وزارة التعليم العالي والبحث العلمي

جـــهاز الإشـــراف والتقـويم العلـمي

دائرة ضمان الجودة والاعتماد الأكاديمي

استمارة وصف البرنامج الأكاديمي للكليات والمعاهد للعام الدراسي 2026-2025

الجامعة : النهرين

الكلية /المعهد : التقنيات الاحيائية

القسم العلمي : التقنيات الحيوية الجزيئية والطبية

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التوقيع

مصادقة السيد العميد

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Al- Nahrain University
College of Biotechnology

First Cycle – Bachelor's degree (B.Sc.) – Molecular and Medical Biotechnology

بكالوريوس في التقنيات الأحيائية - التقنيات الحيوية الجزيئية والطبية

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1. Vision and Mission

Vision

Academic and research leadership in molecular and medical biotechnology sciences, and the development of their applications and outcomes to serve society.

الرؤيا

الريادة الاكاديمية والبحثية في علوم التقنيات الحيوية الجزيئية والطبية وتطوير تطبيقاتها ومخرجاتها لخدمة المجتمع.

Mission

Graduating qualified professionals students with the ability to innovate and create, supporting sustainable development and meeting the evolving needs of the labor market requirements

الرسالة

تخريج كوادر مهنية كفؤة قادرة على الابداع والابتكار مما يسهم في تحقيق التنمية المستدامة وتلبية احتياجات سوق العمل

2. Program Specification

Programme code:	BSc-MMEB	**ECTS**	240
Duration:	4 levels, 8 Semesters	**Method of Attendance:**	Full Time

The Molecular and Medical Biotechnology (MMEB) Program is a guide to assist undergraduate students and early-career scientists in their search for the next step in their education. The Program features detailed profiles of leading institutions in Molecular and biomedical education. Students may compare programs and identify subjects that match their interests in Molecular and Medical Biotechnology to provide students with an opportunity to learn advanced practical biomedical sciences skills necessary to support their activity in a working laboratory or research setting. Students will further augment their theoretical knowledge in biomedical sciences with practical skills in molecular biology, cell biology, animal tissue culture, Human Molecular Genetics, Genetic Engineering, Molecular Techniques, Medical Virology, Nanobiotechnology, Bioseparation Techniques, Enzymology, Microbial Toxins and Human Cytogenetics. These courses will allow students to further enhance their learning by the application of the theoretical concepts and skills in a simulated research laboratory setting. In some disciplines, students need to demonstrate competency before they can progress further in their studies. Competency involves the application skills and knowledge to a particular standard performance. Students need to pass all competency assessments in all courses and reach a total passing of 50% to be awarded a passing grade. Competency Assessment Items are identified in the course specification.

2- مواصفات البرنامج

يعد برنامج التقنيات الحيوية الجزيئية والطبية (MMEB) دليلًا لمساعدة الطلاب الجامعيين والباحثين في بداية حياتهم المهنية في بحثهم عن الخطوة التالية في تعليمهم. يتميز البرنامج بلمسات مفصلة عن التوجهات الرائدة في التعليم الجزيئي والطب الحيوي. ويمكن للطلاب مقارنة البرامج وتحديد الموضوعات التي تتناسب مع اهتماماتهم في التقنيات الحيوية الجزيئية والطبية لتزويدهم بفرصة لتعلم مهارات العلوم الحيوية العملية المتقدمة اللازمة لدعم نشاطاتهم في المختبر أو أي بيئة بحثية. سيقوم الطلاب بزيادة معرفتهم النظرية في العلوم الطبية الحيوية من خلال المهارات العملية في علم الحياة الجزيئي، و علم الحياة الخلية، وزراعة الأنسجة الحيوانية، وعلم الوراثة الجزيئية البشرية ، والهندسة الوراثية ، والتقنيات الجزيئية ، والفيروسات الطبية ، والتقنيات الحيوية النانوية، وتقنيات الفصل الحيوي، وعلم الإنزيمات، والسموم الميكروبية، وعلم الوراثة الخلوية البشرية وغيرها من المواد الدراسية التي تسمح بتعزيز التعلم من خلال تطبيق المفاهيم والمهارات النظرية في المختبرات الطبية. ويحتاج الطلاب إلى إظهار كفاءة مهارات التطبيق قبل أن يتمكنوا من التقدم أكثر في دراساتهم في هذه التخصصات. كما يحتاج الطلاب أن يجتازوا جميع

تقييمات الكفاءة في جميع مراحل الدراسة للوصول إلى إجمالي النجاح بنسبة 50٪ ليتم منحهم درجة البكلوريوس في التقنيات الحيوية الجزيئية والطبية.

Program Goals

1 -Providing world-class education and developing advanced academic curricula aligned with international standards, equipping students with comprehensive theoretical knowledge and strong research and practical skills in molecular and medical biotechnology .

2-Leadership in research and innovation through the support of interdisciplinary scientific studies, and the promotion of innovation in diagnostic and therapeutic fields within an advanced research environment.

3-Developing sustainable healthcare solutions and establishing strategic partnerships with academic institutions, research centers, and global companies to facilitate knowledge exchange and advance innovative solutions that contribute to improving public health and quality of life.

4-Promoting entrepreneurship and innovation by empowering students and researchers to develop innovative projects and start-up ventures in the field of medical biotechnology, while providing a supportive entrepreneurial ecosystem through targeted training programs and strategic partnerships with specialized organizations

5--Graduating a highly qualified workforce for the global labor market and preparing graduates with advanced scientific and technical competencies capable of meeting national and international workforce needs in the fields of medical research and biotechnology .

6-Achieving international academic accreditation and aligning with scientific developments in peer departments, while embedding a culture of continuous improvement in academic and research activities.

3- اهداف البرنامج

- تقديم تعليم عالمي المستوى وتطوير مناهج أكاديمية متقدمة تلبي المعايير الدولية، تزود الطلاب بالمعرفة النظرية والمهارات البحثية والتطبيقية في التقنيات الحيوية الجزيئية والطبية.

2- الريادة في البحث والابتكار ودعم الأبحاث العلمية متعددة التخصصات، وتشجيع الابتكار في مجالات التشخيص، والعلاج، من خلال بيئة بحثية متقدمة .

3- تطوير حلول صحية مستدامة و بناء شراكات استراتيجية مع المؤسسات الأكاديمية والمراكز البحثية والشركات العالمية لتبادل المعرفة وتطوير حلول متقدمة تسهم في تحسين الصحة العامة وجودة الحياة.

4- تعزيز ريادة الأعمال والابتكار وتمكين الطلاب والباحثين من تطوير مشاريع مبتكرة وشركات ناشئة في مجالات التقنيات الحيوية الطبية، وتوفير بيئة داعمة لريادة الأعمال من خلال التدريب والشراكات مع الجهات المتخصصة.

5- تخريج كوادر مؤهلة لسوق العمل العالمي وإعداد خريجين يتمتعون بمهارات علمية وتقنية عالية، قادرة على تلبية احتياجات سوق العمل الوطني والدولي في مجالات الأبحاث الطبية والتكنولوجيا الحيوية.

6- تحقيق الاعتماد الاكاديمي العالمي ومواكبة التطور العلمي في الأقسام المناظرة مع ترسيخ ثقافة التحسين المستمر في جميع الأنشطة الاكاديمية والبحثية .

3. Student Learning Outcomes

- Comprehensive understanding of the principles and practices of Molecular and Medical Biotechnology which will make them able to work in the areas of research and development.
- To empower the graduates with the ability to think and solve problems in the field of Molecular and Medical Biotechnology.
- Well trained students to be able to work in medical laboratories.
- Molecular and Medical Biotechnology students will have the updated current scientific knowledge, well versed with computer programs and web information which will enable them to take online projects in the field of bioinformatics.
- Molecular and Medical Biotechnology students will be well trained in scientific communication skills so that they can effectively communicate with biotech and other interdisciplinary professionals.
- Students with updated knowledge of various disciplines of Molecular and Medical Biotechnology will make good trainers for teaching biotechnology, molecular biology, cell biology, genetics etc at B.Sc level education system.

4. مخرجات تعلم الطالب

- فهم شامل لمبادئ وأساسيات التقنيات الحيوية الجزيئية والطبية التي ستجعل الطلاب قادرين على العمل في مجالات البحث والتطوير الطبي.
- تمكين الخريجين من القدرة على التفكير وحل المشكلات في مجال التقنيات الحيوية الجزيئية والطبية.
- تدريب الطلاب تدريباً جيداً ليكونوا قادرين على العمل في المختبرات والمؤسسات الطبية.
- سيتمتع الطلاب بالمعرفة العلمية في مجال الأختصاص، والدراية جيدة بالمعلوماتية الحيوية التي ستمكنهم من تنفيذ بحوث وبرامج التقنيات الحيوية الجزيئية والطبية.

- تدريب طلاب التتفنيات الحيوية الجزيئية والطبية جيدًا على مهارات الاتصال العلمي حتى يتمكنوا من التواصل بشكل فعال مع المتخصصين في مجال التتفنيات الحيوية وغيرهم من الباحثين متعددي التخصصات.
- سيكون للطلاب الذين لديهم المعارف الحديثة في تخصصات التتفنيات الحيوية الجزيئية والطبية الامكانية تهيئة جيل جديد من طلاب التتفنيات الحيوية والبيولوجي الجزيئي ملمين بعلوم الخلية وعلم الوراثة وما إلى ذلك في نظام التعليم على مستوى البكالوريوس.

Learning outcomes

Outcome 1

To provide education that leads to comprehensive understanding of the principles and practices of biotechnology and to ensure students are able to effectively communicate with biotech and other interdisciplinary professionals.

الحصيلة 1

لتوفير التعليم الذي يؤدي إلى فهم شامل لمبادئ وأساسيات التتفنيات الحيوية الجزيئية والطبية, ولضمان قدرة الطلاب على التواصل بشكل فعال مع الباحثين في مجال الأحنصاص وغيرهم من الباحثين متعددي التخصصات العلمية.

Outcome 2

To understand the chemistry of life and structure and functions of Biomolecules, and be able to describe how microorganisms are used as model systems to study basic biology, genetics, and metabolism.

الحصيلة 2

فهم كيمياء الحياة وتركيب ووظائف الجزيئات الحيوية والقدرة على وصف كيفية استخدام الكائنات الحية الدقيقة كنظم نموذجية لدراسة علم الأحياء وعلم الوراثة ومسارات الأيض.

Outcome 3

Graduates will be able to perform laboratory experiments and field studies, by using scientific equipment and computer technology while observing appropriate safety protocols.

الحصيلة 3

سيتمكن الخريجون من إجراء التجارب المعملية والدراسات الميدانية ، باستخدام المعدات العلمية وتكنولوجيا الكمبيوتر مع مراعاة بروتوكولات السلامة المناسبة.

Outcome 4

Graduates will be able to demonstrate a balanced understanding of how scientific knowledge in the field of plant biotechnology has evolved, including its evolution and foundational laws.

الحصيلة رقم 4

سيتمكن الخريجون من إظهار مفهوم متوازن لكيفية تطور المعرفة العلمية في مجال التقنيات الاحيائية النباتية، بما في ذلك تطور هذا العلم والقوانين التأسيسية له.

Outcome 5

Graduates will be able to demonstrate scientific quantitative skills, such as the ability to conduct simple data analyses.

الحصيلة رقم 5

سيتمكن الخريجون من إظهار المهارات الكمية العلمية ، مثل القدرة على إجراء تحليل بسيط للبيانات.

Outcome 6

Graduates will be able to use critical-thinking and problem-solving skills to develop a research project and/or paper.

الحصيلة رقم 6

سيتمكن الخريجون من استخدام التفكير النقدي ومهارات حل المشكلات لتطوير مشروع بحثي و / أو ورقة.

5. Academic Staff

No.	Name	Academic Title	Degree	Specialty
1	Hameed Majeed Jasim	Professor	PhD	Molecular Biology
2	Shahlaa Mahdi Salih	Professor	PhD	Immunology
3	Salwa Jaber Alawadi	Professor	PhD	Molecular Genetics
4	Asmaa Ali Hussein	Professor	PhD	Enzymology
5	Ali Zaid Al-Saffar	Professor	PhD	Cytogenetics
6	Zahraa Kamel Zedan	Professor	PhD	Stem cells technology
7	Risala Rzuki Hussain	Professor	PhD	Genetic Engineering and Biotechnology
8	Maha Hameed Abdullah	Professor	PhD	Enzymology
9	Bushra Hindi Saleh	Professor	PhD	Medical Microbiology
10	Ruqaia Mohammed Alezzy	Professor	PhD	Cytogenetics
11	Rawaa Nazar Mohammed Ali	Assistant Professor	PhD	Immunology
12	Dhafar Najim Abdualmeer	Assistant Professor	PhD	Medical Microbiology
13	Zena Fawzi Hussien	Assistant Professor	PhD	Embryo Genetics
14	Sahar Medhat Hussein	Assistant Professor	PhD	Molecular Genetics
15	Moyassar Basil Hadi	Assistant Professor	PhD	Stem cell& Animal Tissue culture
16	Yaseen Ismael Imran	Assistant Professor	PhD	Molecular Biology and Genetic Engineering
17	Hanaa Chassb Salim	Lecturer	PhD	Genetic engineering and molecular biology
18	Lamiaa Fingan Nashi	Assistant Professor	PhD	Vaccine technology
19	Zaid Nsaif Abbas	Lecturer	PhD	Molecular Genetics
20	Farah Turki Oraibi	Assistant Professor	PhD	Toxicityand Cytogenetics
21	Mustafa Kahtan Sameen	Lecturer	PhD	Biochemistry
22	Heba Khaleel Ibrahim	Assistant	MSc	Microbiology

		Professor		
23	Manhal Farooq Ahmed	Assistant Professor	MSc	Parasitolog&Immunology
24	Tamara Husham Zedan	Lecturer	MSc	Molecular biology
25	Mays Talip Abdullah	Lecturer	PhD	Molecular biology
26	Reem Naeem Ibrahim	Lecturer	MSc	Microbiology
27	Mohammed Hussein Wali	Lecturer	MSc	Molecular biology
28	Mohanad Hasan Hussein	Assistant Professor	MSc	Microbiology
29	Hadeel Mohamed Khalaf	Assistant Professor	MSc	Molecular biology
30	Mustafa sami mohammed	Assistant Professor	MSc	Molecular biology
31	Ayah Muhammed Maki	Lecturer	MSc	Immunology
32	Noor Ali Oohayyid	Lecturer	MSc	Biotechnology
33	Ola Imad Khudhair	Assistant Lecturer	MSc	Molecular biology
34	Saja Ali Shareef	Lecturer	PhD	Molecular biology
35	Shahad Basil Ismail	Assistant Lecturer	MSc	Genetic engineering
36	Murtadha Adil Hussien	Lecturer	PhD	Animal tissue culture
37	Yasameen Hasan Jumaah	Assistant Lecturer	MSc	Molecular biology

6. الكادر التدريسي

ت	اسم التدريسي	اللقب العلمي	الشهادة	الاختصاص الدقيق
1	حميد مجيد جاسم	استاذ	دكتوراه	بايولوجي جزيئي
2	شهلاء مهدي صالح	استاذ	دكتوراه	منـــاعة
3	سلوى جابر العوادي	استاذ	دكتوراه	وراثة جزيئية
4	اسماء علي حسين	استاذ	دكتوراه	انزيمات
5	علي زيد فاضل	استاذ	دكتوراه	وراثة خلوية
6	زهراء كامل زيدان	استاذ	دكتوراه	تقنيات خلايا جذعية
7	رسالة رزوقي حسين	استاذ	دكتوراه	تقنيات حيوية وهندسة وراثية
8	مها حميد عبدالله	استاذ	دكتوراه	انزيمات
9	بشرى هندي صالح	استاذ	دكتوراه	احياء مجهرية طبية
10	رقية محمد ابراهيم	استاذ	دكتوراه	وراثة خلوية
11	رواء نزار محمد علي	استاذ مساعد	دكتوراه	مناعة
12	ظفر نجم عبد الامير	استاذ مساعد	دكتوراه	احياء مجهرية طبية
13	زينة فوزي حسين	استاذ مساعد	دكتوراه	وراثةو أجنــة
14	سحر مدحت حسين	استاذ مساعد	دكتوراه	وراثة جزيئية
15	ميسر باسل هادي	استاذ مساعد	دكتوراه	خلايا جذعية., وزراعة انسجة حيوانية
16	ياسين اسماعيل عمران	استاذ مساعد	دكتوراه	بايولوجي جزيئي وهندسة وراثية
17	هناء جاسب سالم	مدرس	دكتوراه	هندسة وراثية و بايولوجي جزيئي

18	لمياء فنجان ناشي	استاذ مساعد	دكتوراه	فيروسات
19	زيد نصيف عباس	مدرس	دكتوراه	وراثة جزيئية
20	فرح تركي عريبي	استاذ مساعد	دكتوراه	سمية ووراثة خلوية
21	مصطفى قحطان سمين	مدرس	دكتوراه	كيمياء حياتية
22	هبة خليل ابراهيم	استاذ مساعد	ماجستير	احياء مجهرية
23	منهل فاروق احمد	استاذ مساعد	ماجستير	طفيليات ومناعة
24	تمارا هشام زيدان	مدرس	ماجستير	بايولوجي جزيئي
25	ميس طالب عبدالله	مدرس	دكتوراه	بايولوجي جزيئي
26	ريم نعيم ابراهيم	مدرس	ماجستير	احياء مجهرية
27	محمد حسين والي	مدرس	ماجستير	بايولوجي جزيئي
28	مهند حسن حسين	استاذ مساعد	ماجستير	أحياء مجهرية
29	هديل محمد خلف	استاذ مساعد	ماجستير	بايولوجي جزيئي
30	مصطفى سامي محمد	استاذ مساعد	ماجستير	أحياء مجهرية
31	اية محمد مكي	مدرس مساعد	ماجستير	مناعة
32	نور علي اوحيد	مدرس	ماجستير	تقنيات أحيائية
33	علا عماد خضير	مدرس مساعد	ماجستير	بايولوجي جزيئي
34	سجى علي شريف	مدرس	دكتوراة	وراثة جزيئية
35	شهد باسل اسماعيل	مدرس مساعد	ماجستير	هندسة وراثية
36	مرتضى عادل حسين	مدرس	دكتوراة	زراعة انسجة حيوانية
37	ياسمين حسن جمعة	مدرس مساعد	ماجستير	بايولوجي جزيئي

4. Credits, Grading and GPA

Credits

Al- Nahrain University is following the Bologna Process with the European Credit Transfer System (ECTS) credit system. The total degree program number of ECTS is 240, 30 ECTS per semester. 1 ECTS is equivalent to 25 hrs. student workload, including structured and unstructured workload.

Grading

Before the evaluation, the results are divided into two subgroups: pass and fail. Therefore, the results are independent of the students who failed a course. The grading system is defined as follows:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very	جيد جدا	80 - 89	Above average with some errors

(50 - 100)	Good			
	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:				
Number 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.				

Calculation of the Cumulative Grade Point Average (CGPA)

1. The CGPA is calculated by the summation of each module score multiplied by its ECTS, all are divided by the program total ECTS.

