



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



Faculty of Laboratory medicine.

Department of Hematology
Course Specification of Cellular and Molecular Biology
Course No. (03.13. 317)
2022/2023

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
- Dr. Nabil Alowiri	Dr\ Nawal Al-Henhena	Dr\Gamil Taher Abdul Mughni	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:	03.13. 317			
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 Medical Diagnostic Hematology			
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			

II. Course Description:

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



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: <i>Upon successful completion of the course, students will be able to:</i>		
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: <i>Upon successful completion of the course, students will be able to:</i>		
b1	Design and carry out molecular biology and genetic experiments	B1
C. Professional and Practical Skills: <i>Upon successful completion of the course, students will be able to:</i>		
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: <i>Upon successful completion of the course, students will be able to:</i>		
d1	Demonstrate oral and written effective communication skills	

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

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

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

NO.	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes
-----	-------------------	-----------------	-----------------	---------------	-------------------

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

				(CILOs)	
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 - Translation and Post-translational modifications	<ul style="list-style-type: none"> - General features of the genetic code - Ribosome as the site of protein synthesis 	1	2	a1,a2,b1,c1,d1

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

		<ul style="list-style-type: none"> - 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 - 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 - 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 - 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 - DNA Sequence Analysis	<ul style="list-style-type: none"> - Introduction - Sequencing Methods and Terminology - Sanger Sequencing 	2	4	a1,a2,b1,c1,d1

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

		- 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:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
- Dr. Nabil Alowiri	Dr\ Nawal Al-Henhena	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtessam 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: No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before

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



	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. Nabil Alowiri	Dr\ Nawal Al-Henhena	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtessam Al-Zabedi