioinformatics	Introduction, biological databases – primary, secondary and structural, Protein and Gene Information Resources – PIR, SWISSPROT, PDB, genbank, DDBJ. Specialized genomic resources. DNA sequence analysis, cDNA libraries and EST, EST analysis, pairwise alignment techniques, database searching, multiple sequence alignment. Secondary database searching, building search protocol, computer aided drug design – basic principles, docking, QSAR. Analysis packages – commercial databases and packages, GPL software for Bioinformatics, web-based analysis tools.	2	4	A1,b1,c1
10	Biostatistics and Computers	Basic principles, organization and operational aspects of computers, operating systems. Introduction to MS-Office, MS-Word, MS-Excel. Statistical Data analysis based on above topics through MS-Excel.	1	2	A1,b1,c1
	Final Exam		1	2	A1,b1,c1
	FINAL THEORETICAL		16	32	

Prepared by. - Dr/DrNawal 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. Ebtessam Al-Zabedi
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V. Teaching Strategies of the Course:

1-	Lectures
2-	Practical session
3-	Seminars
5-	Discussion

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)
1	Midterm Exam	7	15	15%	a1,b1,c1
2	Activity	Throughout the semester	5	5%	a1,b1,c1
3	Practical Report	Throughout the semester	10	10 %	a1,b1,c1
4	Practical exam	12	20	20%	a1,b1,c1
5	Final Exam	14	50	50%	a1,b1,c1
Total					

Prepared by: - Dr\ DrNawal Al- Henhena	Reviewed by: Dr. Nabil Alowiri	Head of the Department: DrNawal Al- Henhena	Vice Dean for Quality affairs Dr\Gamil Taher Abdzi Mughni	Dean of College: - Associate Prof. Dr. Ebtesam Al-Zabedi
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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- Analytical Biochemistry, 5th Edition, by David E. Garfinkel
- 2- Principles and Techniques of Biochemistry and Molecular Biology, 5th Edition, by Keith Wilson and John Walker

2- Essential References.

- 1- Bioanalytical Chemistry, 2nd Edition, by Andreas Manz, Norbert Pamme, and Dimitrios Lossifidis
- 2- Electrophoresis in Practice, 3rd Edition, by Rainer Westermeier

3- Electronic Materials and Web Sites etc.

- 1- <https://pubmed.ncbi.nlm.nih.gov/advanced/>
- 2- <https://www.ncbi.nlm.nih.gov/>
- 3- <https://biotech.dpu.edu.in/>
- 4- <https://biotech.dpu.edu.in/>

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: - 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

Prepared by: - Dr/ DrNaval Al-Henhena	Reviewed by: Dr. Nabil Alowiri	Head of the Department: DrNaval Al- Henhena	Vice Dean for Quality affairs Dr/Gamil Taher Abdul Mughni	Dean of College: - Associate Prof. Dr. Ehtesany AlZabedi
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6	Plagiarism: - If any student try to plagiarism another student identity, both of them will be converted to 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/DrNawal 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. Ebtessam Al-Zabedi
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Ministry of Higher Education & Scientific Research
21 SEPTEMBER UMAS
Faculty of Laboratory medicine
Department of microbiology & immunology
Unit of Development & Quality assurance



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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 Research Methodology
Course No. (03.11. 322)
2023/2023

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



I. Course Identification and General Information:				
1	Course Title:	Research Methodology		
2	Course Code & Number:	03.11. 322		
3	Credit Hours:	Theory Hours		
		Lecture	Exercise	Practical
		2	0	0
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 of microbiology & immunology		
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:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
Dr. Nawal Al-Henhena	Ass.Pr. Dr. Ebtasam Al-Zabedi	Dr. Nawal Al-Henhena	Dr Gamil Taher Abdul Mughni	Ass.Pr. Dr. Ebtasam Al-Zabedi



II. Course Description:

This course is an advanced study of research methods and scientific writing. Students will learn about more complex research designs, statistical analysis, and writing for a scholarly audience. The course will also cover ethical issues in research.