   CGPA of a 4-year B.Sc. degree:

   CGPA = [(1st [m]odule score x ECTS) + (2nd [m]odule score x ECTS) + ……] / 240

5. Curiculum/Modules

First Level – First Semester **المستوى الاول - الفصل الاول**

ECTS	عدد الساعات			الرمز	Subject	الموضوع	ت
	SWL hr/sem	USSWL hr/sem	SSWL hr/sem				
6.00	150	71	79	MBt11-GB	General Biology	علم الاحياء العام	1
6.00	150	71	79	MBt11-PBI	Principle of Biotechnology –I	مبادى التقنيات الاحيائية 1	2
6.00	150	71	79	MBt11-AC	Analytical Chemistry	الكيمياء التحليلية	3
5.00	125	46	79	CRBt-Bp	Biophysics	الفيزياء الحياتية	4
3.00	75	12	63	URCOM	Computer	حاسوب	5
2.00	50	17	33	URARA	Arabic Language	اللغة العربية	6
2.0	50	17	33	URDEM	Democracy &Human Rights	الديمقراطية وحقوق انسان	7
30	**750**	**المجموع**					

First Level – Second Semester **المستوى الاول - الفصل الثاني**

ECTS	عدد الساعات	الرمز	Subject	الموضوع	ت

	SWL hr/sem	USSWL hr/sem	SSWL hr/sem				
8.00	200	121	79	MBt12-CB	Cell Biology	علم حياة الخلية	1
8.00	200	121	79	Mbt12-PBII	Principle of Biotechnology -II	مبادئ التقنيات الاحيائية 2	2
8.00	150	121	79	CRBt-OC	Organic Chemistry	الكيمياء العضوية	3
4.00	100	21	79	CRBt-Bs	Biostatistics	الاحصاء الحياتي	4
2.00	50	17	33	URMETI	Medical Terminology	المصطلحات الطبية	5
30.00	**750**	**المجموع**					

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Principle of Biotechnology- 1**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MBt11-PBI				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level			**Semester of Delivery**		
Administering Department	**Department of molecular and medical biotechnology**		**College**	**College of Biotechnology**	
Module Leader	**Farah T.Orabi**		**e-mail**	farah.aljumaili@nahrainuniv.edu.iq	
Module Leader's Acad. Title	**Assisrt.Prof.**		**Module Leader's Qualification**	**Ph.D.**	
Module Tutor			**e-mail**		
Peer Reviewer Name	**Name**		**e-mail**	**E-mail**	
Scientific Committee Approval Date	**1/10/2025**		**Version Number**	**1.0**	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	• To understand biotechnology science and their application. • To understand medical biotechnology as a modern field in biotechnology • This course deals with the basic application of biotechnology in medicine . • Introduce the application of biotechnology in food industry • Understand nanotechnology
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Study biotechnology (definition- fields- application) 2. Study the cancer and its treatment (immunotherapy) 3. Study stem cell-monoclonal antibody and their uses in medical treatment 4. Introduce the application of biotechnology in treatment of different diseases 5. Study vaccine and edible vaccine and their application in treatment disease by using genetically modified plants 6. Study the modern routs in drug delivery 7. Understand the gene therapy technique and take an example (recombinant insulin) 8. Study the modern CRISPER technique 9. Study the application of biotechnology in industry 10. Introducing the nanotechnology as a new field in medical application .
Indicative Contents المحتويات الإرشادية تضم الكلمات المفتاحية المهمة للمحاضرات	Indicative content includes the following. Medical Biotechnology – stem cell-Embryonic stem cells Adult stem cell-prenatal stem cell- Benign (noncancerous) - malignant (cancerous)-Carcinoma-lymphoma – leukemia-Chemotherapy- Precision Medicine monoclonal antibodies-checkpoint inhibitors-vaccines-cytokines-CAR-T cell therapy Edible vaccine – transgenic plant Drug delivery- microneedle patches-Controlled-release formulations-Dexedrine-liposome

	Gene therapy- plasmid –vector-Human gene editing technology-Patient-derived cellular gene therapy products CRISPER –insulin Biotechnology in food -nanotechnology

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

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			

Module Evaluation

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to Biotechnology**
Week 2	**Relation of biotechnology with other science**
Week 3	**Biotechnology Examples in Everyday Life**
Week 4	**Application of Biotechnology**
Week 5	**Application of Biotechnology in agriculture**
Week 6	**Application of Biotechnology in environment**
Week 7	**Application of Biotechnology in industry**
Week 8	**Mid-term Exam**
Week 9	**Application of Biotechnology in healthcare**

Week 10	**What is immunotherapy**
Week 11	**Drug delivery**
Week 12	**Edible vaccine**
Week 13	**Gene therapy**
Week 14	**Biotechnology and cell biology**
Week 15	**Seminars**
Week 16	**final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Glossary of medical terms
Week 2	Laboratory apparatuses
Week 3	Chromosome structure
Week 4	Mitosis And Meiosis
Week 5	Bacterial growth and culturing
Week 6	Subculturing
Week 7	Bacterial culture (gram stain)
Week 8	DNA structure
Week 9	DNA Extraction
Week 10	Purification
Week 11	DNA concentration
Week 12	PCR

Week 13	ELISA principle and types
Week 14	Genetic engineering techniques
Week 15	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**Introduction to Biotechnology** Thieman WJ, Palladino MA. *Introduction to Biotechnology.* 4th ed. Pearson; 2013.	yes
Recommended Texts	. Medical Biotechnology: Advancement and Ethics	yes
Websites	https://www.wgu.edu/blog/medical-biotechnology-advancements-ethics1811.html	

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**General Biology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MBt11-GB**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	**1**		**Semester of Delivery**	**1**	
Administering Department	**Molecular and Medical Biotechnology**		**College**	**Biotechnology**	
Module Leader	Dr. dhafar.alugail		**e-mail**	dhafar.alugaili@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	PhD	
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name	Dr. Lamiaa Fingan		**e-mail**	E-mail	
Scientific Committee Approval Date	1/ 10/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The course aims to advance the student's knowledge of plant biology, its parts, reproduction and usefulness.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1) To introduce basic biological principles through an integrated approach. 2) To investigate the cellular processes of living organisms with an emphasis on biological chemistry applications. 3) To investigate the unifying themes and key concepts of different organisms. 4) To acquaint the student with the anatomy, function, genetics and evolution of different types of organisms. 5) The student will demonstrate factual knowledge of contemporary natural science. 6) The student will apply contemporary scientific models to describe the natural world. 7) To understand and apply the scientific method. 8) Demonstrate basic problem-solving processes, including observation, inference, measurement, prediction, use of numbers, classifying and use of space and time relationships in life sciences. 9) Demonstrate integrated process skills, including identification and control of variables, interpretation of data, formulation and testing of hypotheses, and experimentation in the life sciences.
Indicative Contents المحتويات الإرشادية	**1. Introduction to Biology** • Definition, scope, and importance of biology. • Levels of biological organization: molecules, cells, tissues, organs, organisms, populations, ecosystems. • Scientific methods, observation, experimentation, and hypothesis testing. **2. Chemistry of Life** • Chemical elements essential for life (C, H, O, N, P, S). • Water and its biological properties. • Organic compounds: carbohydrates, lipids, proteins, nucleic acids. • Enzymes: structure, function, and factors affecting activity. **3. Cell Biology**

	• Cell theory and types of cells (prokaryotic vs. eukaryotic). • Cell structure and organelles. • Cell membranes and transport mechanisms. • Introduction to cell division: mitosis and meiosis. **4. Genetics and Molecular Biology** • DNA and RNA: structure and function. • Basic concepts of heredity: Mendelian genetics. • Genes, chromosomes, and genetic variation. • Introduction to molecular genetics and biotechnology. **5. Plant Biology (Botany)** • Plant cell structure and differences from animal cells. • Photosynthesis: light and dark reactions. • Plant tissues: meristematic and permanent tissues. • Plant reproduction: sexual and asexual methods. **6. Animal Biology (Zoology)** • Overview of animal cell structure. • Animal tissues: epithelial, connective, muscle, nervous. • Digestive, respiratory, circulatory, excretory, and reproductive systems. • Homeostasis and regulation.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**1. Teaching Methods** 1. **Lectures** – Traditional classroom lectures delivered by the instructor to explain core concepts and theories. 2. **PowerPoint Presentations** – Use of multimedia presentations to enhance visualization, provide diagrams, animations, and summary tables for complex topics. 3. **Assignments and Tutorials** – Weekly homework assignments and small-group discussion sessions to reinforce understanding and problem-solving skills

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			

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Review of animal biology

Week 2	Cellular history
Week 3	The cell (the cell theory, cellular evolution)
Week 4	Prokaryotic and Eukaryotic cells (structure and function)
Week 5	Viruses , bacteria and Archaea
Week 6	Membranes and transport(membrane structure and function, passive transport processes and active transport processes)
Week 7	Cellular respiration (Aerobic, Anaerobic, Glycolysis, TCA, Fermentation)
Week 8	Midterm exam
Week 9	Sexual reproduction (spermatogenesis and Oogenesis)
Week 10	DNA (Genetic material, DNA structure)
Week 11	Gene function (genetic code)
Week 12	Transcription
Week 13	Translation
Week 14	Mutations
Week 15	Repair of mutations

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction
Week 2	Laboratory Equipment and tools
Week 3	Light Microscope
Week 4	Taxonomy Phylogenetic Systematics

Week 5	Prokaryotes
Week 6	Protists
Week 7	Fungi
Week 8	Midterm Exam
Week 9	Animal Diversity I
Week 10	Animal Diversity II
Week 11	Vertebrate Anatomy (Frog Dissection)
Week 12	Mice Dissection
Week 13	Animal Behavior
Week 14	Reports Presentations I
Week 15	Reports Presentations II

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Gene Cloning and Manipulation Second Edition Christopher Howe University of Cambridge	نعم
Recommended Texts	Dominic W.S. Wong The ABCs of Gene Cloning Second Edition Springer	نعم
Websites	https://www.ncbi.nlm.nih.gov/	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

معلومات المادة الدراسية **Biophysics**					
Module Title	**Biophysics**			**Module Delivery**	
Module Type	**Suport**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CRBt-Bp**				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level			**Semester of Delivery**		
Administering Department	**Department of molecular and medical biotechnology**		**College**	College of Biotechnology	
Module Leader	Dr. Mohammed Tariq		**e-mail**	Mohammed.albaidhani@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**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	01/10/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Biophysics is an interdisciplinary subject and one of the forefront of modern science, emerging as a major field in research laboratories, medical laboratories, industry and academia. The key to the most important progress has been to understand the fundamentals of modern and classical physics in order to develop powerful tools that can be used to address many open questions related to our understanding of human life and disease. In this semester we will cover a wide range of basic and advanced physical concepts and biological applications. We will study the basics of physics that are directly related to biological studies and research.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain models of biological systems and models dealing with statistical mechanics and transport phenomena. 2. Solve qualitative and quantitative problems, using appropriate statistical mechanics and computing techniques. 3. Perform experiments which involve making correct and appropriate use of a range of scientific equipment, keeping an accurate record of experimental work and analysing results and reaching non-trivial conclusions from them. 4. Communicate at an advanced level the results of both theoretical and experimental work in various forms including written reports, oral presentations and poster presentations. 5. Collaborate effectively with team members for scientific investigations and for the process of learning.
Indicative Contents المحتويات الإرشادية تضم الكلمات المفتاحية المهمة للمحاضرات	Lectures will discuss the scope of modern biophysics, introducing students to the basics of classical and modern physics. Physical concepts related to biophysics will then be discussed in detail. Where students will learn about the nature of light, sound, heat, and other physics concepts, and the laws related to them. Thus, the student will have sufficient tools to understand modern biological technologies, which use physical concepts as the basis for their work.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Discussing the topics of the textbook and supporting references • Theoretical lectures including problem solving and discussion of homework • Asking students a set of thinking questions during the lectures for specific topics. • Giving students homework that requires finding self-solutions.

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			

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 11	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative	**Midterm Exam**	1 hr	10% (10)	7	LO # 1-7

assessment	**Final Exam**	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Biophysics
Week 2	Liquid and Gas, The mechanics of Fluid
Week 3	Density Pressure in fluid
Week 4	Buoyancy Surface tension
Week 5	Fluid flow Bernoulli's equation
Week 6	Application of Bernoulli's equation Viscosity
Week 7	Applications about Physics concepts
Week 8	Temperature and expansion
Week 9	Temperature thermal equilibrium Thermometers
Week 10	The Celsius and Fahrenheit scale
Week 11	Thermal expansion
Week 12	Thermal stresses
Week 13	Thermal properties of matter
Week 14	Equation of states

Week 15	Ideal gases P-V diagram
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Instructions to students, Basic personal needs and other requirements. Writing the account of an experiment, Introduction to graphical representation of experimental data, Errors, their determination and minimization, least square fitting. Units.
Week 2	Lab 2: Forces and Equilibrium
Week 3	Lab 3: Spiral Spring and Hooks Law
Week 4	Lab 4: Spiral Spring: Determination of force constant and effective mass of a spring.
Week 5	Lab 5: Spiral Spring: To deduce the acceleration of free fall from a combination of the static and dynamic experiments.
Week 6	Lab 6: Simple Pendulum and determination of gravitational acceleration (g).
Week 7	Lab 7: The Cantilever experiment
Week 8	Lab 8: The bifilar suspension: Variation of the period of oscilation with the distance between the vertical suspension threads.
Week 9	Lab 9: The bifilar suspension: Variation of Oscillation with length of the suspension threads.
Week 10	Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Fundamentals of Physics (3rd edition) College physics (2nd edition)	
Recommended Texts	Physics for biologist (by: George Duncan)	
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer**			**Module Delivery**	
Module Type	**Basic**			■ **Theory**	
Module Code	URCOM			☐ **Lecture**	
ECTS Credits	**3**			■ **Lab**	
SWL (hr/sem)	**75**			☐ **Tutorial**	
				☐ **Practical**	
				☐ **Seminar**	
Module Level	**1**		**Semester of Delivery**	**1**	
Administering Department	**Molecular &Medical Biotechnology**		**College**	**Biotechnology**	
Module Leader	Noor Salameh Shehdh		**e-mail**	Noor.salama@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PhD	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	1/10/2024		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	It includes studying the basic concepts of computers, their types, and the application of software programs.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The course aims to introduce students to the general concept of computers, their components, and types. It focuses on teaching students about various input and output devices, types of memory, and familiarizing them with different operating system software and application software. The course also covers an introduction to Microsoft Office and its components, along with studying the types of application software. The course is designed to teach students how to use application software and apply it to computers, including word processing software like **Microsoft Word**. Additionally, it introduces students to presentation software such as **Microsoft PowerPoint**, its applications, and usage on computers. Furthermore, the course aims to provide foundational knowledge of the **Internet** and how to work with internet technologies
Indicative Contents المحتويات الإرشادية	يجب ان يتم التعامل مع كافة الحتويات العلمية بطريقة النقاش وايجاد الحلول ومن ثم تنفيذها بطرق برمجية مما يساعد المجتمع في التطور نحو بناء انظمة الكترونية في كافة المجالات

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Teaching using mini lessons, where the scientific method is divided into main ideas and then taught to the student in the form of consecutive lectures, and each lecture deals with only one idea 2. The tribal evaluation - through the scientific discussion with the students and knowing the extent of the student's understanding of the subject that we will begin to study. 3. Formative evaluation - through daily and sudden exams, and thus knowing the extent to which the student understands the scientific material during the lectures.

	4. Final evaluation - through the monthly or final exams, through which the student is evaluated and the extent to which the student understands the scientific material.

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	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل			

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to computer
Week 2	Computer components
Week 3	Operating system and Graphical User Interface GUI
Week 4	Word processing
Week 5	Word processing
Week 6	Word processing
Week 7	First exam
Week 8	Spread sheet
Week 9	Spread sheet
Week 10	Presentation software
Week 11	Presentation software
Week 12	Introduction to internet and web browsers
Week 13	Communications and Emails
Week 14	Computer troubleshooting
Week 15	Second exam
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to computer: Concepts of hardware and software with their components; concept of computing, data and information; applications off information electronics and communication technology (IECT); connecting input, input/output devices, and the rates to CPU

Week 2	Computer components: Computer portions, hardware parts, I/O units, memory types, basic CPU components, computer ports, personal computer, personal computer (features and types).
Week 3	Operating system and Graphical User Interface GUI: operating system; basics of common operating system; the user interface, using mouse techniques, use of common icons, status bar, using menu and menu-selection, concept of folders and directories, opening and closing of different windows; creating shortcuts
Week 4	Word processing: Word processing basics; opening and closing of documents; text creation and manipulation; formatting of text, table handling, spell check. Language setting and thesaurus; printing of word document.
Week 5	Word processing: Inserting and formatting images within the document; Using shapes and backgrounds.
Week 6	Word processing: Adjusting margins, orientation, and paper size; Preparing the document for printing; Inserting hyperlinks; Saving documents in different formats, such as PDF.
Week 7	First exam
Week 8	Spread sheet: basics of spreadsheets; manipulation of cells, formulas and functions; editing of spread sheet, printing of spreadsheets
Week 9	Spread sheet: Using PivotTables and Pivot Charts; Adjusting margins, orientation, and paper size for printing; Securing data with a password; Handling files in different formats (e.g., CSV, PDF).
Week 10	Presentation software: basics of presentation software; creating presentation; preparation and presentation office slides; slide show, taking printouts of presentation/handouts.
Week 11	Presentation software: Customizing slide backgrounds; Adding motion effects to elements within the slide; Applying transitions between slides; Inserting audio or video files into the presentation; Using comments or footnotes; Setting up and running the presentation; Enhancing appearance using themes and templates; Securing the presentation with a password; Preparing and printing slides or notes; Saving and sharing the presentation in various formats (e.g., PDF).
Week 12	Introduction to internet and web browsers: computer network basic; LAN, WAN, concept of Internet and its applications; connecting to Internet; world wide web, web browsing software's. search engines; understanding URL, domain name, IP address
Week 13	Communications and Emails: basics of electronic mail; getting an email account; sending and receiving emails; accessing sent emails; using emails; document collaboration
Week 14	Computer troubleshooting identifying and solving common hardware and software problems that computer users encounter. basic troubleshooting techniques and tools for diagnosing and resolving issues
Week 15	Second exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Lectures prepared by the instructor.	
Recommended Texts	• Graham Brown, David Watson, " Cambridge IGCSE information and Communication Technology", 3rd Edition (2020). • Alan Evans, Kendall Martin, Mary Anne Poatsy, "Technology in Action Complete" 16th Edition (2020). • Ahmed Banafa, " Introduction to Artificial Intelligence (AI)", 1st Edition (2024). • الخضر علي الخضر بحاث،" اساسيات الحاسوب" 2016 الدكتور عادل عبدالنور، " مدخل الى عالم الذكاء الاصطناعي" 2005	
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

MODULE DESCRIPTION FORM

Module Information
معلومات المادة الدراسية

Module Title	**Medical Terminology**	**Module Delivery**	
Module Type	**Basic**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	URMTM		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		
Module Level	**Theory**	**Semester of Delivery**	**1**
Administering Department	**Molecular and Medical Biotechnology Department**	**College**	**Biotechnology**
Module Leader	Dr. Lamiaa Fingan Nashi Al-Maliki	**e-mail**	lamiaafingan@yahoo.com
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	PhD
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	10/12025	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	None
Co-requisites module	None	**Semester**	None

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. **1. Knowledge-Based Objectives** 2. **Understand the structure of medical terms, including prefixes, suffixes, and root words.** 3. **Identify and define common medical terms used in anatomy, physiology, pathology, and clinical practice.** 4. **Recognize terminology related to major body systems (cardiovascular, respiratory, nervous, digestive, etc.).** 5. **Comprehend abbreviations, symbols, and acronyms commonly used in healthcare documentation.** 6. **2. Skill-Based Objectives** 7. **Analyze and construct medical terms correctly using word parts.** 8. **Interpret medical records, reports, and prescriptions accurately.** 9. **Communicate effectively using appropriate medical terminology in written and verbal forms.** 10. **Apply medical terms in clinical, laboratory, and research contexts.** 11. **3. Attitude-Based Objectives** 12. **Develop attention to detail and accuracy in using medical language.** 13. **Appreciate the importance of precise terminology in patient care, documentation, and scientific communication.** 14. **Demonstrate professionalism when interacting with healthcare teams using correct terminology**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**Knowledge Outcomes** 1. **Explain** the structure and components of medical terms, including prefixes, suffixes, and root words. 2. **Identify and define** medical terms associated with major body systems and common diseases. 3. **Recognize abbreviations, symbols, and acronyms** used in healthcare documentation. 4. **Describe** the importance of accurate terminology in patient care and clinical communication. **2. Skills Outcomes** 5. **Construct and deconstruct** medical terms correctly using standard word parts. 6. **Interpret medical records, laboratory reports, and prescriptions** accurately. 7. **Apply medical terminology effectively** in clinical scenarios and healthcare communication.

