وصف المقرر للمواد الدراسية للدراسات العليا / قسم التقانة الأحيائية

توزيع العبء الدراسي للطالب			
اسم المقرر باللغة الأنكليزية	Advanced molecular biology	رمز المقرر	
اسم المقرر باللغة العربية	علم الأحياء الجزيئي المتقدم	عدد الوحدات	٣
نوع المقرر	أساسي	تاريخ الأعداد	٢٠٢٥/٩/١٠

وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	**Medical parasitology**	**Module Delivery**	
Module Type	**اساسي**	☐ **Theory**	
Module Code		☐ **Lecture**	
		☐ **Lab**	
		☐ **Tutorial**	
		☐ **Practical**	
		☐ **Seminar**	
Module Level	first	**Semester of Delivery**	
Administering Department	Biotechnology	**College**	Applied science
Module Leader	Prof.dr.mohammed Jubair Al-Mahadi	**e-mail**	mjm20002014@uofallujah.edu.iq
Module Leader's Acad. Title	Prof.dr	**Module Leader's Qualification**	PhD.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	

Scientific Committee Approval Date		**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	**1. In particular it is aimed at final year undergraduates and beginning graduate students.** **2. There is a companion volume, entitled "Biotechnology," that emphasizes the more practical aspects of modern genetics. Together we hope that both books effectively survey the foundations and applications of modern molecular genetics.** **3. Some students who are using this course will already be well grounded in molecular biology, due to having taken courses in genetics, biochemistry, and cell biology**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**1. To enable candidates to acquire the knowledge and develop an understanding of how materials are provided by biological agents to provide goods and services** **2. To appreciate the role played by biotechnology in improving health care for human beings.** **3. To understand the interdisciplinary nature of this subject** **4. .To create awareness about the appreciation of biological processes to industries.** **5. To develop the ability to appreciate biological phenomenon in nature and the contribution of biotechnology to human welfare.** **To develop scientific attitude towards biological phenomenon.**
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Class	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Tutorial	1	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	2	10% (10)	Continuous	All
	Seminar	1	10% (10)	13	LO #5, #8 and #10
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
Summative assessment	Final Exam	4hr	50% (50)	16	All
	Class	2	100% (100 Marks)		
Total assessment		**50/50**			

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction :** **Nucleic acids (DNA, RNA**
Week 2	**An Overview of Transcription in Both Prokaryotic and Eukaryotic Cells**
Week 3	**Synthesis and Structure of Eukaryotic** **Messenger RNAs**
Week 4	**The Processing of Eukaryotic Messenger RNAs**
Week 5	**Packaging the Eukaryotic Genome**
Week 6	**Mid term**

Week 7	**An Overview of Gene Regulation in Eukaryotes**
Week 8	**The Role of Transcription Factors in Regulating xvii** **Gene Expression**
Week 9	**RNA Processing Control**
Week 10	**Translational process and Control**
Week 11	**Posttranslational Control: Determining Protein Stability**
Week 12	**DNA Replication**
Week 13	**The Machinery Operating at the Replication Fork**
Week 14	**Genetic and chromosomal mutations**
Week 15	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	Final exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts		
Recommended Texts		
Websites		

وصف المقرر للمواد الدراسية للدراسات العليا/ قسم التقانة الأحيائية

توزيع العبء الدراسي للطالب			
اسم المقرر باللغة الأنكليزية	Advance genetic engineering	رمز المقرر	
اسم المقرر باللغة العربية	الهندسة الوراثية المتقدمة	عدد الوحدات	٢
نوع المقرر		تاريخ الأعداد	٢٠٢٥/٩/١

وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Advance genetic engineering**	**Module Delivery**	
Module Type		☐ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code			
Module Level		**Semester of Delivery**	
Administering Department	Biotechnology	**College**	Applied science
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	PhD.
Module Tutor	**Leqaa Majeed Aziz**	**e-mail**	**Leqaa.aziz@uofallujah.edu.iq**
Peer Reviewer Name		**e-mail**	