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 specialized research methods	A1
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B. Intellectual Skills:

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

b1	Explain scientific writing and research methodology in the writing scientific reports	B1
b2	Design advanced research project autonomously synthesizing the various ethical, statistical, and reporting methods	B3

C. Professional and Practical Skills:

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

c1	Demonstrate mastery in advanced research methods when write clear and concise research reports.	C1
c2	Applied advanced ethical issues in research	C3

D. Transferable Skills:

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

d1	Communicate effectively about Research Methods and Scientific Writing to a variety of audiences	D1
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Dr. Nawal Al-Henhena	Ass.Pr. Dr. Ebtasam Al-Zabedi	Dr. Nawal Al-Henhena	Dr Gamil Taher Abdul Mughni	Ass.Pr. Dr. Ebtasam Al-Zabedi

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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 specialized research methods	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 scientific writing and research methodology in the writing scientific reports	Lectures	Exam
B2	Design advanced research project autonomously synthesizing the various ethical, statistical, and reporting methods	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	Demonstrate mastery in advanced research methods when write clear and concise research reports.	Lectures	Exam
C2	Applied advanced ethical issues in research	Lecture Research proposal Research report	Exam Research proposal Research report

(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 Research Methods and Scientific Writing to a variety of audiences	Lectures Research proposal Research report	Exam Research proposal Research report

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

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes
1	Introduction to advanced research methods	What is research? The different types of research The research process	1	2	a1,b1,b2,c1,c2,d1
2	Research questions and hypotheses	Developing a research question, designing a study, data collection methods, and statistical analysis.	1	2	a1,b1,b2,c1,c2,d1
3	Literature review and research design	Presenting research results in written and oral formats, creating effective visual aids, and responding to questions from an audience.	1	2	a1,b1,b2,c1,c2,d1
4	Data collection and analysis	Sampling Survey research Experimental research Descriptive statistics Inferential statistics Critiquing Research: Evaluating scientific literature, reviewing peer-reviewed articles, and providing constructive feedback to peers	1	2	a1,b1,b2,c1,c2,d1
5	Writing research proposals	The structure of a research paper, academic writing conventions, scientific language, and citation formats.	1	2	a1,b1,b2,c1,c2,d1

Prepared by: Dr Nawal Al-Henhena	Reviewed by: Ass Pr. Dr Ehtesam Al-Zabedi	Head of the Department: Dr Nawal Al-Henhena	Vice Dean for Quality affairs: Dr Gamil Taher Abdul Mughni	Dean of College: Ass.Pr. Dr. Ebtessam Al-Zabedi
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6	Ethical issues in research	Scientific Writing The elements of scientific writing Writing a research proposal Writing a research report Scientific Writing (cont.) Reviewing and editing scientific writing Presenting research findings	1	2	a1,b1,b2,c1,c2,d1
7	Midterm exam		1	2	a1,b1,b2,c1,c2,d1
8	Research paper proposal	The structure of a research paper, academic writing conventions, scientific language, and citation formats	1	2	a1,b1,b2,c1,c2,d1
9	Research paper draft	The structure of a research paper, academic writing conventions, scientific language, and citation formats	1	2	a1,b1,b2,c1,c2,d1
10	Research paper final draft	The structure of a research paper, academic writing conventions, scientific language, and citation formats	1	2	a1,b1,b2,c1,c2,d1
11			1	2	a1,b1,b2,c1,c2,d1
12	Scientific Writing	The elements of scientific writing Writing a research proposal Writing a research report	1	2	a1,b1,b2,c1,c2,d1
13	Scientific Writing (cont.)	Reviewing and editing scientific writing Presenting research findings	1	2	a1,b1,b2,c1,c2,d1