	8. **Use medical language** accurately in both written and verbal professional interactions. **3. Attitude Outcomes** 9. **Demonstrate attention to detail** in using precise terminology. 10. **Show professionalism and ethical responsibility** when handling medical documentation. 11. **Value the role of clear communication** in enhancing patient safety and interprofessional collaboration. 7- Develop listening skills by focusing on the pronunciation of words and distinguishing some of them with the tone and tone of voice because of their importance. 8- Develop reading skills through fast reading to understand the general content of the texts and focus on important events such as years, numbers and parentheses that refer to events that may be important in the texts.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**. Interactive Lectures** • Introduce key concepts, word roots, prefixes, and suffixes. • Use examples from real medical cases to illustrate terminology. • Encourage student questions and clarification. **2. Visual Aids and Multimedia** • Use charts, diagrams, and flashcards for body systems and medical terms. • Incorporate videos demonstrating clinical usage of terminology. **3. Group Activities** • Small-group exercises to construct and deconstruct medical terms. • Peer teaching for reinforcing knowledge of complex terms.

	4. Case-Based Learning • Present patient cases and medical reports. • Students interpret and use correct terminology in clinical scenarios. **5. Quizzes and Self-Assessment** • Short quizzes after each topic to reinforce memory. • Use online tools (e.g., Kahoot, Quizlet) for interactive learning

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**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	**Quizzes**	2	10% (10)	5, 11	LO #1, 2, 10 and 1
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Onsite Assignments	1	10% (10)	10	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	1hr	10% (10)	7	LO # 1-7
	Final Exam	3 hrs	50% (50)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Medical Terminology
Week 2	Body Organization and Anatomical Terms
Week 3	The Skeletal and Muscular Systems
Week 4	The Cardiovascular System
Week 5	he Respiratory System
Week 6	The Digestive System
Week 7	1st Mid term Exam
Week 8	The Nervous System
Week 9	The Urinary and Reproductive Systems
Week 10	he Endocrine System
Week 11	The Integumentary system
Week 12	The Immune and Lymphatic Systemsoff... p87
Week 13	Medical Specialties and Diagnostic Terms
Week 14	Clinical Documentation and Communication
Week 15	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• **BLS HealthCare Education** (2022). *Medical Terminology for Health Professions* (9th Edition). Cengage Learning. • **Body Systems Publishing** (2020). *Quick & Easy Medical Terminology* (8th Edition).	
Recommended Texts		
Websites	**--- English language <u>Youtube</u>**	

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	الديمقراطية وحقوق الانسان		**Module Delivery**
Module Type	**Basic**		• ☒ **Theory** • ☒ **Lecture** • ☐**Lab** • ☐ **Tutorial** • ☐ **Practical** • ☒**Seminar**
Module Code	**URDEM**		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		
Module Level		**Semester of Delivery**	1
Administering Department	Department of molecular and medical biotechnology	**College**	College of Biotechnology
Module Leader	فؤاد الشافعي اسامة كريم Osama kareem rasheed	**e-mail**	fouad.saadoun@nahrainuniv.edu.iq Usama.kareem1103a@comc.uobaghdad.edu.iq
Module Leader's Acad. Title	Lecture	**Module Leader's Qualification**	Ph.d
Module Tutor	None	**e-mail**	E-mail
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	1.10.2025	**Version Number**	1.0

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 Aims **أهداف المادة الدراسية**	هدف دراسة مادة حقوق الإنسان والديمقراطية يتمثل في تعزيز الفهم والوعي بقضايا حقوق الإنسان والمبادئ الأساسية للديمقراطية. هناك بعض الأهداف الرئيسية لدراسة هذه المادة: 1. فهم حقوق الإنسان: يهدف دراسة حقوق الإنسان إلى تعريفك بالمفاهيم الأساسية لحقوق الإنسان وقيمتها الأساسية في المجتمع. ستتعلم عن التاريخ والتطور القانوني لحقوق الإنسان والمعاهدات والاتفاقيات الدولية المتعلقة بهذا الموضوع. 2 .التوعية بالمبادئ الأساسية للديمقراطية: ستتعرف على مفهوم الديمقراطية وقيمها الأساسية، بما في ذلك حكم القانون، وحقوق المواطنة، والمشاركة السياسية. ستتعلم أيضًا عن أنظمة الحكم المختلفة وكيفية تطبيق مبادئ الديمقراطية في المجتمعات المختلفة. 3 .التعرف على التحديات الحالية: ستتعلم عن التحديات والقضايا الحالية في مجال حقوق الإنسان والديمقراطية. ستدرس القضايا المتعلقة بالتمييز والعدالة الاجتماعية وحقوق المرأة وحقوق الأقليات وحقوق الطفل وحقوق اللاجئين، وكيفية التعامل مع هذه التحديات في إطار الديمقراطية. 4 .تطبيق المفاهيم على الواقع: ستتعلم كيفية تطبيق المفاهيم والمبادئ التي تم دراستها في حقوق الإنسان والديمقراطية على الواقع العملي. ستدرس الأدوار المختلفة للمنظمات الحقوقية والمؤسسات الديمقراطية وكيفية العمل من أجل تعزيز حقوق الإنسان وتعزيز الديمقراطية في المجتمعات. 5 .تنمية المهارات النقدية والتحليلية: ستتعلم كيفية تحليل القضايا المتعلقة بحقوق الإنسان والديمقراطية وتقييم السياق القانوني والأخلاقي والسياسي الذي يحيط بها. ستتدرب على صياغة حجج قوية وتوجيه النقد البناء للسياسات والممارسات غير العادلة. عن طريق دراسة مادة حقوق الإنسان والديمقراطية، ستكتسب المعرفة والفهم اللازمين للمساهمة في تعزيز حقوق الإنسان والديمقراطية في المجتمع والعمل على خلق تغيير إيجابي
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	تعمل جامعة النهرين من خلال تدريس مادة حقوق الانسان والديمقراطية لتعزيز التثقيف والتوعية وتدريب الطلبة على اهمية المشاركة الفاعلة في جوانب الحياة العامة كتعزيز احترام مبادئ حقوق الانسان العامة والمشاركة الفاعلة في الحياة السياسية والثقافية وتكريس القيم والمعتقدات والمواقف التي تشجع جميع الطلبة على دعم الحقوق الخاصة بهم وحقوق غيرهم، كما أنه يتيح فهماً للمسؤولية المشتركة لهذه الشريحة عن جعل حقوق الانسان أمراً واقعاً يعايشونه ويتسلحون بالمعارف والمهارات والمواقف التي تمكنهم من إدراك هذه الحقوق والالتزام بها
Indicative Contents **المحتويات الإرشادية**	• معرفة مفهوم الحق ومفهوم الانسان من الناحية اللغوية والاصطلاحية ومعرفة مفهوم حقوق الانسان ودراسة الشخصية القانونية للإنسان وماهي مميزات الشخصية الطبيعية • معرفة التطور التاريخي لفكرة حقوق الانسان في العصور القديمة والعصور الوسطى وفكرة حقوق الانسان في الشرائع السماوية

	• دراسة مصادر حقوق الانسان المحلية والدولية • دراسة ضمانات حقوق الانسان ومعرفة ماهي الضمانات الدستورية والقضائية وضمانات حقوق الانسان في الإسلام • معرفة دور المنظمات في حقوق الانسان على الصعيد الإقليمي والدولي • دراسة ما مدى تأثير العولمة على حقوق الانسان • دراسة مفهوم الديمقراطية ومعرفة تطوره وتعريفه وابعاده • دراسة الديمقراطية التمثيلية ومعرفة النظام التمثيلي وطبيعته القانونية • معرفة مفهوم الانتخاب وتكييفه القانوني • معرفة كيفية تنظيم الانتخاب وتحديد الدوائر الانتخابية والقوائم الانتخابية والمرشحون والحملة الانتخابية والتصويت • دراسة نظم الانتخابات ومعرفة ماهو الانتخاب المباشر والانتخاب الغير مباشر والانتخاب الفردي والانتخاب بالقائمة • معرفة مميزات وعيوب الديمقراطية

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	1. POWERPOINT 2. كتابة التقارير 3. التعلم عبر الانترنيت 4. زيارات ميدانية

Student Workload (SWL)
الحمل الدراسي للطالب

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			

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative	**Quizzes**	2	10%	6, 11	1-10

assessment			(10)		
	Assignments	1	10% (10)	10	1-9
	Onsite Assignments	1	10% (10)	8	1-7
	Report		10	6	1-10
Summative assessment	**Midterm Exam**	1 hr	20% (20)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) **المنهاج الاسبوعي النظري**	
	Material Covered
Week 1	**مفهوم حقوق الانسان**
Week 2	**حقوق الانسان في الحضارات القديمة**
Week 3	**حقوق الانسان في الشرائع والأديان السماوية**
Week 4	**مصادر حقوق الانسان**
Week 5	**ضمانات حقوق الانسان ووسائل حمايتها**
Week 6	**دور المنظمات في حماية حقوق الانسان**
Week 7	**العولمة و حقوق الانسان**
Week 8	**مفهوم الديمقراطية**
Week 9	**الديمقراطية التمثيلية (النيابية)**
Week 10	**مفهوم الانتخاب وتكيفه القانوني**
Week 11	**تنظيم عملية الانتخاب**
Week 12	**نظم الانتخاب**
Week 13	**تكوين هيئة الناخبين**
Week 14	**مقومات ومعوقات الحكم الرشيد (الحكم الصالح)**
Week 15	**مساوئ ومحاسن الديمقراطية**

Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the**

		Library?
Required Texts	ماهر صالح علاوي الجبوري، حقوق الانسان والطفل والديمقراطية, المكتبة القانونية،2009	نعم
Recommended Texts	د. حميد حنون خالد,حقوق الانسان,مكتبة السنهوري,٢٠١٥	لا
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Analytical Chemistry**		**Module Delivery**
Module Type	**Supportive**		• ☒ **Theory** • ☐ **Lecture** • ☒ **Lab** • ☐ **Tutorial** • ☐ **Practical** • ☐ **Seminar**
Module Code	CRBt-OC		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level		**Semester of Delivery**	1
Administering Department	**Molecular and Medical Biotechnology**	**College**	**Biotechnology**
Module Leader	Alabass abdulkareem	**e-mail**	Albbas.abdulkareem@nahrainuniv.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	Albbas.abdulkareem@nahrainuniv.edu.iq
Peer Reviewer Name		**e-mail**	E-mail
Scientific Committee Approval Date		**Version Number**	1.0

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 Aims **أهداف المادة الدراسية**	1. The aims of an Analytical Chemistry module for first-year university students typically include providing foundational knowledge and skills in the field of analytical chemistry. Here are six main aims for such a module: 2. **Introduction to Analytical Techniques:** To introduce students to a wide range of analytical techniques commonly used in chemical analysis, including spectroscopy, chromatography, titration, and electrochemical methods. 3. **Measurement and Quantification:** To teach students the principles of accurate measurement and quantification, including units of measurement, error analysis, and statistical methods used in analytical chemistry. 4. **Sample Preparation:** To instruct students on proper sample preparation techniques, including sample collection, extraction, and handling, to ensure reliable and reproducible results. 5. **Instrumentation:** To familiarize students with laboratory instrumentation and analytical equipment, including how to operate and maintain them, interpret data, and troubleshoot common issues. 6. **Chemical Analysis:** To enable students to perform chemical analyses, including the selection of appropriate methods and techniques, calibration, data analysis, and reporting of results. 7. **Quality Assurance and Good Laboratory Practices:** To emphasize the importance of quality assurance, safety, and good laboratory practices in analytical chemistry, including the documentation of procedures, adherence to safety protocols, and compliance with ethical guidelines. 8. These aims are designed to provide students with a solid foundation in analytical chemistry, equipping them with the knowledge and skills needed to conduct accurate and reliable chemical analyses in various scientific and industrial settings.
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	1. Module learning outcomes for a first-year university Analytical Chemistry course typically encompass a range of knowledge and skills students are expected to gain during the course. Here are six main aims or learning outcomes for such a module: 2. Fundamental Principles: Understand and apply fundamental principles of analytical chemistry, including concepts related to chemical equilibria, chemical reactions, and the behavior of analytes in various matrices. 3. Analytical Techniques: Gain proficiency in a variety of analytical techniques such as spectroscopy, chromatography, titration, and electrochemical methods, and demonstrate the ability to select and apply appropriate techniques for specific analytical problems. 4. Measurement and Quantification: Develop the skills necessary for accurate measurement and quantification, including proficiency in units of measurement, error analysis, and statistical methods relevant to analytical chemistry. 5. Sample Preparation: Learn and apply proper sample preparation techniques, including sample collection, extraction, and handling, to ensure the reliability

	and reproducibility of analytical results. 6. Instrumentation and Data Analysis: Become proficient in the operation and maintenance of analytical instruments, as well as the interpretation of data generated by these instruments. Analyze experimental data, draw meaningful conclusions, and report findings effectively. 7. Safety and Ethics: Understand and practice laboratory safety protocols and ethical considerations in analytical chemistry, including the responsible use of chemicals, proper disposal of waste, and adherence to ethical guidelines for research and data reporting.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Teaching Analytical Chemistry to first-year university students involves a combination of theoretical concepts and practical laboratory experiences. Here are the main theoretical and practical indicative contents for such a course: **Theoretical Contents:** 1. **Introduction to Analytical Chemistry:** • Definition and scope of analytical chemistry • Importance of analytical chemistry in various fields • Analytical chemistry as a quantitative science 2. **Measurement and Units:** • Fundamental concepts of measurement • Units and dimensions • Accuracy and precision in measurements 3. **Chemical Equilibria:** • Concepts of chemical equilibrium • Equilibrium constants and expressions • Applications in analytical chemistry 4. **Chemical Reactions:** • Reaction stoichiometry • Reaction kinetics • Applications of chemical reactions in analysis 5. **Instrumentation:** • Introduction to analytical instruments • Spectroscopy (UV-Vis, IR, NMR, etc.) • Chromatography (HPLC, GC, etc.) • Electrochemical methods (potentiometry, voltammetry, etc.) 6. **Sampling and Sample Preparation:** • Importance of representative sampling • Sample collection and preservation • Sample extraction and pre-treatment techniques **Practical Contents:** 1. **Laboratory Safety:** • Introduction to laboratory safety rules and practices • Handling of chemicals and safety equipment 2. **Basic Laboratory Skills:** • Proper use of laboratory glassware and equipment • Pipetting and titration techniques • Weighing and measurement techniques 3. **Instrumentation Techniques:** • Hands-on experience with analytical instruments (e.g.,

	spectrophotometers) • Calibration and maintenance of instruments 4. **Sample Preparation:** • Sample collection, preservation, and handling • Sample extraction and pre-treatment procedures 5. **Analytical Techniques:** • Conducting chemical analyses using various techniques • Data acquisition and analysis • Troubleshooting instrument issues

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب

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**			

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Analytical Chemistry
Week 2	Fundamental Units of Measure
Week 3	Units for Expressing Concentration
Week 4	the Chemical Composition of Aqueous Solutions
Week 5	Concentration units, stoichiometry, and chemical equilibrium.
Week 6	Titrations in Analytical Chemistry
Week 7	Types of titration
Week 8	Midterm exam
Week 9	Spectroscopic Methods of Analysis
Week 10	ultraviolet/Visible Photo meters and Spectro photo meters
Week 11	Infrared Spectro photo meters
Week 12	Molecular Photoluminescence Spectroscopy
Week 13	2nd midterm exam
Week 14	Chromatography fundamentals
Week 15	Introduction to gas chromatography (GC) and high-performance liquid chromatography (HPLC).

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to Analytical Chemistry and Laboratory Safety
Week 2	Basic Laboratory Techniques
Week 3	Preparation of Standard Solutions from Solid Materials
Week 4	Preparation of Standard Solutions from Liquid Materials
Week 5	Preparation of Serial Dilutions
Week 6	Acid-Base Titration to Determine the Concentration of an Unknown Acid Solution
Week 7	Acid-Base Titration to Determine the Concentration of an Unknown base Solution
Week 8	Determination of Calcium Carbonate Content in a Sample Using Back Titration
Week 9	1 Midterm exam
Week 10	Preparation of an Acidic Buffer Solution
Week 11	Preparation of an Basic Buffer Solution
Week 12	Determination of Absorbance Using UV-Vis Spectroscopy
Week 13	Determination of Absorbance of Potassium Permanganate ($KMnO_4$) Using UV-Vis Spectroscopy
Week 14	Thin Layer Chromatography (TLC)
Week 15	2 Midterm exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Fundamentals of Analytical Chemistry 9th edition by Skooge	Yes
Recommended Texts	Modern analytical chemistry / David Harvey. — 1st ed.	No
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Cell Biology**			**Module Delivery** \	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MBt12-CB				
ECTS Credits	8				
SWL (hr/sem)	200				
Module Level			**Semester of Delivery**		
Administering Department		**Department of molecular and medical biotechnology**	**College**	**College of Biotechnology**	
Module Leader	**Ruqia M. ibrahium**		**e-mail**	ruqaia.alezzy@ced.nahrainuniv.edu.iq	
Module Leader's Acad. Title		**Prof .Dr.**	**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		**1\10\2025**	**Version Number**	**1.0**	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	General Biology	**Semester**	1
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	y the end of this course, students should be able to: 1. Explain the structure and function of cellular organelles. 2. Distinguish between prokaryotic and eukaryotic cell organization. 3. Understand membrane structure, transport mechanisms, and energy metabolism. 4. Describe the cell cycle and mechanisms controlling cell division. 5. Explain cell communication and signal transduction mechanisms. 6. Discuss programmed cell death (apoptosis) and cancer cell biology. 7. Perform basic laboratory techniques related to cell observation and analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Describe the structure and function of eukaryotic and prokaryotic cells. • Explain the composition and role of cellular organelles and membranes. • Discuss the mechanisms of energy production and cellular metabolism. • Understand the molecular basis of the cell cycle, mitosis, and meiosis. • Explain the principles of cell communication and signal transduction. • Describe the processes of apoptosis and the cellular mechanisms leading to cancer. • Identify and explain the experimental approaches used to study cell structure and function.

Indicative Contents
المحتويات الإرشادية
	• **Introduction to Cell Biology**
	  • Historical background and cell theory.
	  • Overview of prokaryotic and eukaryotic cell organization.
	  • Methods used in cell biology (microscopy, cell fractionation, cell culture).
	• **The Plasma Membrane**

- Structure and composition of biological membranes (lipids, proteins, carbohydrates).
- The fluid mosaic model.
- Membrane dynamics and transport mechanisms (passive, active, vesicular transport).

- **Cytoplasm and Cytoskeleton**

  - Components of the cytoplasm.
  - Structure and functions of microtubules, microfilaments, and intermediate filaments.
  - Cell motility and intracellular transport.

- **Cell Organelles and Their Functions**

  - Nucleus, nucleolus, and chromatin organization.
  - Endoplasmic reticulum, Golgi apparatus, lysosomes, and peroxisomes.
  - Mitochondria and chloroplasts: structure and energy production.
  - Comparison between plant and animal cells.

- **Cellular Energy and Metabolism**

  - Overview of catabolic and anabolic pathways.
  - Glycolysis, Krebs cycle, oxidative phosphorylation, and ATP synthesis.
  - Photosynthesis in plant cells.

- **The Cell Cycle and Cell Division**

  - Stages of the cell cycle (G1, S, G2, M phases).
  - Regulation of the cell cycle (cyclins, CDKs, checkpoints).
  - Mitosis and meiosis: processes and biological significance.