Scientific Committee Approval Date		**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course aims to provide students with advanced theoretical knowledge and practical skills in the field of genetic engineering and its modern applications through the following: **1- Knowledge Objectives:** Introduce students to advanced principles of DNA manipulation and gene-editing mechanisms. Provide in-depth knowledge of modern techniques such as CRISPR-Cas9, Knock-in/Knock-out strategies, and targeted gene modification. Explain medical applications (gene therapy, vaccine development, personalized medicine), in addition to agricultural and industrial applications. Raise awareness of ethical, legal, and biosafety considerations related to the use of genetic engineering. **2- Skills Objectives:** Enable students to design and conduct advanced experiments in gene cloning, gene expression, and protein engineering. Train students to use bioinformatics tools and software for genetic data analysis. Develop students' skills in analyzing and interpreting research results critically and scientifically. Enhance students' ability to prepare scientific reports and present research findings professionally. 3- **Attitudinal Objectives:** Foster scientific research spirit and innovation in biotechnology and genetic engineering. Encourage teamwork and collaboration in research projects. Strengthen commitment to ethical responsibility when dealing with genetically modified organisms and gene-editing applications. Integrate theoretical knowledge with practical applications to serve society and support sustainable development.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, students will be able to: 1. Knowledge and Understanding Explain advanced principles of DNA manipulation and gene-editing mechanisms. Describe modern genetic engineering techniques such as CRISPR-Cas9, Knock-in/Knock-out, and targeted gene modification. Discuss medical, agricultural, and industrial applications of genetic engineering. Recognize ethical, legal, and biosafety issues related to genetic manipulation. 2. Cognitive/Intellectual Skills Analyze and interpret data from advanced genetic engineering experiments. Critically evaluate research findings in the field of molecular genetics. Design innovative strategies for applying genetic engineering in biotechnology and medicine. 3. Practical and Technical Skills Perform advanced laboratory techniques in gene cloning, expression, and protein engineering. Apply bioinformatics tools to analyze genetic sequences and experimental data. Prepare well-structured scientific reports and effectively present research outcomes. 4. Transferable and Attitudinal Skills Demonstrate teamwork and collaborative skills in laboratory and research settings. Show commitment to ethical practices and biosafety in genetic research. Integrate theoretical knowledge with practical applications to address real-world challenges. Develop independent learning skills and engage in lifelong learning in biotechnology.
Indicative Contents المحتويات الإرشادية	Theoretical Topics • Introduction • Historical development of genetic engineering. • Fundamental concepts in DNA manipulation and gene editing.

	• DNA Manipulation Techniques • Restriction enzymes and ligases. • Molecular vectors: plasmids, bacteriophages, artificial chromosomes. • Advanced strategies for gene cloning. • Modern Gene Editing Technologies • CRISPR-Cas systems and their applications. • Knock-in and Knock-out approaches. • Other genome editing tools: TALENs, ZFNs. • Regulation of Gene Expression • Expression vectors and promoter systems. • Regulatory elements in gene expression. • Gene silencing techniques: RNA interference, antisense technology. • Protein Engineering • Site-directed mutagenesis. • Recombinant protein production. • Therapeutic and industrial proteins. • Medical Applications • Gene therapy strategies. • Vaccine development and production of therapeutic proteins. • Personalized medicine and genomic medicine. • Agricultural and Industrial Applications • Genetically modified crops. • Stress and disease resistance improvement. • Industrial use of genetically engineered microorganisms. • Bioinformatics in Genetic Engineering • Sequence analysis tools. • Genetic databases and genome annotation. • Computational design and simulation. • Ethical, Legal, and Biosafety Issues

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Lectures and Interactive Discussions • Delivering core theoretical concepts in advanced genetic engineering. • Using case studies and recent research findings to encourage critical thinking. • Problem-Based Learning (PBL) • Group activities focusing on solving real-world challenges (e.g., designing a gene therapy approach). • Encouraging teamwork, innovation, and application of theoretical knowledge. • Seminars and Student Presentations • Students review and present recent scientific articles in genetic engineering. • Development of communication, critical review, and scientific argumentation skills. • Application of computational approaches to gene editing design and validation. • Independent and Self-Directed Learning • Encouraging students to engage with up-to-date literature.