Prepared by: Dr. Nawal Al-Henhena	Reviewed by: Ass.Pr. 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: Ass.Pr. Dr. Ebtesam Al-Zabedi
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14	Final exam	1	2	a1,b1,b2,c1,c2,d1
Number of Weeks /and Units Per Semester		16	32	

V. Teaching Strategies of the Course:

1-	Lectures
2-	Practical session
3-	Research proposal
4-	Research report

VI. Assessment Methods of the Course:

No	Assignment	
1	Written Exams (Short Essays) and Quizzes	A1,b3,b4,C1
2	Written Exams(MCQ)	A1,b3,b4,C1
3	Structured Oral Exams	A1,b3,b4,C1
4	Objective Structured Practical Exams (OSPE)	A1,b3,b4,C1
5	Student presentation	A1,b3,b4,C1

VII. Assignments:

No.	Assignments	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs (symbols)
1	Midterm Exam	7	15	15%	a1,b3,b4,c1
2	Activity	Throughout the semester	5	5%	A1,b3,b4,C1
3	Practical Report	Throughout the semester	10	10%	A1,b3,b4,C1
4	Practical exam	12	20	20%	A1,b3,b4,C1
5	Final Exam	14	50	50%	A1,b3,b4,C1
Total					

Prepared by: Dr. Nawal Al-Henhena	Reviewed by: Ass.Pr. Dr. Ebtesam Al-Zabedi	Head of the Department: Dr. Nawal Al-Henhena	Vice Dean for Quality affairs Dr. Garnil Taher Abdul Mughni	Dean of College: Ass.Pr. Dr. Ebtesam Al-Zabedi
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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).
1-Research Methods: A Process for Scientific Investigation, 11th Edition by John W. Creswe
2-Research Methods: A Process for Scientific Investigation, 8th Edition by David L. Stufflebeam and Charles W. Shinkfield.
2- Essential References.
1 Research Methods: A Structured Inquiry, 12th Edition by John W. Creswell and Vicki L. Plano Clark
2- Research Design. John W. Creswell's 3rd Ed
3- Electronic Materials and Web Sites etc.
The American Psychological Association (APA) Style Guide.
The Publication Manual of the American Sociological Association (ASA).

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: Ass.Pr. Dr. Ebtasam Al-Zabedi	Head of the Department: Dr. Nawal Al-Henhena	Vice Dean for Quality affairs Dr Gamil Taher Abdul Meghni	Dean of College: Ass.Pr. Dr. Ebtasam Al-Zabedi
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Faculty of Laboratory medicine.

Department of Biochemistry and Molecular biology
Course Specification of Advanced Molecular Genetics
Course No. (03.11.320)
2022/2023

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

1. Course Identification and General Information:					
1	Course Title:	Advanced Molecular Genetics			
2	Course Code & Number:	03.11.320			
3	Credit Hours:	Theory Hours			
		Lecture	Exercise	Practical	Credit Hours
		2	0	0	2
4	Study Level/ Semester at which this Course is offered:	2 nd Level / 2 nd Semester			
5	Pre -Requisite (if any):	Molecular biology			
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 Maghni	Dean of College: - Associate Prof. Dr. Ebjesan Al-Zabedi
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II. Course Description:

This course provides an advanced introduction to the principles and techniques of molecular genetics and genetic disorders. Topics covered include Genomics, Genetic disease types, pattern of genetic disease inheritance, prenatal diagnosis, genetics of cancer, and Genome analysis.