- **Cell Communication and Signal Transduction**

  - Types of cell signaling (autocrine, paracrine, endocrine, juxtacrine).
  - Signal receptors and ligands.
  - Major signaling pathways: GPCRs, RTKs, secondary messengers.

- **Cell Death and Cancer Biology**

  - Mechanisms of apoptosis and necrosis.
  - Role of p53 and caspases in programmed cell death.
  - Molecular basis of cancer: oncogenes, tumor suppressor genes, and uncontrolled proliferation.

- **Experimental Approaches in Cell Biology (if practical sessions included)**

  - Microscopic observation of cell types and organelles.

	• Cell staining and identification. • Observation of mitosis and meiosis. • Basic cell viability and enzyme activity assays.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures, Laboratory Sessions,Tutorials and Group Discussions and Assignments and Projects The main strategy that will be adopted in delivering this module is encouraging students to interact positively with others, think critically, solve related problems and and think independently and access relevant literature and review information

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			

Module Evaluation تقييم المادة الدراسية				
	Time/Nu	**Weight (Marks)**	**Week Due**	**Relevant Learning**

		mber			Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, and 9
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	8	LO # 1-7
	Final Exam	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Cell Biology
Week 2	Plasma Membrane
Week 3	Membrane transport
Week 4	Cytoplasm & Cytoskeleton
Week 5	Nucleus & Genetic Material
Week 6	Mid Term Exam
Week 7	Mitochondria & Energy Conversion
Week 8	Cell Communication
Week 9	Signal Transduction Pathways
Week 10	The Cell Cycle
Week 11	Cell division
Week 12	Apoptosis & necrosis

Week 13	Cancer biology
Week 14	Methods in cell study
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Glossary of medical terms**
Week 2	**Biosafety**
Week 3	**Sterilization**
Week 4	**Classification of kingdom**
Week 5	**Animal cell**
Week 6	**Plant cell**
Week 7	**Bacteria**
Week 8	**Fungi**
Week 9	**Mid exam**
Week 10	**Cell cycle**
Week 11	Osmosis and Diffusion
Week 12	Cell viability
Week 13	Cell Staining Techniques
Week 14	slid preparation
Week 15	final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**lberts, B., Johnson, A., Lewis, J., Morgan, D., Raff, M., Roberts, K., & Walter, P.** (2022). *Molecular Biology of the Cell* (7th ed.). New York: Garland Science. → The most authoritative and comprehensive reference on cell structure, function, and molecular mechanisms.	Yes
Recommended Texts	. **Karp, G.** (2021). *Cell and Molecular Biology: Concepts and Experiments* (9th ed.). Hoboken, NJ: John Wiley & Sons.	Yes
Websites	https://www.khanacademy.org/science/biology/cell-biology	

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Principle of Biotechnology-II**			**Module Delivery**	
Module Type	Core			☒ **Theory** **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MBt12-PB				
ECTS Credits	8				
SWL (hr/sem)	200				
Module Level	1		**Semester of Delivery**	2	
Administering Department	**Department of molecular and medical biotechnology**		**College**	**College of Biotechnology**	
Module Leader	**Asmaa Ali Hussein**		**e-mail**	**asmaa.ali@nahrainuniv.edu.iq**	
Module Leader's Acad. Title	**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	**1\10\2025**		**Version Number**	**1.0**	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Principle of Biotechnology-I	**Semester**	1
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	**The outcomes of this course provide students with knowledge and information** Students taking this introductory course begin understanding the role of biotechnology plays in the fields of human, animal genetics, environment and industry. **Biotechnology course will enable students to learn about the sciences behind biotechnology, scientific concepts and knowledge about the field of**

	biotechnology and deeper understanding of the biological concepts used. Furthermore, students will explore and evaluate career opportunities in the field of biotechnology through extensive readings.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**The knowledge, skills and information to be developed by the student are:** **1. Be able to define the term "biotechnology" and appreciate its scope** **2. Have an information on biotechnology and its resultant industries, and a broad knowledge of which are represented nationally and locally** **3. Be familiar with the key events in the development of biotechnology** **4. Be able to state the broad categories of biotechnological processes based on the products formed and/or the process or substrates used, and have detailed knowledge of examples of each of these** **5. Have an understanding of the multidisciplinary nature of biotechnology and the associated role that has been played by enabling technologies in the development of biotechnology**
Indicative Contents المحتويات الإرشادية تضم الكلمات المفتاحية المهمة للمحاضرات	**Indicative content includes the following.** - **Growth phases and growth culture of bacteria** - **Medical Biotechnology** - **DNA structure and Biotechnology** - **Protein, enzyme and biotechnology** - **Industrial biotechnology** - **Bioremediation and biotechnology**

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.**
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			

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 6and 9
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction on biotechnology and applications**
Week 2	**Industrial biotechnology**
Week 3	**DNA structure**
Week 4	**Molecular biotechnology**
Week 5	**Protein structure**
Week 6	**Enzyme and Their applications in biotechnology**
Week 7	**Bioremediations**
Week 8	**Mid-term Exam**
Week 9	**Culture technique**

Week 10	**Growth culture**
Week 11	**bioreactor design**
Week 12	**Fermentation**
Week 13	**Single Cell Protein**
Week 14	**Mid-term Second Exam**
Week 15	**Seminars**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Laboratory apparatus**
Week 2	**Isolation of bacteria from different sources**
Week 3	**Culturing of bacteria on different media**
Week 4	**Growth phases of bacteria**
Week 5	**Preparation of solvents and solutions used in biotechnology experiments**
Week 6	**Quantification of proteins**
Week 7	**Determination of enzyme activity in bacterial isolate**
Week 8	**Determination of enzyme activity in serum samples**
Week 9	**Mid term exam**
Week 10	**DNA extraction in ten easy steps from plant samples**
Week 11	**DNA extraction using kit**
Week 12	PCR
Week 13	**Exam**
Week 14	**Report**
Week 15	**Report**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**Biotechnology: Applying the Genetic Revolution** Clark DP, Pazdernik NJ. *Biotechnology: Applying the Genetic Revolution.* 2nd ed. Elsevier Academic Press; 2016	yes
Recommended Texts	. Medical Biotechnology: Advancement and Ethics	yes
Websites	https://www.wgu.edu/blog/medical-biotechnology-advancements-ethics1811.html	

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
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Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Organic Chemistry**			**Module Delivery**	
Module Type	**Supportive**			☒ **Theory** **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CRBt-OC				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level			**Semester of Delivery**	2	
Administering Department	**Department of molecular and medical biotechnology**		**College**	**College of Biotechnology**	
Module Leader	**Dr. Dalid Mahmmod**		**e-mail**	dalia.mahmood34@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Assist.Prof		**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	**1\10\2025**		**Version Number**	**1.0**	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Analytical chemistry	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The module is intended to introduce the structure and bonding of simple organic molecules. The properties, preparation, reactivity and reaction mechanisms will be explored for a number of functional groups.t covers the common organic molecules (alkenes, alcohols, amines, carbonyls etc.) and emphasizes their recognition, naming, reactions and relevance to everyday life and health.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**On completion of this module students should be able to:** **1.Understand the structures of organic molecules and recognize and name examples of them.** **2.Predict the properties and reactions of a molecule from its structure.** **3.Discuss the reactions of common organic compounds.** **4.Design the synthesis of a simple molecule from available starting materials.** **5.Understand the molecular basis of life.** **6.Safely perform a simple chemical synthesis in the laboratory.**
Indicative Contents المحتويات الإرشادية تضم الكلمات المفتاحية المهمة للمحاضرات	**Fundamental organic chemistry covers a wide range of topics that are essential for understanding the principles and reactions of organic compounds. Here's an indicative list of contents typically covered in a fundamental organic chemistry course:** 1. **Introduction to Organic Chemistry:** Definition of organic chemistry, historical perspective, and importance in everyday life. 2. **Structure and Bonding:** Covalent bonding, Lewis structures, VSEPR theory, molecular geometry, hybridization, polarity, and resonance. 3. **Functional Groups:** Introduction to functional groups, classification, and properties of various functional groups such as alkanes, alkenes, alkynes, alcohols, ethers, halides and amines. 4. **Nomenclature:** IUPAC rules for naming organic compounds, including alkanes, alkenes, alkynes, cyclic compounds, and compounds with functional groups. 5. **Isomerism:** Structural isomerism, geometric isomerism (cis-trans isomerism), and optical isomerism (enantiomerism). 6. **Acids and Bases in Organic Chemistry:** Bronsted-Lowry and Lewis acid-base theories, pKa values, and the concept of nucleophiles and electrophiles
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	When it comes to learning and teaching fundamental organic chemistry, it's essential to employ strategies that cater to the complexity and depth of the subject while ensuring comprehension and retention. Here are some effective learning and teaching strategies for fundamental organic chemistry: **Learning Strategies:** 1. **Active Learning**: Engage in active learning techniques such as problem-

	solving, concept mapping, and group discussions to reinforce understanding and promote critical thinking. 2. **Visualization Tools**: Utilize molecular modeling kits, software, or interactive online tools to visualize molecular structures and reactions, helping to grasp spatial arrangements and mechanisms. 3. **Practice Problems**: Regularly solve organic chemistry problems from textbooks, worksheets, and online resources to apply concepts and develop problem-solving skills. 4. **Conceptual Understanding**: Focus on understanding fundamental concepts and principles rather than memorization. Relate concepts to real-world examples and applications to enhance comprehension. 5. **Self-Assessment**: Use quizzes, flashcards, and practice exams to assess understanding and identify areas for improvement. Regular self-assessment aids in retention and reinforces learning. 6. **Multimodal Learning**: Employ a variety of learning resources such as textbooks, videos, tutorials, and interactive simulations to accommodate different learning styles and preferences. Teaching Strategies: 1.Active Learning Activities: Incorporate active learning strategies into lectures and tutorials, such as think-pair-share, group problem-solving, and case studies, to promote student engagement and participation. 2.Interactive Demonstrations: Use interactive demonstrations, molecular models, and animations to illustrate complex concepts, mechanisms, and reactions, enhancing understanding and retention. 3.Real-World Applications: Relate organic chemistry concepts to real-world applications and examples in fields such as medicine, pharmaceuticals, materials science, and environmental science to emphasize relevance and motivation. 4.Formative Assessment: Use formative assessment techniques such as concept quizzes, clicker questions, and group discussions to gauge student understanding, provide feedback, and address misconceptions in real-time.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل			

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 7and 9
	Assignments	2	10% (10)	4, 12	LO # 3, 4, 6 and 8
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-6
	Final Exam	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction and General principles about organic chemistry
Week 2	Hybridization in organic compounds
Week 3	Alkanes: structure and nomenclature
Week 4	Alkanes: synthesis and reactions
Week 5	Alkenes: structure and nomenclature
Week 6	Alkenes: synthesis and reaction
Week 7	Mid-term Exam
Week 8	Alkynes: structure, nomenclature and reaction.
Week 9	Alkyl halides: structure, nomenclature and reaction
Week 10	Amines: nomenclature
Week 11	Ethers: structure and nomenclature,
Week 12	Ethers: synthesis and reactions
Week 13	Alcohols: structure, physical and chemical properties, nomenclature
Week 14	Alcohols: Reaction and preparation
Week 15	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	**Laboratory safety**
Week 2	**Equipment and tools**
Week 3	**Determination of Melting Point**
Week 4	**Determination of Boling Point**
Week 5	**Filtration**
Week 6	**Recrystallization**
Week 7	**Sublimation**
Week 8	**Solubility**
Week 9	**Midterm exam**
Week 10	**Simple Distillation**
Week 11	**Fraction Distillation**
Week 12	**Extraction**
Week 13	**Isolation of natural product**
Week 14	**Thin Layer Chromatography (TLC)**
Week 15	**Second Midterm Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Bruice, Paula Yurkanis.Organic chemistry, University of California, Santa Barbara.8ed.2015	yes
Recommended Texts	Carey, Francis A., and Robert M. Giuliano. *Organic chemistry*. McGraw-Hill, 2017.	yes
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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Biostatistics			**Module Delivery** تملا من قبل القسم	
Module Type	Supportive			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MBt12-BS				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		1	**Semester of Delivery**		2
Administering Department		Molecular and medical biotechnology	**College**	biotechnology	
Module Leader	**Zaid Nsaif Abbas**		**e-mail**	zaid.altameemi@nahrainuniv.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		**Tabarek sabah**	**e-mail**	E-mail	
Scientific Committee Approval Date		1/10/2025	**Version Number**		1.0

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 Aims أهداف المادة الدراسية	The Statistics module aims to provide undergraduate students with a solid foundation in statistical concepts, methods, and applications. Through this module, students will develop a comprehensive understanding of the principles and techniques used in statistical analysis, data interpretation, and inference. The module will cover various statistical topics, including descriptive statistics, probability theory, hypothesis testing, regression analysis, and data visualization. Aims of Study Statistics for Undergraduate Students: • **Understanding Statistical Concepts:** The module aims to familiarize students with fundamental statistical concepts, such as population, sample, variables, measures of central tendency, and measures of dispersion. Students will learn how to describe, summarize, and analyze data using appropriate statistical techniques. • **Data Analysis and Interpretation:** The module aims to equip students with the necessary skills to collect, organize, and analyze data effectively. Students will learn how to apply statistical methods to explore relationships, patterns, and trends within datasets. They will also gain proficiency in interpreting and drawing meaningful conclusions from statistical analyses. • **Statistical Inference:** The module aims to introduce students to the principles of statistical inference, including hypothesis testing and confidence interval estimation. Students will learn how to formulate research hypotheses, select appropriate statistical tests, and make valid inferences about populations based on sample data. • **Statistical Software and Tools:** The module aims to familiarize students with commonly used statistical software and tools. Students will gain hands-on experience in using statistical software packages to perform data analysis, conduct statistical tests, and generate graphical representations of data. • **Critical Thinking and Problem-Solving:** The module aims to enhance students' critical thinking and problem-solving skills through the application of statistical methods. Students will develop the ability to identify real-world problems that can be addressed using statistical analysis and propose appropriate solutions based on data-driven evidence. • **Communication of Statistical Findings:** The module aims to improve students' ability to communicate statistical findings effectively. Students will learn how to present statistical results in a clear and concise manner, using appropriate visualizations and written explanations. They will also develop

	skills in critically evaluating and interpreting statistical information presented by others.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the Statistics module, students will be able to: 1. Demonstrate a solid understanding of fundamental statistical concepts, including population, sample, variables, measures of central tendency, and measures of dispersion. 2. Collect, organize, and analyze data using appropriate statistical methods and software tools. 3. Apply statistical techniques to describe, summarize, and interpret data, identifying relationships, patterns, and trends within datasets. 4. Formulate research hypotheses, select appropriate statistical tests, and perform hypothesis testing and confidence interval estimation. 5. Critically evaluate and interpret statistical information presented in research studies, reports, and media sources. 6. Communicate statistical findings effectively through clear and concise written and visual presentations. 7. Apply critical thinking and problem-solving skills to address real-world problems using statistical analysis and evidence-based decision making. 8. Work collaboratively in teams to design and conduct statistical studies, analyze data, and present findings. 9. Recognize the ethical considerations and limitations associated with statistical analysis and interpretation. 10. Continuously update and expand their statistical knowledge and skills to adapt to evolving research methodologies and technological advancements.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: 1. Introduction to Biostatistics 2. Data Types and Measurement Scales 3. Descriptive Statistics 4. Probability Theory 5. Statistical Inference 6. Parametric Tests 7. Non-Parametric Tests 8. Correlation and Regression 9. Survival Analysis 10. Experimental Design 11. Statistical Software

Learning and Teaching Strategies استراتيجيات التعلم والتعليم

Strategies	1. **Lectures:** Traditional classroom lectures will be used to present key concepts, theories, and statistical methods. Lectures will provide a structured overview of the topics and allow for explanations and demonstrations by the teacher. 2. **Practical Sessions:** Practical sessions will be conducted with statistical software to provide hands-on experience in data analysis and interpretation. Students will have the opportunity to apply statistical techniques to real-world datasets, perform calculations, and interpret the results. 3. **Case Studies:** Case studies involving real research scenarios and datasets will be discussed to illustrate the application of statistical methods in the field of biostatistics. Students will analyze the data, identify appropriate statistical tests, and interpret the findings. 4. **Group Discussions:** Group discussions will be encouraged to promote active learning and critical thinking. Students can share their understanding of statistical concepts, discuss complex problems, and explore different perspectives on statistical analyses. 5. **Practical Assignments:** Assignments will be given to students to solve statistical problems and conduct data analyses independently. These assignments will reinforce the learning outcomes and provide opportunities for students to practice their skills. 6. **Online Resources:** Online resources such as video tutorials, interactive quizzes, and reading materials will be provided to supplement classroom learning. These resources can be accessed at any time, allowing students to review concepts and practice statistical techniques at their own pace. 7. **Formative Feedback:** Regular formative assessments, such as quizzes or in-class exercises, will be conducted to monitor students' progress and provide feedback on their understanding of statistical concepts. This will help identify areas that require further clarification or reinforcement. 8. **Individual Consultations:** Individual consultations with the instructor will be available to address specific questions or concerns regarding statistical concepts, calculations, or data analysis techniques. This personalized support can assist students in overcoming challenges and clarifying their understanding.