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Class	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Tutorial	1	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	2	10% (10)	Continuous	All
	Seminar	1	10% (10)	13	LO #5, #8 and #10
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
Summative assessment	Final Exam	4hr	50% (50)	16	All
	Class	2	100% (100 Marks)		
Total assessment		**50/50**			

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction in genetic engineering
Week 2	Restriction enzymes
Week 3	Cloning Vectors
Week 4	Phages cloning strategies
Week 5	Artificial chromosomal vectors
Week 6	**Mid**
Week 7	Cell cloning
Week 8	Reproductive cloning
Week 9	Therapeutic cloning
Week 10	DNA Sequencing
Week 11	Gene therapy
Week 12	Genetic mapping

Week 13	Non-Coding RNA
Week 14	Molecular diagnosis
Week 15	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	Final exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Primrose, S. B., & Twyman, R. M. (2020). Principles of Gene Manipulation and Genomics (8th ed.). Wiley-Blackwell. • Brown, T. A. (2016). Gene Cloning and DNA Analysis: An Introduction (7th ed.). Wiley-Blackwell. • Watson, J. D., Baker, T. A., Bell, S. P., Gann, A., Levine, M., & Losick, R. (2017). Molecular Biology of the Gene (7th ed.). Pearson.	Some of them

Recommended Texts	• Lodish, H., Berk, A., Kaiser, C. A., Krieger, M., et al. (2021). Molecular Cell Biology (9th ed.). Macmillan. • Khan, F. H. (2016). The Elements of Bioinformatics. Cengage. • Chesnoy, S. (2015). Gene Therapy: Tools and Potential Applications. Springer.	
Websites	• Encyclopedia Britannica – Genetic Engineering • National Center for Biotechnology Information (PMC) – "Principles of Genetic Engineering"	

وصف المقرر للمواد الدراسية للدراسات العليا/ قسم التقانة الأحيائية

توزيع العبء الدراسي للطالب			
اسم المقرر باللغة الأنكليزية	Advance Biotechnology	رمز المقرر	
اسم المقرر باللغة العربية	تقنيات احيائية متقدم	عدد الوحدات	
نوع المقرر		تاريخ الأعداد	

وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Advance Biotechnology	**Module Delivery**	
Module Type		☑ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code			
Module Level		**Semester of Delivery**	
Administering Department	Biotechnology	**College**	Applied science
Module Leader	Dr.Mohammed Abdullah Hamad	**e-mail**	dr-moh75mnr@uofallujah.edu.Iq
Module Leader's Acad. Title		**Module Leader's Qualification**	PhD.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	

Scientific Committee Approval Date		**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To provide in-depth knowledge of the principles and advanced techniques used in modern biotechnology. 2. To develop understanding of molecular and cellular tools such as recombinant DNA technology. 3. To explore applications of biotechnology in medicine, agriculture, industry, and environmental management. 4. To train students in analyzing and interpreting biotechnological data using advanced bioinformatics tools.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain advanced molecular and cellular principles underpinning biotechnology. 2. Demonstrate proficiency in modern techniques such as recombinant DNA technology, CRISPR-Cas genome editing, transcriptomics, and proteomics. 3. Apply biotechnology approaches in medicine (gene therapy, vaccines, stem cell technology), agriculture (GMOs, tissue culture), and industry (bioreactors, biofuels, enzymes). 4. Analyze and interpret experimental data using bioinformatics and computational biology tools. 5. Design and evaluate biotechnological experiments, research proposals, and innovative solutions to real-world biological problems. 6. Critically assess recent advancements, trends, and challenges in biotechnology research.

	7. Discuss and debate ethical, legal, and social implications (ELSI) of biotechnology, including biosafety and intellectual property rights. 8. Communicate scientific ideas effectively through research reports, presentations, and collaborative discussions. 9. Demonstrate awareness of global issues where biotechnology contributes to health, food security, energy sustainability, and environmental conservation.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Class	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Tutorial	1	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	2	10% (10)	Continuous	All
	Seminar	1	10% (10)	13	LO #5, #8 and #10
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
Summative assessment	Final Exam	4hr	50% (50)	16	All
	Class	2	100% (100 Marks)		