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 genetics and genetic disorders	A1
a2	Describe the different patterns of genetic disorders and different methods of molecular diagnostic	A2

B. Intellectual Skills:

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

b1	Design and carry out molecular genetic experiments	B1
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C. Professional and Practical Skills:

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

c1	Critically evaluate the scientific literature in molecular genetics and the advantages and disadvantages of different molecular diagnostic techniques.	C1
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D. Transferable Skills:

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

d1	Demonstrate oral and written effective communication skills	D1
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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
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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	Critically evaluate the scientific literature in molecular genetics and the advantages and disadvantages of different molecular diagnostic techniques	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 Mughni	Dean of College: - Associate Prof. Dr. Ehtesam Al-Zahedi
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NO.	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CLOs)
1	Basic of Genetics and Genomics	<ul style="list-style-type: none"> - Genetics and Genomics in Medicine - Categories of Genetic Disease - The Human Genome and its Chromosomes - Cell Division - Human Gametogenesis and Fertilization - Medical Relevance of Mitosis and Meiosis 	2	4	a1,a2,b1, c1,d1
2	The Chromosomal and Genomic Basis of Disease: Disorders of the Autosomes and Sex Chromosomes	<ul style="list-style-type: none"> - Human Chromosomes - Characterizing Human Chromosomes - Chromosomes Abnormalities - Autosomal Disorders - The Sex Chromosomes and their Abnormalities 	2	4	a1,a2,b1, c1,d1
3	Patterns of Single-Gene Inheritance	<ul style="list-style-type: none"> - Overview and Concepts - Mendelian Inheritance - Factors Affecting Pedigree Patterns - Correlating Genotype and Phenotype - Autosomal Patterns of Mendelian Inheritance - X-linked Inheritance - Pseudoautosomal Inheritance - Mosaicism - Imprinting in Pedigrees - Maternal Inheritance of Disorders Caused by Mutations in the Mitochondrial Genome 	3	6	a1,a2,b1, c1,d1
4	Molecular Genetics of Common Disorders with Complex Inheritance	<ul style="list-style-type: none"> - Introduction - Qualitative and Quantitative Traits - Genetic and Environmental Modifiers of Single-Gene Disorders - Examples of Multifactorial Traits for Which Genetic and Environmental Factors 	1	2	a1,a2,b1, c1,d1
5	Genetic Variation in Populations	<ul style="list-style-type: none"> - Overview Mutations and their Consequences - Human genetic diversity - Inherited variation and polymorphism in DNA - Inherited variation and polymorphism in proteins - Genotypes and phenotypes in populations 	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 Mughrni	Dean of College: - Associate Prof. Dr. Ebtesam Al-Zabedi
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		<ul style="list-style-type: none"> - Factors that disturb Hardy Weinberg equilibrium - Ethnic differences in the frequency of various genetic diseases 			
6	The Molecular, Biochemical, and Cellular Basis of Genetic Disease	<ul style="list-style-type: none"> - Diseases due to mutations in different classes of proteins - Diseases involving enzymes - Defects in receptor proteins - Transport defects - Disorders of structural proteins - Neurodegenerative disorders 	1	2	a1,a2,b1, c1,d1
7	Prenatal Diagnosis	<ul style="list-style-type: none"> - Introduction - Indications for prenatal diagnosis by invasive testing - Methods of prenatal diagnosis - Laboratory studies - Emerging technologies for prenatal diagnosis - Prenatal prevention and management of genetic disease - Genetic counseling for prenatal diagnosis 	1	2	a1,a2,b1, c1,d1
8	Cancer Genetics and Genomics	<ul style="list-style-type: none"> - Genetic Basis of Cancer - Oncogenes - Tumor-suppressor genes - Tumor Progression - Applying Genomics to Individualize Cancer Therapy - Cancer and The Environment 	2	4	a1,a2,b1, c1,d1
9	Genome analysis	<ul style="list-style-type: none"> - DNA Typing - RFLP - DNA polymorphisms - Short tandem repeat analysis - Mitochondrial DNA analysis - Randomly amplified polymorphic DNA (RAPD) - Single nucleotide polymorphisms - Genomics - Proteomics 	2	4	a1,a2,b1, c1,d1
9	Final Exam		1	2	
	Number of Weeks /and Units Per Semester		16	32	

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 Abd Mughal	Dean of College. - Associate Prof. Dr. Ebtesam Al-Zabedi
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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

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. 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
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Learning Resources:

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

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

Robert L. Nussbaum - Thompson & Thompson Genetics in Medicine - 8th Edition.