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	

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 12	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 9	LO # 3, 4, 6 and 10
	Onsite Assignments	1	10% (10)	12	1-11
	Report	1	10% (10)	10	LO # 5, 8 and 14
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Biostatistics
Week 2	Description and Presentation of Numerical Data
Week 3	Description and Presentation of Numerical Data (tutorial)
Week 4	Description and Presentation of Categorical Data
Week 5	Description and Presentation of Categorical Data (tutorial)
Week 6	Probability

Week 7	Estimation
Week 8	Midterm Exam
Week 9	Hypothesis Testing
Week 10	Sampling Techniques
Week 11	Inferential Statistics
Week 12	T-test and Chi Square Distribution
Week 13	Analysis of Variance (ANOVA)
Week 14	Correlation and Linear Regression
Week 15	Measure of Association and Impact
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• **Biostatistics: A Foundation for Analysis in the Health Sciences** Daniel WW, Cross CL. *Biostatistics: A Foundation for Analysis in the Health Sciences.* 11th ed. Wiley; 2018.	Yes
Recommended Texts	• **Biostatistics: The Bare Essentials** Norman GR, Streiner DL. *Biostatistics: The Bare Essentials.* 4th ed. PMPH-USA; 2014.	No
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group	**A –** Excellent	امتياز	90 - 100	Outstanding Performance
(50 - 100)	**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	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
(0 – 49)	**F –** Fail	راسب	(0-44)	Considerable amount of work required

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	اللغة العربية		**Module Delivery** • ☒ Theory • ☒ Lecture • ☐Lab • ☐ Tutorial • ☐ Practical • ☒Seminar
Module Type	Basic		
Module Code	URARA		
ECTS Credits	2		
SWL (hr/sem)	50		
Module Level		**Semester of Delivery**	2
Administering Department	Department of molecular and medical biotechnology	**College**	College of Biotechnology
Module Leader	مجد رحمن	**e-mail**	mohammed.rahman@nahrainuniv.edu.iq
Module Leader's Acad. Title	Lecture	**Module Leader's Qualification**	Ph.D
Module Tutor	None	**e-mail**	E-mail
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	1.10.2025	**Version Number**	1.0

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 Aims **أهداف المادة الدراسية**	هدف دراسة مادة حقوق اللغة العربية يتمثل في تعزيز الفهم والوعي باللغة العربية. هناك بعض الأهداف الرئيسية لدراسة هذه المادة: 1. فهم اللغة العربية: تعريف ومقدمة عن اللغة العربية ومراحل تشكلها، واطلاع الطلبة على الأدب عبر العصور. 2 .تعريف الطلبة على الجوانب اللغوية والادبية غير المدروسة سابقا، او تغذيتهم بالمستحدث منها، والغاية الرئيسة هي الثقافة اللغوية والادبية كونهم اقسام غير التخصص الدقيق، عليه كان الهدف الرئيس هو تجاوز الاخطاء اللغوية وتصحيح المعلومات اللغوية والادبية قدر المستطاع 3 .العمل على بناء شخصية متميزة للطالب من خلال تطوير الوعي الثقافي والاجتماعي بما يؤهله بعد التخرج من المساهمة الفعالة في خدمة مجتمعه. 4. السعي الدائم في البحث عن كل ما هو حديث في مجالات اللغة، وتعريف الطالب بمفاتيح اللغة التي توصله الى الكتابة والنطق السليم 5. ليكون خريج البكالوريوس قادرا على الكتابة الصحيحة وتعميق المفاهيم اللغوية والادبية 6. فضلا عن القدرة على التعامل مع اللغة والاخذ والعطاء مع الاخر بعقول ناضجة لغة، بما يؤمن سالمة الكتابة والنطق على مستوى عالٍ من الدقة
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	تعمل جامعة النهرين من خلال تدريس اللغة العربية لتعزيز التثقيف والتوعية وتعريف الطلبة على اهمية اللغة العربية وادابها لما تمثله اللغة العربية من اهمية بالغة في الحياة الدينية والعملية وتكريس القيم والمعتقدات والمواقف التي تشجع جميع الطلبة على معرفة التراث اللغوي والحضاري والديني والثقافي ، كما أنه يتيح فهماً للمسؤولية المشتركة لهذه الشريحة جعل العربية وادابها أمراً واقعاً يعايشونه ويتسلحون بالمعارف والمهارات اللغوية والمواقف التي تمكنهم من إدراك المفاهيم العلمية والادبية
Indicative Contents **المحتويات الإرشادية**	• المعرفة والفهم • فهم اساليب الكتابة الصحيحة • تقديم مفاتيح ختامية للتخلص من الاخطاء او تجنبها قدر المستطاع • مراجعة المادة السابقة • فسح المجال للمناقشة لمعرفة مدى الاستجابة ومواطن الضعف • معرفة التطور التاريخي للغة العربية والتطور الذي مر به الادب العربي • دراسة مصادر اللغة العربية والادبية • دراسة المفاهيم والمصطلحات اللغوية والادبية

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**			
Strategies	5. POWERPOINT 6. كتابة التقارير 7. التعلم عبر الانترنيت 8. زيارات ميدانية		
Student Workload (SWL) **الحمل الدراسي للطالب**			
Structured SWL (h/sem)		**Structured SWL (h/w)** **الحمل الدراسي المنتظم للطالب أسبوعيا**	

الحمل الدراسي المنتظم للطالب خلال الفصل			
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			

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 8 and 9
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Seminar	1	10% (10)	11	LO # 5, 8 and 10
	Report	1	10%	13	1-12
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	اقسام الكلام (الاسم، الفعل، الحرف)المبتدأ والخبر
Week 2	كان واخواتها، ان واخواتها
Week 3	المثنى والملحق به، جمع المذكر السالم والملحق به، جمع المؤنث السالم والملحق به
Week 4	بناء الفعل الماضى، بناء فعل الامر
Week 5	الفعل المضارع بناؤه واعرابه
Week 6	الاسماء المنصوبة

Week 7	الشعر / نازك الملائكة
Week 8	محمد مهدي الجواهري
Week 9	الاملاء/ كتابة الهمزة الوصل والقطع
Week 10	الهمزة المتوسطة والمتطرفة
Week 11	كتابة الضاد والظاء
Week 12	كتابة التاء القصيرة والطويلة
Week 13	علامات الترقيم وقاعدة الالف الفارقة
Week 14	كتابة العدد
Week 15	القران الكريم/ سورة يس

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	د. طه محسن، النحو الادبي ودروس العربية، 2022	نعم
Recommended Texts	د. محمد الطريحي، موسوعة النحو والادب والبلاغة والعروض، 2004	لا
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

Second Level –Semester-3

ECTS	عدد الساعات			الرمز	Subject	الموضوع	ت
	SWL hr/sem	USSWL hr/sem	SSWL hr/sem				
6.00	150	71	79	MBt21-HE	Histology and Embryology	علم الانسجة والاجنة	1
6.00	150	71	79	CRBt-BcI	Biochemistry	الكيمياء الحياتيةI	2
6.00	150	71	79	MBt21-PG	Principles of Genetics	مبادئ علم الوراثة	3
6.00	150	71	79	MBt21-GM	General Microbiology	احياء مجهرية عام	4
2.00	50	17	33	MBt21-BRM	Biosafety and Risk management	السلامة الاحيائية وادارة المخاطر	5
2.00	50	17	33	URBRC	Baath Regime crimes	جرائم حزب البعث	6
2.00	50	17	33	URENG2	New Headway plus Pre-Intermediate	اللغة الانكليزية	7
30	750	المجموع					

Level-2 / Semester-4

ECTS	عدد الساعات			Module Code	Subject	الموضوع	ت
	SWL hr/sem	SSWL hr/sem	SSWL hr/sem				
4.00	100	21	79	MBt22-AP	Animal Physiology	فسلجة حيوانية	1
6.00	150	71	79	CRBt-BcII	Biochemistry11	الكيمياء الحياتيةII	2
6.00	150	71	79	MBt22-MM	Medical Microbiology	احياء مجهرية طبية	3
4.00	100	21	79	MBt22-MG	Microbial Genetics	وراثة احياء مجهرية	4
3.00	75	11	64	URCOM2	ComputerII	الحاسوب 2	5
5.00	125	46	79	MBt22-Ps	Parasitology	علم الطفيليات	6
2.00	50	17	33	URARA2	Arabic language-II	اللغة العربية 2	7
30	750	المجموع					

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Histology&Embryology			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MBt-21-HE				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		2	**Semester of Delivery**		3
Administering Department		**Department of molecular and medical biotechnology**	**College**	**biotechnology**	
Module Leader	Dr: Zina Fawzi. AL-obaidi		**e-mail**	zena.alobaeady@nahrainuniv.edu.iq	
Module Leader's Acad. Title		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		1/10/2025	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	General biology	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• Covering the basics of histology. • Full understanding of histology, how to cut tissue and make smears from tissues, • how tissues work in the human body at the functional level. Study the tissue preparation • Understand and appreciate the field of embryology and fetal development • Understand and appreciate the diversity and usefulness of embryonic techniques. • Understanding embryology in human embryos and the possibility of using modern applications of IVF technology
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- called microscopic anatomy and histochemistry, 2- histology allows for the visualization of tissue structure and characteristic changes the tissue may have undergone. Because of this, it is utilized in medical diagnosis, scientific study, autopsy, and forensic investigation. 3- Histology is the study of the tissues as well as the structures that are associated with the tissues. This form of study proves to be really important when it comes to understanding the complexity of the tissue structure in the human body 4- The student will be able to determine the abnormalities of the human system and organs under a microscope, but will recognize the developmental stages of the face, jaw and neck, as well as the sensory 5- help understand the causes of variations in humans and it offers an understanding of normal development and malformations 6- starting with the formation of gametes, fertilization, formation of the zygote, development of the embryo and fetus, and ending with the birth of a new person
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1-The first stage in the development of a fetus is fertilization – the process by which the male sperm and female egg join together 2-the fertilized oocyte (egg) splits into two cells of equal size; called blastomeres. 3-the group of cells is referred to as the morula. 4-This subject involves all aspects of tissue biology, with the focus on how cells' structure and arrangement optimize functions specific to each organ

	5-The study of tissues and cells under a microscope 6-There are 4 basic types of tissue: connective tissue, epithelial tissue, muscular tissues and nervous tissue

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students. Examine the Tissues under microscope Study the main stages of embryonic development Explain the the assistant reproductive system such as IVF,IUI

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction of Embryology
Week 2	Spermatogenesis& oogenesis
Week 3	Cell division
Week 4	Neuralation
Week 5	Fertilization
Week 6	Mid-term Exam
Week 7	Introduction of histology
Week 8	Epithelial tissue
Week 9	Transitional epithelial

Week 10	simple epithelial tissue+ Stratified epithelial tissue
Week 11	Pseudostratified epithelial tissue
Week 12	Mid-term Exam
Week 13	Egg layers
Week 14	Embryo implantation
Week 15	Connective tissue
Week 16	**final Exam**

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Introduction of histology
Week 2	Epithelial tissue
Week 3	Transitional epithelial
Week 4	simple epithelial tissue
Week 5	Stratified epithelial tissue
Week 6	Psuedostrtiefied epithelial tissue
Week 7	Mid-term Exam
Week 8	Introduction to embryology
Week 9	Gametogenesis
Week 10	Fertilization and Morula formation
Week 11	Blastocyst Implantation
Week 12	Development of placenta

Week 13	Gastrulation
	Mid exam
Week 14	Introduction to embryology
Week 15	Gametogenesis
Week 16	Fertilization and Morula formation

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education	Yes
Recommended Texts	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

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

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	General microbiology			**Module Delivery**	
Module Type	Core			☒ **Theory** **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MBt21-GM				
ECTS Credits	6				
SWL (hr/sem)	**150**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	**Department of molecular and medical biotechnology**		**College**	**Biotechnology**	
Module Leader	Dr.Bushra hindi Saleh Asst. prof. Dr. Dhufar		**e-mail**	Bushra.aftan@nahrainuniv.edu.iq dhafar.alugaili@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Assist.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	1/10/2025		**Version Number**	1.0	

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 Aims أهداف المادة الدراسية	• Provide students with the knowledge and information about the principles of General microbiology ,Classification of M.O • Study prokaryotic structure and function, differences between prokaryotic and Eukaryotic , • Study the most important process occurs inside cell like respiration , nutrition and metabolism. • Learning students the methods of sterilization . • Study the role of antiseptic and detergent in control the growth of M.O. • (Mycology):The main aim of this module is to provide you with an understanding of fundamental principles in medical mycology and fungal immunology. After an introduction to key concepts in the field, you will be taught about the nature of fungal infections, state-of-the-art research approaches that are being applied to dissect molecular mechanisms underlying fungal pathogenesis, the processes that underlie antifungal immunity, and how fungal infections are treated in the clinic. The module will also provide basic training in aseptic technique, safe handling and culture of pathogenic fungi, molecular tools, immunology, cytometry and bioinformatics tools. In addition to learning about this clinically important field, you will engage with original research literature, develop research level critical thinking skills in in medical mycology and fungal immunology, and learn to communicate complex ideas to both groups and individuals.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Understand the principles of microbiology. • Recognize the differences between prokaryotic and Eukaryotic cells. • Define metabolism and learn differences between anabolism and catabolism. • Identify the nutritional types of M.o.and recognize the transport system in bacteria • Discuss the respiration and recognize differences between catabolism and anabolism. • Identify the virus, structure of virus ,most important viruses , replication
Indicative Contents	Indicative content includes the following.

المحتويات الإرشادية	Part A – principles of general microbiology Discovery of microbes , microbes classification. Prokaryotic cell, Eukaryotic cell, structure and function. Microbial nutrition, macro element, micro elements, autotroph, heterotroph. microbial transport system ,active transport, passive transport Part B – Major process Metabolism of cell, anabolism ,catabolism Growth curve, changes during each phase of growth curve Respiration, aerobic respiration, anaerobic respiration

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the classes, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive tutorials and by considering type of simple experiments interesting to the students and help them in identification of bacteria through learn different staining technique and other important test.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Growth curve of bacteria ,factors influence on growth curve
Week 2	Bacterial nutrition, major elements required for growth of microorganism ,classification of microorganism according to their nutrition.
Week 3	Transport system in bacteria , active transport, passive transport, Facilitated diffusion compares between them .
Week 4	Respirations ,aerobic respiration ,Krebs cycle , Anaerobic respiration and fermentation
Week 5	Metabolism, catabolism, anabolism
Week 6	Antibiotics, definition ,classification, Antiseptic and detergents, their types and mode of actions

Week 7	Viruses, Classification of virus according nucleocapsid, types of nucleic acid. Replication of viruses
Week 8	**Mid exam**
Week 9	Transpiration
Week 10	Phototropism and Photoperiodism
Week 11	Plant secondary compounds
Week 12	Flowering plant reproduction
Week 13	Primary growth
Week 14	Secondary growth in plant
Week 15	Plant cell division In general
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction about apparatus and tools in lab
Week 2	Lab 2: Types of microscope
Week 3	Lab 3: Types of culture media ,preparation of culture media
Week 4	Lab 4: Method of microbial culture
Week 5	Lab 5: Methods for counting of bacteria
Week 6	Lab 6: Types of stain
Week 7	**Lab 7: Mid exam**
Week 8	Lab 8 :Simple stain
Week 9	Lab 9: Negative stain

Week 10	Lab 10:Gram stain
Week 11	Lab 11:Acid fast stain
Week 12	Lab12: Capsule stain
Week 13	Lab 13:Biological control
Week 14	Lab 14:Antibiotic sensitivity test
Week 15	Lab 15: Preparation of bacterial culture in compared with MacFarlands tubes.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Ogunseilan,O.Microbial Diversity,form and function in prokaryotic.1st(ed.).Blackwell. USA	No
Recommended Texts	Schaechingter,M.;Ingraham,J. L .and Neidhardt ,F.C. ,F.CMicrobe.1st(ed.).ASMpress. Washington.chapter.	No
Websites	https://www.ncbi.nlm.nih.gov/books/NBK7627/	

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Biochemistry			**Module Delivery**	
Module Type	**Suport**			☒ **Theory** **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CRBt-BcI				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	**Department of molecular and medical biotechnology**		**College**	**Biotechnology**	
Module Leader	د. مصطفى قحطان سمين مصطفى		**e-mail**	Mustafa.kahtan@ced.nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**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	1/10/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**Analytical Chemistry** **Organic Chemistry**	**Semester**	1 2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشاديۃ

Module Aims أهداف المادة الدراسية	• Biochemistry is an introductory module providing the essentials for understanding all living processes. • This module aims to teach core concepts in biochemistry including topics on structure of proteins, enzyme kinetics and metabolic pathways. • The module will also provide a background to fundamental aspects of chemistry. This module provides the core knowledge and skills to enhance performance in the area of biological chemistry. • Understand how the chemical properties of molecules determine the ways in which they interact and react with each other. • Understand different types of chemical reactions and how they are used by living organisms. • Use a variety of models to understand and explain chemical and biochemical phenomena, being aware of their strengths and weaknesses. • Develop effective and safe chemical and biochemical laboratory skills that require use of the methods and instrumentation of modern biochemistry.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Explain the basic concepts of biochemistry. • Recall the range and structures of biological molecules. • Summarize the relationship between chemical structure and biological function. • Identify metabolic pathways. • Communicate key practical skills relating specifically to biochemistry.
Indicative Contents المحتويات الإرشادية	<u>Chemistry of Carbohydrates:</u> Definition, structure, types, and functions of carbohydrates. <u>Chemistry of Lipids:</u> Definition, structure, types, and functions of lipids. <u>Chemistry of proteins:</u> Definition, amino acids types and structure, peptide bond, polypeptides, primary, secondary, tertiary and quaternary structure of proteins, types of proteins, and functions of proteins. <u>Enzymes:</u> Definition, structure, classes, mechanism of enzyme action, Michaelis–Menten

	constant, theories of enzyme-substrate interaction, cofactors and coenzymes, factors affecting enzyme action, inhibitors and enzyme inhibition, allosteric enzymes, isozymes. Nucleic acids: DNA and RNA, definition, structure, types, and function. In addition to replication, transcription, and translation. Carbohydrates metabolism: Composition of dietary carbohydrates, digestion of carbohydrates, glucose intolerance, glycolysis, TCA cycle, glycogenesis, glycogenolysis, gluconeogenesis, cori cycle, pentose phosphate pathway, regulation of blood glucose. Lipids metabolism: Composition of dietary lipids, digestion of lipids, beta oxidation of fatty acids, ketone bodies, atherosclerosis. Proteins metabolism: Digestion and absorption of proteins, gastric juice, digestion by pancreatic enzymes, digestion by intestinal enzymes, protein turnover, nitrogen balance, catabolism of amino acids, urea cycle and blood urea.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by practical experiments at the laboratory involving the different aspects of biochemistry.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem)	79	**Structured SWL (h/w)**	5

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Chemistry of carbohydrates 1
Week 2	Chemistry of carbohydrates 2

Week 3	Chemistry of lipids 1
Week 4	Chemistry of lipids 2
Week 5	Chemistry of amino acids and proteins 1
Week 6	Chemistry of amino acids and proteins 2
Week 7	Mid-term Exam
Week 8	Enzymes 1
Week 9	Enzymes 2
Week 10	Chemistry of nucleic acids
Week 11	Nucleic acids: Replication, transcription, and translation
Week 12	Carbohydrates metabolism
Week 13	Lipids metabolism
Week 14	Proteins metabolism 1
Week 15	Proteins metabolism 2
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Spectrophotometry
Week 2	Carbohydrates (Molisch test, Sellwanoff's test
Week 3	Carbohydrates (Benedicts and osazone tests)
Week 4	Carbohydrates (Nelson-Somogi method, sumner's method, Barfoed and Bials tests)

Week 5	Estimation of reducing and non-reducing sugars (ferricyanide method for reducing sugars)
Week 6	Glycogen isolation and hydrolysis
Week 7	Lipids and fatty acids tests
Week 8	Quantitative determination of amino acids (Ninhydrin test)
Week 9	Mid-term Exam
Week 10	Quantitative determination of proteins (Biuret method)
Week 11	Proteins (Folin-Lowry method)
Week 12	Proteins (Bradford method)
Week 13	Nucleic acids (Extraction of total nucleic acids)
Week 14	The isolation of DNA
Week 15	The isolation of RNA
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	**Lehninger Principles of Biochemistry** • Authors: David L. Nelson, Michael M. Cox • Publisher: W.H. Freeman • Edition: 8th (2021	Yes
Recommended Texts	**Biochemistry** • Authors: Donald Voet and Judith G. Voet • Publisher: Wiley • Edition: 5th (201	No
Websites	https://www.ncbi.nlm.nih.gov/	

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Principle of Genetics			**Module Delivery**	
Module Type	Core			☒ **Theory** **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MBt21-PG				
ECTS Credits	6				
SWL (hr/sem)	**150**				
Module Level		2	**Semester of Delivery**		3
Administering Department		**Department of molecular and medical biotechnology**	**College**	**Biotechnology**	
Module Leader	Dr.Ruqaia Mohammed Dr. Farah t.Orabi		**e-mail**	ruqaia.alezzy @nahrainuniv.edu.iq	
Module Leader's Acad. Title		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		1/10/2025	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• Provide students with the knowledge and information about the principles of genetics • Study DNA and RNA structure • Study Mendels principle, cell cycle , cell division • The main aim of this module is to provide you with an understanding of fundamental principles in genetics. After an introduction to key concepts in the field, you will be taught about DNA structure and disease associated with defects in DNA repair system.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Understand the principles of genetics. • Recognize the differences between DNA and RNA structure . • Define Mendel's role. • Knowledge about cell cycle and division
Indicative Contents المحتويات الإرشادية	**This course is intended to give the students an understanding of the principles of genetics by studying the nature of inheritance within a conceptual framework.**

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the classes, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive tutorials and by considering type of simple experiments interesting to the students

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to genetics
Week 2	DNA: Components and Structure
Week 3	Mendel's Principles(I)
Week 4	Mendel's Principles(II)
Week 5	Cell Cycle, Mitosis and Meiosis

Week 6	Sex Determination, Sex Linkage
Week 7	Dosage Compensation
Week 8	**Mid exam**
Week 9	Sex linked Genes in Human Beings
Week 10	Pedigree Analysis
Week 11	Eukaryotic Chromosomes
Week 12	Chromosomal Banding
Week 13	The Non Mendelian Inheritance
Week 14	Disease associated with genetics abnormality
Week 15	DNA repair system
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to basic of genetic,
Week 2	Lab 2: DNA Structure, genetic units
Week 3	Lab 3: Genotype and phenotype
Week 4	Lab 4: Genetic transport (show slide of meiosis)
Week 5	Lab 5: Application of Mendel's Principles(I)
Week 6	Lab 6: Application of Mendel's Principles (II)
Week 7	**Lab 7: Mid exam**

Week 8	Lab 8: blood group inheritance
Week 9	Lab 9: inheritance patterns part I
Week 10	Lab 10: Inheritance patterns part II
Week 11	Lab 11: inheritance tests
Week 12	Lab12: Mid exam
Week 13	Lab 13: reports discussion
Week 14	Lab 14: reports discussion
Week 15	Lab 15: Preparation for final exam.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	The Language of Life: DNA and the Revolution in Personalized Medicine" by Francis Collins. "DNA: The Secret of Life" by James D. ... "The Gene: An Intimate History" by Siddhartha Mukherjee.	No
Recommended Texts	Best genetics textbook Human Genetics and Genomics, Includes Wiley E-Text, 4th	No
Websites	https://www.wiley.com › en-gb › Human+Genetics+and+...	