Total assessment	**50/50**			

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to Advanced Biotechnology/**
Week 2	**Molecular Biotechnology Tools**: Recombinant DNA technology (cloning, vectors, expression systems) Restriction enzymes, ligases, and CRISPR basics
Week 3	**Omics Technologies/** Genomics, transcriptomics, proteomics, metabolomics Next-generation sequencing (NGS) Bioinformatics in omics data analysis
Week 4	**Gene Editing & Synthetic Biology** Advanced CRISPR-Cas systems and applications, Synthetic biology concepts and design , Case studies: engineered microbes, synthetic circuits.
Week 5	**Medical Biotechnology I –** Molecular Diagnostics PCR, qPCR, RT-PCR, Microarrays, next-generation diagnostics, Biosensors in medicine
Week 6	**Medical Biotechnology II –** Therapeutics, Gene therapy strategies, Stem cell technology & regenerative medicine , Personalized and precision medicine
Week 7	**Medical Biotechnology III –** Vaccines & Immunotherapy, Recombinant vaccines, DNA & mRNA vaccines, Monoclonal antibodies and cancer immunotherapy, Current examples: COVID-19 vaccine platforms
Week 8	**Agricultural Biotechnology I** GM crops and genome editing in plants, Plant tissue culture & micropropagation, Agricultural genomics and food security
Week 9	**Agricultural Biotechnology II** Stress-tolerant and nutritionally enhanced crops, Biopesticides and biofertilizers, Plant disease diagnostics
Week 10	**Week 10: Industrial Biotechnology I** Microbial production of enzymes, biofuels, and biopolymers, Bioreactors and fermentation technology, Downstream processing.
Week 11	**Industrial Biotechnology II & Environmental Biotechnology** Bioremediation and waste management, Biosensors and biochips for industry and environment, Nanobiotechnology applications

Week 12	**Systems Biology & Organoids** Systems biology concepts, Organoids and lab-on-a-chip models, Artificial life and future biotechnology
Week 13	**Ethical, Legal, and Social Issues (ELSI),** Biosafety regulations and biocontainment, Bioethics in genetic modification and cloning, Intellectual property rights and patenting in biotechnology.
Week 14	**Future Perspectives & Student Presentations** Climate-smart biotechnology, Biotechnology entrepreneurship & start-ups, Student-led seminars & case study discussions
Week 15	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	Final exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts		
Recommended Texts		
Websites		

1. Course Name:
English Language
2. Course Code:
MPA-16
3. Semester / Year:
4. Description Preparation Date:
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
15 hours/1 Unit
7. Course administrator's name (mention all, if more than one name)
Name: Asst. Prof. Dr. Ahmad Aziz Darweesh Email: ahmad.darweesh@uofallujah.edu.iq
8. Course Objectives

Course Objectives	• To bridge the gap between general English and the demands of an English-medium academic environment. • To equip students with a toolkit of essential study skills for university success. • To build student confidence in using English in formal academic settings. • To develop critical thinking skills through the evaluation of sources and construction of arguments..

9. Teaching and Learning Strategies

Strategy	1- **Lectures** 2- **Classroom Discussions and Questioning**

10.Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1	1	dentify the main idea and overall purpose of a text (e.g., argument, explanation, description).	International student	theoretical lectures	Discussions, quizzes, monthly exam and final course exam
2	1	Understanding Text Structure: To recognize how academic texts are organized (e.g., introduction, body paragraphs, conclusion) and the function of different parts.	Where in the world...?	theoretical lectures	Discussions, quizzes, monthly exam and final course exam
3	1	Identifying Supporting Ideas: To distinguish between main ideas and specific examples, evidence, or details that support them.	Newspaper articles	theoretical lectures	Discussions, quizzes, monthly exam and final course exam
4	1	Understanding Cohesion: To recognize linking words and phrases	Modern technology	theoretical lectures	Discussions, quizzes, monthly exam and final course exam
5	1	To scan texts efficiently to locate key facts, dates, names, or definitions.	Conferences and visits	theoretical lectures	Discussions, quizzes, monthly exam and final course exam
6	1		1st Mid Exam	theoretical lectures	Discussions, quizzes, monthly exam and final course exam
7	1	Understanding Writer's Purpose and Tone	Science and our world	theoretical lectures	theoretical lectures
8	1	write a well-organized paragraph with a clear topic	People: past and present	theoretical lectures	theoretical lectures