2- Essential References.

- 1 - PETER D TURNPENNY – EMERY; ELEMENTS OF MEDICAL GENETICS – 13th EDITION
- 2- WILLIAM B. COLEMAN and GREGORY J. TSONGALIS – 2010 - MOLECULAR DIAGNOSTICS – SECOND EDITION - SPRINGER NEW YORK DORDRECHT HEIDELBERG LONDON

3- Electronic Materials and Web Sites etc.

- 1- Learn Genetics;
- 2- The World Health Organization (WHO) website;
<https://www.who.int/>
- 3- American Society of Human Genetics;

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

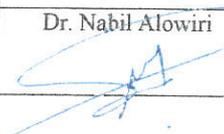
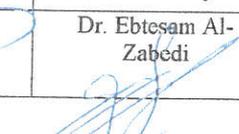
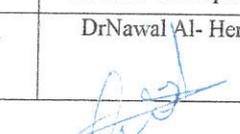
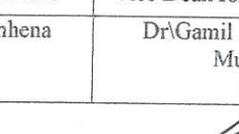
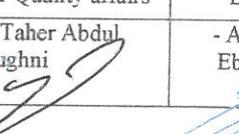
Prepared by: Dr. Nabil Alowiri	Reviewed by: Dr/ Nawal Al- Henhena	Head of the Department: Dr/ Nawal Al- Henhena	Vice Dean for Quality affairs Dr/Gamil Taher Abdul Mughni	Dean of College: - Associate Prof. Dr. Ebtesam Al-Zabedi
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Republic of Yemen
Ministry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



Republic of Yemen
Ministry of Higher Education & Scientific Research
21 SEPTEMBER UNAS
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

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:	1 st Level / 2 nd 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
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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
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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
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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
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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 Mujibir	Dean of College: - Associate Prof. Dr. Ebtessam Al-Zabedi
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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. Ebtesam Al-Zabedi	Head of the Department: DrNawal Al- Henhena	Vice Dean for Quality affairs Dr\Gamil Taher Abdul Maghni	Dean of College: - Associate Prof. Dr. Ebtesam Al-Zabedi
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NO.	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CIOs)
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 Ca ²⁺ by hormones	Catecholamine's receptors, calcium as second messenger, effect of calcium on liver metabolism, nature of intracellular calcium pool, mechanism of action of Ca ²⁺ as a regulator (Calmodulin its structure and physical properties, effect of calmodulin binding to target enzymes).	2	4	a1,,b1,c1
6	Ca ²⁺ 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 Ca ²⁺ 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	

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 Maghni	Dean of College: - Associate Prof. Dr. Ebtesam Al-Zabedi
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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

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		

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
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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 – 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 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. Nabil Alowiri	Reviewed by: Dr. Ebtessam Al-Zabedi	Head of the Department: Dr.Nawal Al- Henhena	Vice Dean for Quality affairs Dr.Gamil Taher Abdal Mughani	Dean of College: - Associate Prof. Dr. Ebtessam Al-Zabedi
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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



الجمهورية اليمنية

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

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

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 Maghni	- Associate Prof. Dr. Ebtesam 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 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. Ebtessam Al-Zabedi	Dr Nawal Al- Henhena	Dr Nawal Al-Henhena	Dr. Gamal Taher Abdul Mughni	Ass.Pr. Dr. Ebtessam 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
4	Semester at which this Course is offered:	1 st Level /2 nd 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		

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
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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 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 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:

bi	Interpret and explain results of Clinical Biochemistry and Molecular Biology and effectively to clinicians.	B1
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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
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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
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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
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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 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 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

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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, haemochromatosis, 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, exchange 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 learning
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

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