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Bio-Safety and Risk Assessments معلومات المادة الدراسية					
Module Title	**Bio-Safety and Risk Assessments**			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MBt21-BRM				
ECTS Credits	2				
SWL (hr/sem)	3				
Module Level	2		**Semester of Delivery**	3	
Administering Department	Molecular &Medical biotechnology		**College**	Biotechnology	
Module Leader	Prof. Dr. Ali Zaid Al-Saffar		**e-mail**	ali.saffar@nahrainuniv.edu.iq	
Module Leader's Acad. Title	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	1/10/2025		**Version Number**	1.0	

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 Aims	

أهداف المادة الدراسية	• Understand the fundamental principles of bio-safety and risk assessment in various laboratory and research settings. • Gain knowledge of the potential hazards associated with biological agents and genetically modified organisms (GMOs). • Learn about the legal and regulatory frameworks governing bio-safety and risk assessment. • Explore different levels of bio-safety containment and their corresponding practices and requirements. • Develop skills to identify and assess potential risks in laboratory procedures and experimental protocols. • Understand the principles and techniques of risk assessment, including hazard identification, exposure assessment, and risk characterization. • Learn about the importance of implementing appropriate control measures and safety protocols to mitigate risks. • Develop critical thinking and problem-solving skills to address bio-safety challenges effectively. • Understand the ethical considerations and responsibilities associated with bio-safety and risk assessment. • Gain practical knowledge of emergency response procedures and contingency planning for bio-safety incidents.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Demonstrate a comprehensive understanding of the principles and concepts of bio-safety and risk assessment in laboratory and research environments. • Identify and assess potential hazards associated with biological agents, including pathogens and genetically modified organisms (GMOs). • Apply knowledge of legal and regulatory frameworks to ensure compliance with bio-safety guidelines and protocols. • Conduct thorough risk assessments, including hazard identification, exposure assessment, and risk characterization. • Develop effective control measures and safety protocols to mitigate risks and protect personnel and the environment. • Apply critical thinking and problem-solving skills to address bio-safety challenges and make informed decisions. • Demonstrate ethical responsibility in handling biohazardous materials and

	communicating potential risks. • Participate in emergency response procedures and implement contingency plans for bio-safety incidents. • Collaborate effectively with colleagues to promote a culture of bio-safety and risk management. • Continuously update knowledge and skills in bio-safety through ongoing professional development and research.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to Bio-Safety: Definition and importance of bio-safety in laboratory and research settings. Historical incidents and lessons learned in bio-safety. Classification of Bio-Hazardous Agents: Different categories and levels of bio-hazardous agents. Characteristics and risks associated with each category. Legal and Regulatory Framework: International, national, and local regulations and guidelines for bio-safety. Compliance requirements and responsibilities. Risk Assessment Principles: Hazard identification: identification of potential hazards and risks in laboratory procedures. Exposure assessment: evaluation of the likelihood and extent of exposure to bio-hazardous agents. Risk characterization: assessment of the severity and consequences of identified risks. Bio-Safety Levels and Practices: Bio-Safety Level (BSL) classifications and their corresponding containment practices. Standard operating procedures (SOPs) for handling bio-hazardous agents at different BSLs. Personal protective equipment (PPE) and engineering controls. Bio-Safety in Genetically Modified Organisms (GMOs): Risks and regulations associated with GMOs in research and industrial applications.

	Containment strategies and practices for handling GMOs. Control Measures and Safety Protocols: Implementation of bio-safety measures, including facility design, access control, and waste management. Decontamination procedures and methods for sterilization and disinfection. Emergency response planning and protocols for bio-safety incidents. Ethical Considerations in Bio-Safety: Responsible conduct of research and ethical responsibilities in bio-safety practices. Communication of risks to stakeholders and public awareness of bio-safety issues. Auditing and Monitoring: Internal and external audits for bio-safety compliance. Ongoing monitoring and evaluation of bio-safety practices and protocols. Professional Development and Training: Ongoing education and training programs for bio-safety personnel. Continual improvement and staying updated with emerging bio-safety practices.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
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	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Project	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Principles of Biological Safety; and Biosafety Course Resources
Week 2	Laboratory-acquired Infections; Routes of exposure
Week 3	Good Laboratory Practices (BSL1 and -2 requirements)

Week 4	Risk Groups (1-4) and Biological Safety Levels (BSL1-4)
Week 5	Biological Safety Cabinets (BSC-I, II, III)
Week 6	Regulations, Standards, and Guidelines Applicable to Biological Safety
Week 7	Mid-Course Exam
Week 8	Risk Assessment, Biosafety Program Management
Week 9	Controls in Biological safety:
Week 10	I: Facility Design and Containment Equipment
Week 11	II Personal Protective Equipment (PPE)
Week 12	Decontamination, Spills, and Waste Management
Week 13	Biosecurity and Select Agents
Week 14	Biosafety Level 3 and 4 Containments
Week 15	Human Gene Transfer and Animal Biosafety
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Biosafety in Microbiological and Biomedical Laboratories (BMBL) 5th edition.	No (Available as an e-book)
Recommended Texts	Biosecurity: Understanding, Assessing, and Preventing the Threat. Editor(s): Ryan Burnette. 2013. Edition, Leboffe and Pierce.	No (Available as an e-book)
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Microbial Genetics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MBt22-MG**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	**2**		**Semester of Delivery**	**4**	
Administering Department	**Molecular and Medical Biotechnology**		**College**	**Biotechnology**	
Module Leader	dhafar.alugaili		**e-mail**	dhafar.alugaili@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	PhD	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	1/9/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Principle of Genetics	**Semester**	4
Co-requisites module	None	**Semester**	None

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	This course will provide an inquiry based study of prokaryotic genetics. Emphasis will be placed on the advances in microbial genetics and effects on technological and medical advances.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the course students will be able to: □ Demonstrate proficiency in summarizing and paraphrasing simple scientific topics as they relate to life. □ Demonstrate proficient application of the steps of the scientific method. □ Learn how to analyze data and generate scientific conclusions. □ Perform accurate metric measurements. □ Use a compound microscope and a dissecting microscope. □ Master the art of writing concise and coherent lab reports. □ Design and execute an independent research project.
Indicative Contents المحتويات الإرشادية	The number of teaching units are three units which consists of approximately 14-15 week timetabled study over a two hours lecturing with a two-hour practical laboratory every week. The teaching methods involve interactive/active learning lectures, videos, tutorial sessions, laboratory classes and homework assignment 15 hours will be independent or self-directed study.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1. **Lectures** – Traditional classroom lectures delivered by the instructor to explain core concepts and theories. 2. **PowerPoint Presentations** – Use of multimedia presentations to enhance visualization, provide diagrams, animations, and summary tables for complex topics. 3. **Assignments and Tutorials** – Weekly homework assignments and small-group discussion sessions to reinforce understanding and problem-solving skills.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered

Week 1	Introduction
Week 2	Why study Prokaryotic genetics?
Week 3	DNA as the genetic material
Week 4	Genetic exchange in bacteria
Week 5	Bacterial transformation
Week 6	Bacterial conjugation
Week 7	Transduction
Week 8	Transposable genetic elements
Week 9	Midterm exam
Week 10	Mutations as the raw material of genetic variation
Week 11	Genetic repair system in prokaryote (DNA damage and mutation)
Week 12	Protoplast formation in microorganisms
Week 13	Operons
Week 14	Regulation of gene expression
Week 15	Genetically modified organisms (GMOs)

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to Microbial Genetics Laboratory : - Lab safety protocols and guidelines. - Introduction to lab equipment (micropipettes, centrifuges, PCR machines, etc.). - Aseptic techniques and sterile handling of microbial cultures.

Week 2	Why Study Prokaryotic Genetics? - Observation of prokaryotic diversity under the microscope (Gram staining). - Culturing bacteria on selective and differential media. - Discussion: Importance of prokaryotic genetics in biotechnology, medicine, and environmental science.
Week 3	DNA as the Genetic Material: - Isolation of genomic DNA from *E. coli* or another model bacterium. - Quantification and quality assessment of DNA using spectrophotometry or gel electrophoresis. - Discussion: Historical experiments proving DNA as the genetic material (Avery-MacLeod-McCarty experiment).
Week 4	Genetic Exchange in Bacteria - Demonstration of horizontal gene transfer mechanisms (transformation, conjugation, transduction). - Preparation of competent cells for transformation (to be used in Week 5). - Discussion: Natural genetic exchange and its role in bacterial evolution.
Week 5	Bacterial Transformation: - Transformation of competent *E. coli* cells with a plasmid containing an antibiotic resistance gene. - Selection of transformants on antibiotic-containing plates. - Analysis of transformation efficiency.
Week 6	Transposable Genetic Elements - Detection of transposons in bacterial genomes using PCR or gel electrophoresis. - Discussion: Role of transposable elements in antibiotic resistance and genome evolution.
Week 7	Midterm Exam
Week 8	Bacterial Conjugation: - Demonstration of conjugation using donor (F+) and recipient (F-) strains of E. coli. - Selection of transconjugants on selective media. - Discussion: Role of plasmids in bacterial conjugation.

Week 9	Mutations as the Raw Material of Genetic Variation: - Inducing mutations in *E. coli* using UV radiation or chemical mutagens. - Selection and screening of mutants (e.g., antibiotic resistance or auxotrophy). - Discussion: Role of mutations in genetic diversity and adaptation.
Week 10	Genetic Repair Systems in Prokaryotes - Demonstration of DNA repair mechanisms using UV-induced DNA damage. - Comparison of survival rates of repair-proficient and repair-deficient strains. - Discussion: Importance of DNA repair systems in maintaining genomic integrity.
Week 11	Protoplast Formation in Microorganisms - Preparation of protoplasts from Gram-positive bacteria (e.g., *Bacillus subtilis*). - Observation of protoplasts under the microscope. - Discussion: Applications of protoplasts in genetic engineering.
Week 12	Operons - Study of the lac operon in *E. coli*: Induction with IPTG and observation of β-galactosidase activity. - Discussion: Regulation of gene expression in prokaryotes.
Week 13	Regulation of Gene Expression - Experiment: Analysis of gene expression under different environmental conditions (e.g., nutrient availability). - Use of reporter genes (e.g., GFP) to monitor gene expression. - Discussion: Transcriptional and post-transcriptional regulation in prokaryotes.
Week 14	Genetically Modified Organisms (GMOs) - Demonstration of creating a GMO: Cloning a gene into a plasmid and transforming *E. coli*. - Ethical and safety considerations in GMO research. - Final discussion: Applications of microbial genetics in biotechnology and medicine.
Week 15	Nano Drop spectrophotometer

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Genetics. Bengamin A. pierce. Sixth edition. W.H. freeman	
Recommended Texts	**Molecular Genetics of Bacteria. Fifth Edition.** Tina M. Henkin and Joseph E. Peters (Successors to Larry Snyder and Wendy Champness) Wiley-Liss (ASM Press) September 2022	
Websites	NATIONAL CENTER FOR BIOTECHNOLOGY INFORMATION (NCBI): http://www.ncbi.nlm.nih.gov/.	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Animal physiology			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MBt22_AP**				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	2		**Semester of Delivery**	4	
Administering Department	Medical and Mol. Biotechnology		**College**	Collage of Biotechnology	
Module Leader	Dr: Zina Fawzi. AL-obaidi		**e-mail**	zena.alobaeady@nahrainuniv.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	1/9/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	General biology	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• animal can physiologically adapt to a new habitat. For example, a fox may adapt to extreme heat in order to survive in the environment. Most animals physiologically adapt by developing means for protection, body temperature regulation and predation. • physiological responses are changes in heart rate, a higher respiration rate, sweating, changes in body temperature and changes in blood pressure. • Physiology deals respectively with the functions of those anatomical parts and the chemical processes involved. This is the basic subject for all electrical and electronic circuits. • physiological enquiry focuses on the human body as an entire structure, all the way down to the single cellular component. Anatomy and physiology represent two complementary approaches in biological science • physiological needs are physical things needed for human survival and proper functioning of the human body.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Most animals physiologically adapt by developing means for protection, body temperature regulation and predation. • The HPA system releases cortisol, corticotrophin-releasing hormone and other hormones for relieving a person's emotional or physical stress, according to the Centers for Disease Control and Prevention Summarize what is meant by a basic electric circuit. • Physiological activity refers to the normal function of an organism. It may refer to specific organs or the organism as a whole. Describe electrical power, charge, and current. • Define Osmoregulation • Identify the Thermoregulation in heat and cold • Discuss the operations of sinusoid and phasors in an electric circuit. • Discuss physical things needed for human survival and proper functioning of the human body. • learn about all of the major systems of the body, and how they work together to keep the body functioning at its best. • Identify introduction to the discipline of anatomy and physiology.

Indicative Contents المحتويات الإرشادية	Osmoregulation, Thermoregulation, Homeostasis, Adaptation , respiration, Gas Exchange, Blood physiology, skeletal and Reproductive physiology

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1-The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of 2-simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11

assessment	**Assignments**	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction
Week 2	General physiology
Week 3	Osmoregulation
Week 4	Circulatory system
Week 5	Exchange/Respiration
Week 6	Thermoregulation
Week 7	Mid-term Exam 1
Week 8	The Digestive system physiology
Week 9	The Urinary system physiology
Week 10	Muscle system physiology
Week 11	Human Reproductive physiology
Week 12	Human Reproductive Hormones
Week 13	Mid-term Exam 2

Week 14	Blood physiology
Week 15	Neuron physiology
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Cell membrane function
Week 2	Type of cell
Week 3	Complete blood unite
Week 4	Synthesis and functions of hemoglobin
Week 5	Types of hemoglobin
Week 6	Hematocrit blood test
Week 7	Mid-term Exam 1
Week 8	Red blood cells counts
Week 9	White blood cell and types
Week 10	White blood cell counts
Week 11	Erythrocyte sedimentation rate
Week 12	Bleeding time
Week 13	Clotting time
Week 14	Blood pressure measure
Week 15	Platelet count

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**Animal Physiology** • **Authors:** Richard W. Hill, Gordon A. Wyse, Margaret Anderson • **Publisher:** Sinauer Associates / Oxford University Press • **Edition:** 4th (2022	Yes
Recommended Texts	**Comparative Animal Physiology** • **Authors:** C.L. Prosser and F.A. Brown • **Publisher:** Saunders	No
Websites	https://www.ncbi.nlm.nih.gov/books	

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Medical microbiology			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MBt22-MM				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	2		**Semester of Delivery**	4	
Administering Department	**Department of molecular and medical biotechnology**		**College**	**College of Biotechnology**	
Module Leader	Dr.Bushra hindi Saleh		**e-mail**	Bushra.aftan@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Assist.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	19/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	General microbiology	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims	

أهداف المادة الدراسية	• Provide students with the knowledge and information about the principles of Medical microbiology , who bacteria caused diseases. • Identify students about most important gram positive bacterial family and important diseases caused by each type. • Study most important gram negative bacterial *spp* that causes important diseases , classification ,virulence factors and their role in mechanism of pathogenesis in bacteria, predisposing factor, Lab diagnosis and treatment. • Identify students about the mechanism of most important risk diseases effect on human health like tuberculosis, cholera, Diphtheria.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Learn students important terms in medical microbiology. • Understand the mechanism of pathogenesis in bacteria. • Learn the role of virulence factors in pathogenesis of diseases. • Identify most important gram positive bacteria , most important diseases caused by it. • Recognize the differences' between endotoxin and exotoxin • Identify Enterobacteriacae family and diseases caused by important *spp*. • Learn about prevention of diseases • Identification of bacteria by lab diagnosis
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Medical microbilogy</u> Medical microbiology principles ,most important terms in it. Gram positive bacteria, family classification, clinical sings, pathogenesis. Diagnosis Enterobacteriacae family ,gram negative lactose fermenter *spp*., pathogenesis, diagnosis Gram negative non-lactose fermenter *spp*., pathogenesis, diagnosis . Gram(-)Non enteric bacteria-, diseases, pathogenesis. Gram positive bacilli ,Family classification, diseases, pathogenesis, diagnosis.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the classes, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive tutorials and by involving the students to take sampling from different clinical cases and encourage them to participate in lab diagnosis.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7

	Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction into medical microbiology, Most important terms in medical microbiology
Week 2	Family micrococcaceae, Staphylococcus virulence factors ,pathogenesis of most important disease caused by important *spp*, diagnosis
Week 3	Streptococcus**.** classification of bacteria ,pathogenesis ,most important diseases caused by main groups
Week 4	Family Enterobacteriacae**.** most important characters of it ,E.coli ,important diseases caused by it
Week 5	Salmonella, virulence factors, typhoid fever , mechanism of pathogenesis, diagnosis
Week 6	Proteus, most important spp., virulence factors, pathogenesis, diagnosis
Week 7	Tuberculosis ,causative agent, risk factor ,mechanism of disease, prevention
Week 8	**Mid exam**
Week 9	Pseudomonas, Characters of bacteria, virulence factors and pathogenesis, most important diseases
Week 10	Clostridia, virulence factors, gas gangrene, most important clinical sings, pathogenesis, diagnosis,.
Week 11	Bacillus *spp***,** characters of bacteria, virulence factors, most important disease
Week 12	Coryne bacteria, virulence factors, Diphtheria ,most important clinical sings, pathogenesis, diagnosis.