		sentence, supporting sentences, and a concluding sentence.			
9	1	To learn to express and support a point of view with logical reasoning and evidence.	The world of IT	theoretical lectures	theoretical lectures
10	1	To understand what plagiarism is and learn the basics of citing sources.	The world of IT	theoretical lectures	theoretical lectures
11	1	To recognize the phrases lecturers use to structure their talk (e.g., "I'm going to discuss three main points...", "On the other hand...", "To sum up...").	Inventions, discoveries, and processes	theoretical lectures	theoretical lectures
12	1	To understand and use high-frequency academic words and phrases from the Academic Word List (AWL).	Inventions, discoveries, and processes	theoretical lectures	theoretical lectures
13	1	Actively participate in academic discussions.	Travel and tourism	theoretical lectures	theoretical lectures
14	1	Begin to function more autonomously in an English-speaking academic setting.	Travel and tourism	theoretical lectures	theoretical lectures
15	1		2nd Mid Exam	theoretical lectures	theoretical lectures
11. Course Evaluation					

Monthly exam and final course exam	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Headway, Academic Skills Reading, Writing, and Study Skill, LEVEL 2, Student's Book
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Scientific Research Methodology**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code					
ECTS Credits	**2**				
SWL (hr/sem)					
Module Level	1		**Semester of Delivery**	1	
Administering Department	Type Dept. code		**College**	Type College Code	
Module Leader	Asst. Prof. Dr. Mohammed Abbood Mohammed		**e-mail**	Mohammed.a.mohammed@uofallujah.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The following objectives are essential elements for successful completion: • Introduce students to quantitative and qualitative methods of educational and education-related research • Help students gain an understanding of the application of appropriate educational research models • Enhance students' ability to analysis published research • Provide exercises on preparing research reports

	• Enhance students' ability to use research and research methods in developing and completing a research project in educational and education-related settings
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student will: • Demonstrate an understanding of research as a systematic approach • and a systematic thinking process • Demonstrate an understanding of reasoning and the use of research terms in describing educational practice on a spectrum from action research to experimental design • Demonstrate critical skills to evaluate educational research and its applicability to educational practice • Demonstrate the critical skills necessary to propose and implement a field research project • Apply the guidelines for presenting research papers in a basic way (American Psychological Association Manual, Sixth Edition)
Indicative Contents المحتويات الإرشادية	In congruence with the teaching and learning strategy of the college, the following tools are used: I. Class lectures, interactive learning (class discussions, group work) video presentations, and practical problems solved in class. II. Exercises and primary source documents are assigned as homework, the solutions of which are reviewed in class III. Office hours: students are encouraged to make full use of the office hours of their instructor, where they can ask questions, see their exam paper, and/or go over lecture/lab material. IV. Use of a blackboard site, where instructors post lecture notes, assignment Instructions, timely announcements, as well as additional resources.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Problem-Based Learning (PBL)** • Students work in groups to solve real or hypothetical research problems. • Encourages them to design mini-projects, formulate research questions, and propose methodologies. **Case Studies** • Analyze published research articles to understand how methodology is applied in different fields. • Helps students evaluate strengths and weaknesses in research designs.

	Workshops and Skill-Based Sessions • Sessions on using research tools such as **SPSS**, **Excel**, **NVivo**, or **Mendeley/Zotero**. • Focus on data analysis, survey design, referencing, and report writing.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Class**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Tutorial	١	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Seminar	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	١0% (١0)	7	LO #1 - #7
	Final Exam	٤hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Definition of Research methodology
Week 2	Formulating the Research Problem

Week 3	Formulating the Research Objective
Week 4	Extensive Literature Survey
Week 5	Developing the Research Hypothesis
Week 6	Preparing the Research Design
Week 7	Determining the Research Design
Week 8	Med term Exam
Week 9	Collecting the Research Data
Week 10	Analyzing the Research Data
Week 11	Execution of the Project
Week 12	Hypothesis Testing
Week 13	Generalization and Interpretation
Week 14	Analysis of Data
Week 15	Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• RESEARCH METHODOLOGY: TOOLS AND TECHNIQUES ISBN 978-606-93502-7-0 Buzau, Al. Marghiloman 245 bis, 120082 • Pandey, Prabhat, and Meenu Mishra Pandey. "***Research methodology tools and techniques***". Bridge Center, 2021	No
Recommended Texts		
Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A –** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E – Sufficient	مقبول	50 - 59	Work meets minimum criteria

Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

وصف المقرر للمواد الدراسية للدراسات العليا

توزيع العبء الدراسي للطالب			
اسم المقرر باللغة الأنكليزية	Advanced Biochemistry	رمز المقرر	
اسم المقرر باللغة العربية	كيمياء حياتية متقدمة	عدد الوحدات	٣
نوع المقرر	نظري	تاريخ الأعداد	٢٠٢٥/٩

وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Advanced Biochemistry**	**Module Delivery**	
Module Type		☐ **Theory** ☐ **Lecture** ☐ **Seminar**	
Module Code			
Module Level		**Semester of Delivery**	
Administering Department	Advanced Biochemistry	**College**	Applied science
Module Leader	Dr. Wisam Mahmood Mohammed	**e-mail**	wissamatea@uofallujah.edu.iq
Module Leader's Acad. Title		**Module Leader's Qualification**	PhD.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date		**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	• The building blocks of life: proteins, nucleic acids, carbohydrates, lipids • Enzymes and their mechanisms of action • Biosynthesis and catabolism of energy • Metabolic pathways and nutritional balance • Techniques of biochemical analysis
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• **LO1**: Explain the structure and function of proteins and enzymes and their impact on metabolic pathways. • **LO2**: Summarize the role of DNA/RNA in storing and transmitting genetic information. • **LO3**: Describe how cellular energy is transformed through pathways such as cellular respiration and anaerobic processes. • **LO4**: Apply biochemistry principles to understand diseases and their biological implications. • **LO5**: Interpret interactions of biomolecules with environmental factors and resultant changes in biological activity.

Indicative Contents
المحتويات الإرشادية
	• **Biochemical Energy: Synthesis and Degradation**
	  ○ Biosynthetic (anabolic) pathways
	  ○ Catabolic pathways, including glycolysis, beta-oxidation, and oxidative phosphorylation
	  ○ ATP as the cellular energy currency
	• **Metabolic Pathways and Homeostasis**
	  ○ Metabolic flux, regulation, and integration of pathways
	  ○ Hormonal control and signaling influences on metabolism
	• **Analytical Techniques in Biochemical Analysis**
	  ○ Spectroscopy, chromatography, mass spectrometry
	  ○ Enzyme assays and biomolecule quantification
	  ○ Data interpretation and experimental design
	• **Applications in Medicine and Industry**
	  ○ Diagnostic and therapeutic implications
	  ○ Biotechnological and industrial applications of biochemistry

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1. Course Design and Alignment

	2. Active Learning and Engagement 3. Teaching Methods and Activities 4. Assessment and Feedback 5. Inclusivity and Accessibility 6. Technology and Tools 7. Pedagogical Content Knowledge (PCK) 8. Reflection and Continuous Improvement

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Class	3	20 % (25)	5 and 10	LO #1, #2 and #10, #11
	Tutorial				LO #3, #4 and #6, #7
	Projects / Lab.				All
	Seminar	1	10% (5)	5	LO #5, #8 and #10
	Midterm Exam	2hr		7	LO #1 - #7
Summative assessment	Final Exam	3hr	70 % (50)	16	All
	Class		100% (100 Marks)		
Total assessment		**50/50**			

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction and Foundations**
Week 2	**Proteins and Amino Acids**
Week 3	**Nucleic Acids and Genetic Information**
Week 4	Carbohydrates and Lipids
Week 5	Enzymes – Basics and Kinetics
Week 6	**Enzyme Regulation and Mechanisms**
Week 7	**Energy in the Cell – Part I**
Week 8	**Energy in the Cell – Part II (Glycolysis)**
Week 9	**Exam**
Week 10	**Lipid Metabolism and Beta-Oxidation**
Week 11	**Carbohydrate and Amino Acid Metabolism**
Week 12	**Analytical Techniques in Biochemistry**
Week 13	**Biochemistry in Health and Disease**
Week 14	Biotechnological and Industrial Applications
Week 15	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	

Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**Lehninger Principles of Biochemistry by David L. Nelson and Michael M. Cox** **Description: Clear explanations with emphasis on mechanistic detail and clinical relevance.** **Use: Supplementary readings; good for deeper dives into metabolism and enzyme kinetics.**	yes
Recommended Texts	**Biochemistry: A Short Course by Harold A. Harper** **Description: Concise introduction focusing on essential concepts, ideal for quick references.** **Use: Pre-class reading or quick review before labs.**	no
Websites		