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 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 Abdel Mughni	- Associate Prof. Dr. Ebtesam Al-Zubedi

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:**	1st Level / 1st Semester			
5	**Pre –Requisite (if any):**	None			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Master Degree Biochemistry and Molecular biology			
8	**Language of Teaching the Course:**	English			
9	**Study System:**	Semester			
10	**Mode of Delivery:**	Regular			
11	**Location of Teaching the Course:**	University Campus			
12	**Prepared by:**				
13	**Date of Approval:**	2022-2023			

II. Course Description:

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 (CILOs)	Referenced PILOs
A. Knowledge and Understanding: *Upon successful completion of the course, students will be able to:*		
a1	**Understand** the acquired knowledge for tackling certain biotechnology-related problems.	A1
B. Intellectual Skills: *Upon successful completion of the course, students will be able to:*		
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: *Upon successful completion of the course, students will be able to:*		
c1	**Apply** molecular genetic techniques to solve biological problems	C1
D. Transferable Skills: *Upon successful completion of the course, students will be able to:*		
d1		D1
d2		

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 Ebtesam Al-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	**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

NO.	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
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

		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; Nanoparticular 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, genebank, 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	**Biostatics 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 THEORTICAL		**16**	**32**	

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:	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. 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- 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:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
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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

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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 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. Ebtesam Al-Zabedi	Dr. Nawal Al-Henhena	Dr Gamil Taher Abdul Mughni	Ass.Pr. Dr. Ebtesam 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	**Credit Hours**
		2	0	0	2
4	**Study Level/ Semester at which this Course is offered:**	1st Level / 2nd Semester			
5	**Pre –Requisite (if any):**	None			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Master degree 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			

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**
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	**C 3**
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**

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

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

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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:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
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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).
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

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Republic of Yemen

Ministry of Higher Education & Scientific Research

21 SEPTEMBER UNIVERSITY of MEDICALS & APPLIEED

SCIENCES

Faculty of Laboratory medicine.

Department of Biochemistry and Molecular biology
Course Specification of Advanced 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/ Nawal Al-Henhena	Dr/ Nawal Al- Henhena	DrGamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam 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:**	2nd Level / 2nd 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			

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
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
D. Transferable Skills: *Upon successful completion of the course, students will be able to:*		
d1	**Demonstrate** oral and written effective communication skills	D1

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

NO.	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Basic of Genetics and Genomics	- 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	- 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	- 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	- 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	- 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:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
Dr. Nabil Alowiri	Dr/ Nawal Al-Henhena	Dr/ Nawal Al- Henhena	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

		- 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**	- 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**	- 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**	- 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**	- 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**	

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

VI. Assessment Methods of the Course:

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

VII. Assignments:

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

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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

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