Week 13	Listeria, virulence factors, Listeriosis, clinical sings, pathogenesis
Week 14	Brucella, virulence factors, most important *spp*. malta fever, clinical sings, pathogenesis
Week 15	Cholera, causative agents, transmission , signs and symptoms of disease, pathogenesis of disease**.**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Sample collection
Week 2	ApI 20 E system
Week 3	Lab 3: Gram (+) bacteria ,Staph *spp*, identification of bacteria by biochemical test and lab diagnosis
Week 4	Lab 4: strept *spp*. identification by biochemical tests and lab diagnosis
Week 5	Lab 5:Gram negative enterobacteriacae , E.coli, identification by biochemical test and lab diagnosis
Week 6	Lab 6: Salmonella biochemical test and lab diagnosis
Week 7	**Lab 7: Mid exam**
Week 8	Klebsiella *spp.* biochemical test and lab diagnosis
Week 9	Proteus *spp* .biochemical test and lab diagnosis
Week 10	Shigella *spp.* biochemical test and lab diagnosis
Week 11	Pseudomonas *spp.* biochemical test and lab diagnosis
Week12	Brucella *Spp*. biochemical test and lab diagnosis
Week 13	Acintobacter *spp*. biochemical test and lab diagnosis
Week 14	*Nesseria gonorrhea* lab diagnosis
Week 15	Bacillus *spp*. lab diagnosis

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Garrity,G),Berges Manual of systematic Bacteriology . 2nd(ed.)spr verla.New York.465-471	No
Recommended Texts	Murray,p.R;Rosenthal,K.S.and Pfaller,M.A.(2020).Medical Microbiology. E-Book.9th(ed.).ElsevierHealth science.Houston	No
Websites	https://www.ncbi.nlm.nih.gov/books/NBK7627/	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	BiochemistryII			**Module Delivery**	
Module Type	Suport			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CRBt-BcII				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level			**Semester of Delivery**	4	
Administering Department	**Department of molecular and medical biotechnology**		**College**	BiotechnologyI	
Module Leader	DR.Maha Hammed		**e-mail**	maha.albahrani@ced.nahrainuniv.edu.iq	
Module Leader's Acad. Title	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	1/10/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Biochemistry	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• The aim of this course is to build the foundation for application of the understanding of the basic chemical processes of the body in health and diseases. • Gain an in-depth understanding of the biochemical function of living organisms, particularly humans. • learn about the chemical processes that occur within living organisms and study how cells work at the sub-cellular and molecular levels. • Provide all students with an in-depth knowledge and understanding of the core elements of Biochemistry relating to medicine. • Gain an adequate basic knowledge and experience to enable students to work within a research institute, pharmaceutical industry, or hospital laboratory. • Demonstrate the role of chemistry in health and disease. • Demonstrate the health and safety procedures in medical and biochemical laboratories.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of this course, the student should be able to: • Explain the context of medical biochemistry in health and disease conditions. • Demonstrate knowledge and understanding of the structure of the major classes of biochemical compounds and the relationship of these structural attributes to their function within a cell/organism. • Demonstrate knowledge and understanding of the molecular basis of selected human diseases. • Apply health and safety procedures in the medical biochemical laboratory. • Demonstrate knowledge and understanding, skills and other attributes that will aid in understanding of all the basic medical sciences. • Provide a knowledge of the molecular and sub-cellular causes of some selected human diseases. • Explain and understand the role of chemistry in health, disease and medicine.
Indicative Contents	<u>Hormones:</u>

المحتويات الإرشادية	Endocrinology, autocrine, paracrine, human body glands and their hormones. Chemistry of the immune system: Innate and adaptive immune systems, inflammation and blood clotting, chemical structure, types and function of immunoglobulins. Hemoglobin: structure and function: Hemoglobin structure, heme, types and functions of hemoglobin, myoglobin. Hemoglobinopathies: Thalassemia alpha and beta, sickle cell anemia, methemoglobin, abnormal derivatives of hemoglobin. Biogenic amines and selected inborn errors of amino acid metabolism: Albinism, maple syrup disease, Phenylketonuria, Hartnup's disease, Homocystinuria, serotonin and melatonin, histamine. Plasma proteins: Components and types of plasma proteins, synthesis of plasma proteins, albumin, function of albumin, ferritin, transferrin, c-reactive protein, alpha feto protein, globulins, lipoproteins, HDL, LDL, VLDL. Regulation of blood glucose: Insulin, glucagon, epinephrine (adrenaline), regulation of blood glucose in fed and fasting states. Diabetes mellitus: Definition, types, causes and diagnosis. Water homeostasis: Total body water content, water compartments in the body, hypervolemia, hypovolemia, thirst mechanism, blood pressure, renin, angiotensin. Electrolytes and trace elements: Sodium, potassium, iron, calcium magnesium phosphate, vitamin D Liver function tests: Total bilirubin, direct bilirubin, indirect bilirubin, GOT, GPT, ALP. Renal function tests:

	Uremia definition, types and causes, blood urea, blood urea nitrogen (BUN), creatinine. Cardiac function tests: Cardiac muscle and function, AST, ALT, LDH, creatine kinase (CK), troponins.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by practical experiments involving the different subjects of medical biochemistry.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	21	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7

	Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Hormones 1
Week 2	Hormones 2
Week 3	Chemistry of the immune system
Week 4	Hemoglobin: structure and function
Week 5	Hemoglobinopathies
Week 6	Selected inborn errors of amino acid metabolism
Week 7	Mid-term Exam
Week 8	Plasma proteins
Week 9	Regulation of blood glucose
Week 10	Diabetes mellitus
Week 11	Water homeostasis
Week 12	Electrolytes and trace elements
Week 13	Liver function tests
Week 14	Renal function tests
Week 15	Cardiac function tests
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Laboratory safety
Week 2	Biochemical specimen
Week 3	Blood collection and types of blood collection tubes
Week 4	How to use the micropipette
Week 5	Standard tools and equipment in medical and clinical laboratories
Week 6	Determination of blood glucose
Week 7	Mid-term Exam
Week 8	Glucose tolerance test
Week 9	Glycosylated hemoglobin (HbA_{1c})
Week 10	Lipid profile: Total Cholesterol
Week 11	Lipid profile: Triglycerides
Week 12	Renal function tests: Determination of blood urea and plasma creatinine
Week 13	Liver function tests: Determination of GOT, GPT and bilirubin
Week 14	Electrolytes: Determination of serum calcium, phosphate, iron, sodium and potassium
Week 15	Determination of uric acid
Week 16	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Marks Essentials of Medical Biochemistry A Clinical Approach Lippincott Illustrated Reviews: Biochemistry Clinical Biochemistry and Metabolic Medicine by Martin Crook	Yes
Recommended Texts	Essentials of biochemistry by Pankaja Naik, Lehninger Principles of Biochemistry Mathews biochemistry Principles of Medical Biochemistry, 3E (2012)	No
Websites	https://www.rcsb.org/	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	اللغة العربية		**Module Delivery** • ☒ Theory • ☒ Lecture • ☐Lab • ☐ Tutorial • ☐ Practical • ☒Seminar
Module Type	**Basic**		
Module Code	**URDEM**		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		
Module Level		**Semester of Delivery**	4
Administering Department	Department of molecular and medical biotechnology	**College**	College of Biotechnology
Module Leader	محمد رحمن	**e-mail**	Mohammed.rahman@nahrein unvi.edu.iq
Module Leader's Acad. Title	Lecture	**Module Leader's Qualification**	Ph.D
Module Tutor	None	**e-mail**	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	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims **أهداف المادة الدراسية**	هدف دراسة مادة حقوق اللغة العربية يتمثل في تعزيز الفهم والوعي باللغة العربية. هناك بعض الأهداف الرئيسية لدراسة هذه المادة: 1. فهم اللغة العربية: تعريف ومقدمة عن اللغة العربية ومراحل تشكلها، واطلاع الطلبة على الأدب عبر العصور. 2 .تعريف الطلبة على الجوانب اللغوية والادبية غير المدروسة سابقا، او تغذيتهم بالمستحدث منها، والغاية الرئيسة هي الثقافة اللغوية والادبية كونهم اقسام غير التخصص الدقيق، عليه كان الهدف الرئيس هو تجاوز الاخطاء اللغوية وتصحيح المعلومات اللغوية والادبية قدر المستطاع 3 .العمل على بناء شخصية متميزة للطالب من خلال تطوير الوعي الثقافي والاجتماعي بما يؤهله بعد التخرج من المساهمة الفعالة في خدمة مجتمعه. 4. السعي الدائم في البحث عن كل ما هو حديث في مجالات اللغة، وتعريف الطالب بمفاتيح اللغة التي توصله الى الكتابة والنطق السليم 5. ليكون خريج البكالوريوس قادرا على الكتابة الصحيحة وتعميق المفاهيم اللغوية والادبية 6. فضلا عن القدرة على التعامل مع اللغة والاخذ والعطاء مع الاخر بعقول ناضجة لغة، بما يؤمن سالمة الكتابة والنطق على مستوى عالٍ من الدقة
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	تعمل جامعة النهرين من خلال تدريس اللغة العربية لتعزيز التثقيف والتوعية وتعريف الطلبة على اهمية اللغة العربية وادابها لما تمثله اللغة العربية من اهمية بالغة في الحياة الدينية والعملية وتكريس القيم والمعتقدات والمواقف التي تشجع جميع الطلبة على معرفة التراث اللغوي والحضاري والديني والثقافي ، كما أنه يتيح فهماً للمسؤولية المشتركة لهذه الشريحة جعل العربية وادابها أمراً واقعاً يعايشونه ويتسلحون بالمعارف والمهارات اللغوية والمواقف التي تمكنهم من إدراك المفاهيم العلمية والادبية
Indicative Contents **المحتويات الإرشادية**	• المعرفة والفهم • فهم اساليب الكتابة الصحيحة • تقديم مفاتيح ختامية للتخلص من الاخطاء او تجنبها قدر المستطاع • مراجعة المادة السابقة • فسح المجال للمناقشة لمعرفة مدى الاستجابة ومواطن الضعف • معرفة التطور التاريخي للغة العربية والتطور الذي مر به الادب العربي • دراسة مصادر اللغة العربية والادبية • دراسة المفاهيم والمصطلحات اللغوية والادبية

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	9. POWERPOINT 10. كتابة التقارير 11. التعلم عبر الانترنيت 12. زيارات ميدانية
Student Workload (SWL)	

الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.1
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	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Seminar	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**اقسام الكلام (الاسم، الفعل، الحرف)المبتدأ والخبر**
Week 2	**كان واخواتها، ان واخواتها**
Week 3	**المثنى والملحق به، جمع المذكر السالم والملحق به، جمع المؤنث السالم والملحق به**
Week 4	**بناء الفعل الماضي، بناء فعل الامر**

Week 5	الفعل المضارع بناؤه واعرابه
Week 6	الاسماء المنصوبة
Week 7	الشعر / نازك الملائكة
Week 8	محمد مهدي الجواهري
Week 9	الاملاء/ كتابة الهمزة الوصل والقطع
Week 10	الهمزة المتوسطة والمتطرفة
Week 11	كتابة الضاد والظاء
Week 12	كتابة التاء القصيرة والطويلة
Week 13	علامات الترقيم وقاعدة الالف الفارقة
Week 14	كتابة العدد
Week 15	القران الكريم/ سورة يس

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	د. طه محسن، النحو الادبي ودروس العربية، 2022	نعم
Recommended Texts	د. محمد الطريحي، موسوعة النحو والادب والبلاغة والعروض، 2004	لا
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information **معلومات المادة الدراسية**			
Module Title	**جرائم حزب البعث**		**Module Delivery**
Module Type	**Basic**		• ☒ **Theory** • ☒ **Lecture** • ☐**Lab** • ☐ **Tutorial** • ☐ **Practical** • ☒**Seminar**
Module Code	**URDEM**		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		
Module Level		**Semester of Delivery**	1
Administering Department	Department of plant biotechnology	**College**	College of Biotechnology
Module Leader	مجد رحمن الذهبي	**e-mail**	Mohammed.rahman@nahrein unvi.edu.iq
Module Leader's Acad. Title	Lecture	**Module Leader's Qualification**	p.h.d
Module Tutor	None	**e-mail**	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	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims **أهداف المادة الدراسية**	الأهداف المهاراتية الخاصة بالمقرر 1- التعريف بتاريخ العراق السياسي ومراحل التطور. 2- نشر الثقافة وتغذية الطالب من الجانب السياسي . 3- كيفية الحفاظ على المجتمع والوطن من خلال تعزيز حب البلد لهم . 4- التعرف على اهم الحقوق الممنوحة لهم وفق الاعراف والقوانين الدولية. تعزيز المواطنة لدى الطالب
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	-الاهداف المعرفية أ1- استفادة الطلبة من معرفة انواع الانظمة والحكومات التي توالت لحكم العراق. أ2- توضيح المراحل التاريخية لتطور النظام السياسي في العراق وكيف وصل نظام البعث
Indicative Contents **المحتويات الإرشادية**	• المعرفة والفهم • فهم التاريخ السياسي للعراق في حقبة حزب البعث .

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	13. POWERPOINT 14. كتابة التقارير 15. التعلم عبر الانترنيت 16. زيارات ميدانية
Student Workload (SWL) **الحمل الدراسي للطالب**	

Structured SWL (h/sem) **الحمل الدراسي المنتظم للطالب خلال الفصل**	33	**Structured SWL (h/w)** **الحمل الدراسي المنتظم للطالب أسبوعيا**	2.2
Unstructured SWL (h/sem) **الحمل الدراسي غير المنتظم للطالب خلال الفصل**	17	**Unstructured SWL (h/w)** **الحمل الدراسي غير المنتظم للطالب أسبوعيا**	1.1
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	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Seminar	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	عرض مفردات المادة على الطلبة والخطة الدراسية بغية الالتزام بتنفيذها
Week 2	انتهاكات النظام البعثي للحقوق والحريات
Week 3	– الميدان النفسي
Week 4	– عسكرة المجتمع

Week 5	–تسلط حزب البعث على السلطة
Week 6	استعمال الاسلحة المحرمة دوليًا
Week 7	حادثة الدجيل
Week 8	امتحان 1
Week 9	تجفيف الاهوار
Week 10	المقابر الجماعية
Week 11	الهجرة القسرية
Week 12	تدمير البيئة الزراعية والثروة الحيوانية
Week 13	محاربة الاحزاب المعارضة
Week 14	لاستبداد في فرض العقوبات والانتهاكات ومحاربة العلماء
Week 15	امتحان 2

Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	ملزمة (جرائم حزب البعث)	نعم
Recommended Texts	جرائم حزب البعث البائد مجموعة باحثين	لا
Websites	المقابر الجماعية في العراق، الوضع السياسي العراقي من سنة 1968ألى سنة 2003 د خالد العطار	

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Parasitology			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MBt22-Ps**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level			**Semester of Delivery**		
Administering Department	**Molecular &medical biotechnology**		**College**	**Biotechnology**	
Module Leader	**Dr. yahia yass khudair**		**e-mail**	Yahia.yass@alnahrainuniv.edu.iq	
Module Leader's Acad. Title	**Lecture**		**Module Leader's Qualification**		**PhD**
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	1/10/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Microbiology	**Semester**	1 2
Co-requisites module	None	**Semester**	None

Module Aims **أهداف المادة الدراسية**	Parasitology has many important goals are:- 1-Understanding types of pathogenic parasites 2- common clinical cases 3- To provide basis for treating .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**Learning outcomes and teaching and learning methods** **Knowledge and understanding:** The graduate must be able to know and understand all of the following: **1**- Principles and theoretical basics related to the scientific material of cognitive sciences **2 -** Foundations of scientific research and methods of measurement and scientific analysis. **3-** The importance of theoretical scientific aspects related to the applications of various sciences **4-** Scientific and linguistic terms and their definition for different scientific subjects **5-** Methods related to the analysis and design of scientific experiments for various scientific subject.

Indicative Contents المحتويات الإرشادية	1- The ability to deal with sources of information and search for scientific topics different 2 - The ability to write and analyze in a work style for scientific applications in the fields different 3 - Identifying obstacles and problems for applications and finding appropriate solutions 4- Using the best descriptive and quantitative methods to analyze scientific issues **General and transferable skills (other skills related to employability and personal development).** 1 - Enable students to think and analyze issues related to the intellectual framework and international biotechnology standards 2- Enable students to think and analyze topics related to biotechnology 3 - Enable students to think and analyze issues related to systems and punishment of abusers by using dangerous microorganisms. 4 - The ability to use computer capabilities and modern technological media in communication and information and search for information 5 - The ability to write and present reports using modern means of communication and technology 6 - The ability to communicate ideas, whether in written or oral form 7 - The ability to deal with a foreign language - at least one - spoken or written 8 - The ability to efficiently use methods to solve problems, whether between individuals or within an institutional framework 9 - The ability to self-learning using time management and self-regulation 10 - The ability to work together and manage the team

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Methods of teaching and learning** The style of the lectures 2- The power point system 3- The system of homework and seminars **learning modalities** 1- Quick exams per week 2- Discussion, questions and immediate answers 3-The international network for information on the subject of specialization **Evaluation modalities** 1- Weekly and quarterly exams 2- Evaluation of students' performance through seminars 3- Grades determined by homework.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction to parasitology**
Week 2	**Protozoa**
Week 3	***Giardia intestinalis* ,*Giardia lamblia* *Giardia duodenalis***
Week 4	***Cryptosporidium* (cryptosporidiosis)**
Week 5	**Trypanosomiasis**
Week 6	Leishmaniasis
Week 7	*Cryptosporidium* (cryptosporidiosis)
Week 8	Mid term exam
Week 9	Trichomoniasis
Week 10	

	Cestodea
Week 11	*Taenia saginata*
Week 12	Trematodes, digenea, bilharzia
Week 13	Vector born diseases
Week 14	Discusions of reports
Week 15	Final exam

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Terms in lab. diagnosis
Week 2	Molecular based identification of parasites
Week 3	Bioinformatics related to parasite diagnosis.
Week 4	ELISA and IFA
Week 5	Describe basic morphological properties of all protozoans stage
Week 6	Whife test , entero test and xenodiagnoses test.
Week 7	Type of worm diagnosis, (nanotechnology based method)
Week 8	Mid term exam
Week 9	GSE and Concentration techniques
Week 10	Morphological characters of cestodes
Week 11	Morphological diagnosis of nematodes

Week 12	Blood smear and Serological diagnosis of parasites
Week 13	Pseudo parasites
Week 14	Labe. Report
Week 15	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Medical Parasitology A Textbook, Rohela Mahmud Yvonne Ai Lian Lim • Amirah Amir, 2017	**Available in the Library?**
Required Texts		
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

Third Year – First Semester السنة الثالثة - الفصل الاول

ECTS	عدد الساعات			Module Code	Subject	الموضوع	ت
	SWL hr/sem	SSWL hr/sem	SSWL hr/sem				
6.00	150	71	79	MBt31-Im	Immunology	علم المناعة	1
6.00	150	71	79	Mbt31-MBI	Molecular Biology-I	علم الحياة الجزيئي-1	2
6.00	150	71	79	MBt31-MCB	Molecular cell biology	علم الخلية الجزيئي	3
4.00	100	21	79	MBt31-EN	Enzymology	انزيمات	4
6.00	150	71	79	MBt31-ATC	Animal Tissue Culture	زراعة انسجة حيوانية	5
2.00	50	17	33	MBt31-ED	Experimental Design &Academic Writing	تصميم التجارب والكتابة الجامعية	6
30	**750**	**المجموع**					

Third Year – Second Semester السنة الثالثة - الفصل الثاني

ECTS	عدد الساعات			Module Code	Subject	الموضوع	ت
	SSWL hr/sem	SSWL hr/sem	SSWL hr/sem				
8.00	200	121	79	MBt32-HC	Human Cytogenetics	الوراثة الخلوية للانسان	**1**
6.00	150	71	79	MB32-VV	Viruses and Vaccine	الفايروسات واللقاحات	**2**
5.00	125	46	79	MBt32-Nb	Nanobiotechnology	تقنيات احيائية نانوية	**3**
8.00	200	121	79	MBt32-MBII	Molecular Biology-II	علم الحياة الجزيئي-2	**4**
2.00	50	17	33	MBt32-MI	Medical Immunology	علم المناعة الطبية	**5**
1.00	25	7	18	URETH	Ethics	اخلاقيات المهنة	**6**
30	**750**						

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Immunology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MBt31-1**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		3	**Semester of Delivery**		5
Administering Department		**Department of molecular and medical biotechnology**	**College**	**Biotechnology**	
Module Leader	Shahlaa M. Salih & Rawaa and Nazar		**e-mail**	Shahlaa.mahdi@nahrainuniv.edu.iq Rawaa.alchalabi@ nahrainuniv.edu.iq	
Module Leader's Acad. Title		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		01/10/2025	**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Medical microbiology	**Semester**	4
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	• Describe how the immune system is able to discriminate self vs. non-self. • Explain how the innate and adaptive immune systems work together to generate an effective • immune response against a specific pathogen. • Explain how the immune system is able to respond to so many diverse antigens. • Distinguish between humoral and cell-mediated (cellular) immunity and the location of the • pathogens they target (extracellular, intracellular). • Explain what happens when there are defects in the immune system (i.e., autoimmune diseases, allergy, organ/tissue rejection).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Define the functions of the immune system. • Distinguish between innate immunity and acquired immunity. • Understand the Structure and Function of the molecules, cells, and organs involved in Immunity. • Describe how cell mediated and antibody-mediated immunity work to protect a host from pathogenic organisms and harmful substances. • Explain how the immune system recognizes foreign antigen and the significance of self/non-self discrimination • Explain how the clonal selective theory impacts the immune system's ability to recognize millions of antigens • Understand the basics of tumor immunity. • List the Immunodeficiency diseases. • Understand Immune tolerance and principles of autoimmunity

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1-Cells and Tissue of the immune system 2-(myeloid and lymphoid lineages, bone marrow, thymus, spleen, lymph nodes, mucosal associated lymphoid tissue, lymphatics adn cellular movement). 3-The innate immune response (non-specific external surface protection, innate immune cell recognition of foreign material, phagocytosis, inflammation and complement). 4– Antigens and antigen receptors (antigens, immunogens, antibodies, T and B cell receptors, MHC class I and II, antigen presentation) 5– The adaptive immune response: dynamics of the immune response (activation/costimulation/differentiation of T cells, cytokines, germinal centres, class switching, somatic hypermutation/affinity maturation). 6– The adpative immune response: tolerance, hypersensitivity and mucosal immunity (central and peripheral tolerance mechanisms, type I/II/III/IV and V hypersensitivity, mucosal structure and functions, secretory IgA).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Teaching Methods** 1. **Lectures** – Traditional classroom lectures delivered by the instructor to explain core concepts and theories. 2. **PowerPoint Presentations** – Use of multimedia presentations to enhance visualization, provide diagrams, animations, and summary tables for complex topics. 3. **Assignments and Tutorials** – Weekly homework assignments and small-group discussion sessions to reinforce understanding and problem-solving skills. The main strategy that will be adopted in delivering this module is encouraging students to interact positively with others, think critically, solve immunology-related problems and to solve problems related to Immunology and think independently and access relevant literature and review information.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

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

Total assessment	100% (100 Marks)		

elivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction of immunology**
Week 2	**Fundamental of blood cell biology**
Week 3	**Lymphoid and lymphoid tissue**
Week 4	**Inflammatory response**
Week 5	**Complement system**
Week 6	**Innate immunity**
Week 7	**Mid-term Exam**
Week 8	**Antigen and immunogens**
Week 9	**Antigen presentation and MHC complex**
Week 10	**Antibodies**
Week 11	**Immune response**
Week 12	**Cytokines**
Week 13	**Autoimmune diseases**
Week 14	**Hypersensitivity**
Week 15	**Immunological tolerance**
Week 16	**final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Lab 1: Deals with experimental Animals**
Week 2	**Lab 2: Route of inoculation**
Week 3	**Lab 3: Determination of bacterial numbers**
Week 4	**Lab 4: Antigen preparation**
Week 5	**Lab 5: Phagocytosis**
Week 6	**Lab 6: Agglutination Reaction**
Week 7	**Lab 7: Precipitation reaction**
Week 8	**Exam**
Week 9	**Lab 9: Complement fixation test**
Week 10	**Lab 10: lymphocyte isolation**
Week 11	**Lab 11: ELISA**
Week 12	**Lab 12: Immunochromatography test**
Week 13	**Lab 13: Immunofluorescence**
Week 14	**Lab 14: Antibody purification**
Week 15	**Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Immunology by Ivan M .Roitt (Editor), J. Brostoff and D. Male Paperback. Kuby Immunology by Richard A.Goldsby,Thomas J. Kindt and Barbara A. Osborne Paperback	Yes

Recommended Texts	Molecular Immunology by Abul K. Abbas, Andrew H. Lichtman, Jordan S. Pober Paperback -	No
Websites	https://www.livescience.com/26579-immune-system.html	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Animal Tissue Culture**			**Module Delivery**	
Module Type	Core			☒ **Theory** **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MBt31-ATC				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		3	**Semester of Delivery**		5
Administering Department		**Department of molecular and medical biotechnology**	**College**	**College of Biotechnology**	
Module Leader	**Pro. Zahraa K. Zedan** **Dr. Moyassar Basil Hadi**		**e-mail**	**Dr.zahraa.zedan@gmail.com** **Moyassar.basil@nahrainuniv.edu.iq**	
Module Leader's Acad. Title		Prof. 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		01/10/2025	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Histology Physiology	**Semester**	3 4
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The course aims that students acquire the practical skills needed to isolate mammalian cells for in vitro studies, perpetuate animal cells in the laboratory, manipulate animal cells in the laboratory, and apply molecular techniques in laboratory situations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The graduate should be able to know and understand all of the following: 1- The use of a microscope for the purpose of microscopic examination of the stages of cell growth outside the living body. 2- Using tissue sections and glass slides to stain the cells to clarify the changes that occur on them as a result of laboratory experiments. 3- Enables students to monitor the cells, their activities, and their response to external influences. 4- Understand the biological problems and causes that hinder cell growth in the laboratory.
Indicative Contents المحتويات الإرشادية	1- Develop the student's skills in isolating animal cells from tissues and transplanting them into culture dishes. 2- Develop the student's skills to understand and distinguish the ideal applications of cells in therapeutic and medical applications. 3- Developing the skills of successful cell growth in the laboratory. 4- Develop the skills of preserving cells under laboratory conditions. 5- Develop students' skills to modify animal cells in the laboratory according to the conditions of the experiment.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Learning and strategies with high impact teaching focus on planning, teaching and assessment to equip students to excel their role in state associations after graduation. These include: • Planning for lecture • Lecture structure

	• Explicit teaching and inquiry • Questioning generation • Feedback from students • Effective assessment for the students • Greater understanding of planning expectations • Assessment skills that will change teaching style

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to animal tissue culture
Week 2	Primary cell culture
Week 3	Cell Lines
Week 4	Animal cell culture media
Week 5	Types of cell culture
Week 6	Applications of animal tissue culture
Week 7	Midterm Exam
Week 8	Biology of Cells in Culture
Week 9	Factors affecting cell behavior in vitro
Week 10	The difference between two-dimensional and three-dimensional cultivation environment
Week 11	Applications of 3D tissue culture
Week 12	Scaffolds of 3D tissue culture
Week 13	Use of microfluidic system as a tissue culture system
Week 14	Review and answer students' questions
Week 15	Review and answer students' questions
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction to tissue culture lab
Week 2	Types of tissue culture media and their preparation
Week 3	Subculture and change media
Week 4	Cell count and seeding density
Week 5	Preparation of primary culture
Week 6	Assessment and Characterization of cells in culture
Week 7	Midterm Exam
Week 8	Migration assay
Week 9	Cytotoxicity and proliferation assay
Week 10	3D cell culture
Week 11	Assessment and Characterization of 3D culture
Week 12	Midterm Exam
Week 13	Review and answer students' questions
Week 14	Preparatory week before the final Exam
Week 15	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the

		Library?
Required Texts	1. Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications, Sixth Edition. 2. Basics of animal cell culture: Foundation for modern science	No
Recommended Texts	1. Animal Cell Culture and Technology	No
Websites	1. An Introductory Undergraduate Course Covering Animal Cell Culture Techniques. https://iubmb.onlinelibrary.wiley.com/doi/epdf/10.1002/bmb.2004.494032050381	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Molecular Biology1			**Module Delivery**	
dule Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MBt31-MB1				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	3		**Semester of Delivery**	5	
Administering Department	**Department of molecular and medical biotechnology**		**College**	**College of Biotechnology**	
Module Leader	Dr. Hameed M. Jasim Dr. Resala R. Allami		**e-mail**	Hameed.jasim@nahrainuniv.edu.iq ririallami@yahoo.com	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	1/10/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	General Biology& = Principle of Genetics	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1- To provide students with knowledge and information as well as practical experience about Molecular Biology. 2- Studying the composition, structure and interactions of cellular molecules – such as nucleic acids and proteins 3- Carrying out the biological processes essential for the cell's functions and maintenance.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the module a student will be able to: 1. Describe the basic structure and biochemistry of nucleic acids and proteins and discriminate between them. 2. Identify the principles of DNA replication, transcription and translation and explain how they relate to each other. 3. Describe the main principles of methods for preparation of DNA, such as DNA extraction, cloning, transformation and PCR, and analyze their applications. 4. Describe the main principles of methods for analysis of DNA, such as hybridization, restriction analysis and DNA sequencing and analyze their applications. 5. Describe and discuss applications of molecular biology, including the use of bioinformatics and genomics.
Indicative Contents المحتويات الإرشادية	The course study the development of molecular biology, the molecular structure, and the holistic role of the DNA molecule (the function of DNA as the initiator and the regulator of metabolic mechanisms comprehensively). Discussing gene expression related to transcription, translation, and control of expression at the molecular level in prokaryotes and eukaryotes; DNA replication mechanism; gene regulation mechanism; extrachromosomal DNA; proteomics and genomics; DNA repair, DNA mutation and the application of molecular biology in various fields. The module is expected to cover the following topics: • Description and integration of the biochemistry of nucleic acids. • Genetic diversity. • Gene expression. • Basic methods used in molecular biology. • How molecular biology relates to other fields of science.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	A grounding of molecular biology is provided through a combination of recorded lectures (screencasts) and demonstrations. These will cover various aspects of basic molecular biology including nucleic acids and proteins; gene expression; DNA analysis; gene cloning; molecular evolution; typing and diagnostics. A summative assessment will be carried out via a timed Quiz style test on Moodle at the end of the module. This assessment does not count toward the grade.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7

	Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Molecular Biology
Week 2	• Macromolecules' • Large macromolecular assemblies
Week 3	• Properties of Nucleic acids • Nucleic acid structure • Chemical and physical properties of nucleic acids
Week 4	• Prokaryotic and Eukaryotic Chromosomes • Prokaryotic chromosome structure Chromatin structure
Week 5	• Eukaryotic chromosome structure • Genome complexity • The flow of genetic information
Week 6	• Replication of DNA • DNA replication: an overview • Bacterial DNA replication • The cell cycle • Eukaryotic DNA replication
Week 7	• The Cell Cycle • Mitosis and Meiosis
Week 8	**Mid Term Exam**
Week 9	• Gene anatomy • Promoters, Terminators, Enhancers, sense strand

Week 10	• Transcription • Basic principles of transcription • Transcription in eukaryotes • What is a post-transcriptional modification in eukaryotes?
Week 11	• Gene Expression • Translation of prokaryotic & eukaryotic genes
Week 12	• RNA processing and RNPs • rRNA processing and ribosomes
Week 13	• tRNA processing and other small RNAs • mRNA processing, hnRNPs and snRNPs • Alternative mRNA processing
Week 14	• The genetic code
Week 15	tRNA structure and function
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Personal safety
Week 2	Lab 2: Operating Instructions for equipment an apparatus
Week 3	Lab 3: Preparation of Solutions
Week 4	Lab 4: Isolation of genomic
Week 5	Lab 5: Phenol/chloroform Extraction of DNA
Week 6	Lab 6: Ethanol Precipitation of DNA
Week 7	Lab 7: Extraction of Genomic DNA from Blood
Week 8	Mid Exam

Week 9	Lab 8: Isolation of RNA from Mammalian Cells
Week 10	Lab 9: Agarose Gel Electrophoresis
Week 11	Lab 10: PCR Amplification of DNA
Week 12	Lab 11: Optimization of Annealing Temperature
Week 13	Lab 12: PCR Troubleshooting
Week 14	Lab 13: Alternate Method for Purifying DNA from Agarose Gels
Week 15	Lab 14: Characterization of DNA by Spectrophotometric Assay and Melting Temperature (Tm)
Week 16	Lab 15: Sanger Sequencing

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• **Molecular Biology of the Cell** – by Bruce Alberts, Alexander Johnson, Julian Lewis, et al.	Yes
Recommended Texts	• • Molecular Biology of the Cell – by Bruce Alberts, Alexander Johnson, Julian Lewis, et al. •	No
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	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded

(0 – 49)	**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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Molecular Cell Biology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MBt-31MCB				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	Molecular and Medical biotechnology		**College**	Biotechnology	
Module Leader	Zaid Nsaif Abbas		**e-mail**	zaid.altameemi@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Saja Ali Sharif		**e-mail**	saja.ali@nahrainuniv.edu.iq	
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	General biology& Cell Biology , Principle of Genetics	**Semester**	1,2.
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This module aims to: 1. Provide fundamental understanding of the molecular architecture and functional organization of eukaryotic cells. 2. Explain the biochemical and structural properties of biological macromolecules. 3. Describe gene expression, regulation, and mechanisms controlling protein synthesis. 4. Illustrate major cell signaling pathways and communication mechanisms. 5. Understand the cell cycle, mitosis, and meiosis, and how they are regulated. 6. Explain cellular metabolism and energy production pathways. 7. Describe membrane structure and mechanisms of transport across membranes. 8. Understand protein targeting, sorting, and intracellular trafficking. 9. Explain programmed cell death (apoptosis) and autophagy pathways. 10. Connect molecular abnormalities with various human diseases, including cancer, genetic disorders, and metabolic syndromes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A. Knowledge and Understanding 1. Describe the structural organization of cells and their organelles and explain how structure relates to function. 2. Explain the chemical properties and biological roles of macromolecules. 3. Understand the molecular mechanisms of gene expression and its regulation. 4. Describe how cells communicate through signaling pathways. 5. A5. Explain the cell cycle, cell division, and associated regulatory mechanisms. 6. Understand energy metabolism, ATP production, and metabolic pathways. 7. Describe membrane transport mechanisms and protein trafficking routes. 8. Explain apoptosis and autophagy and their physiological significance. 9. Understand molecular bases of major diseases and relate molecular defects to pathology. 10. B. Subject-Specific Skills The student will develop the ability to: 1. Analyze cellular pathways and interpret molecular diagrams. 2. Identify disruptions in cellular systems leading to diseases.

	3. Connect theoretical molecular mechanisms to laboratory observations. 4. Interpret microscopy images and molecular case studies. 5. Apply molecular concepts in problem-solving and scientific reasoning.
Indicative Contents المحتويات الإرشادية	• Cell Structure & Organelles • Biological Macromolecules • Gene Expression & Regulation • Cell Signaling & Communication • Cell Cycle & Cell Division • Cellular Metabolism & Energy Production • Membrane Transport Mechanisms • Protein Sorting & Trafficking • Apoptosis & Autophagy • Molecular Basis of Disease

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy adopted in delivering this module is to encourage student participation and enhance critical thinking skills. This is achieved through: • Interactive lectures supported by diagrams and molecular animations. • Laboratory demonstrations involving microscopy and cell imaging. • Case studies linking molecular mechanisms to disease. • Group discussions and student presentations. • Self-directed learning through scientific articles and videos.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	
	Assignments	2	10% (10)	2 and 12	
	Projects / Lab.	10	10% (10)		
	Report	1	10% (10)	13	
Summative assessment	Midterm Exam	2hr	10% (10)	7	
	Final Exam	3hr	50% (50)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Molecular Cell Biology
Week 2	Cell Structure & Organelles
Week 3	Biological Macromolecules
Week 4	Gene Expression: Transcription
Week 5	Gene Regulation & Translation
Week 6	Cell Signaling Overview
Week 7	Signaling Pathways & Communication
Week 8	**Midterm Exam**
Week 9	Cell Cycle: Stages & Regulation
Week 10	Cell Division (Mitosis & Meiosis)
Week 11	Cellular Metabolism & Energy Production
Week 12	Membrane Transport Mechanisms
Week 13	Protein Sorting & Trafficking
Week 14	Apoptosis & Autophagy
Week 15	Molecular Basis of Disease
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Orientation – Theoretical Introduction
Week 2	Microscopy and Cell Observation
Week 3	Organelle Identification (Images & Videos)
Week 4	DNA/RNA extraction demonstration
Week 5	Gene Expression Visualization Tools
Week 6	Signaling Pathways Worksheet
Week 7	Cell Cycle Analysis Using Images
Week 8	Metabolism Charts Interpretation
Week 9	Membrane Transport Simulations
Week 10	Protein Sorting Activity
Week 12	Apoptosis & Autophagy Case Studies
Week 11	Lab Report Preparation
Week 13	Review Session
Week 14	Lab Closure

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• *Molecular Cell Biology, Lodish et al.* • *Cell and Molecular Biology, Karp*	Yes
Recommended Texts	• The *Cell: A Molecular Approach*, Cooper • • Nature Reviews Molecular Cell Biology articles	No
Websites	• www.nature.com • www.ncbi.nlm.nih.gov • www.sciencedirect.com	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group	**A –** Excellent	امتياز	90 - 100	Outstanding Performance

(50 - 100)	**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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	**Experimental design and Academic writing**	**Module Delivery**	
Module Type	**Suport**	**Theory** ☒ **Lecture** **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MBt-31-ED		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		

Module Level	3	**Semester of Delivery**	5
Administering Department	Molecular and Medical biotechnology	**College**	Biotechnology
Module Leader	Yaseen Ismael Imran	**e-mail**	Yaseen.ismael@nahrainuniv.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	1. To understand the experimental design for different types of sciences 2. To understand how to write academically
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**. Knowledge and Understanding** The graduate should be able to know and understand the following: **A1.** The fundamental principles and theoretical basics related to the scientific content of cognitive sciences. **A2.** The foundations of scientific research, methods of measurement and analysis, and approaches to finding solutions to scientific problems. **A3.** The importance of theoretical scientific aspects related to the applications of various sciences. **A4.** Scientific and linguistic terminology and its definitions across different scientific subjects. **A5.** Methods related to the analysis and design of scientific experiments in various scientific disciplines. **B. Subject-Specific Skills** **B1.** The ability to use information sources and search for various scientific topics. **B2.** The ability to write and analyze scientifically for practical applications in different fields. **B3.** The ability to identify obstacles and problems in applications and to find appropriate solutions. **B4.** The ability to use the best descriptive and quantitative methods to analyze scientific problems. 1.
Indicative Contents	

المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

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			

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11

assessment	**Assignments**	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.				
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Why we take experimental design course?
Week 2	Methods of acquiring knowledge
Week 3	The Scientific Method
Week 4	Scientific Research
Week 5	Deductive reasoning, Inductive reasoning, Theories and hypothesis
Week 6	Types of research studies
Week 7	Research proposal
Week 8	Midterm Exam
Week 9	What is academic writing
Week 10	Types of academic writing
Week 11	How to write a reference

Week 12	How to write concisely with examples
Week 13	The writing process
Week 14	How to write presentation
Week 15	Final Exam
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Montgomery, Douglas C. *Design and Analysis of Experiments*. Eighth Edition. John Wiley & Sons,	Yes
Recommended Texts	• Schimel, Joshua. *Writing Science: How to Write Papers That Get Cited and Proposals That Get Funded*. Oxford University Press,	No
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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Viruses and Vaccines**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MBt32-VV				
ECTS Credits	**6**				
SWL (hr/sem)	150				
Module Level	**Theory, Lab**		**Semester of Delivery**	**6**	
Administering Department	**Molecular and Medical Biotechnology Department**		**College**	**Biotechnology**	
Module Leader	Dr. Lamiaa Fingan Nashi Al-Maliki Dr. Rawaa Nazar Alchalabi		**e-mail**	lamiaafingan@yahoo.com rawaaalchalabi-1984@yahoo.com	
Module Leader's Acad. Title	Lecturer Doctor Assistant professor Doctor		**Module Leader's Qualification**	PhD	
Module Tutor	Dr. Lamiaa Fingan Nashi Al-Maliki		**e-mail**	E-mail lamiaafingan@yahoo.com	
Peer Reviewer Name	Dr. Rawaa Nazar Alchalabi		**e-mail**	E-mail rawaaalchalabi-1984@yahoo.com	
Scientific Committee Approval Date	June/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Medical microbiology- Immunity	**Semester**	5-4
Co-requisites module	None	**Semester**	None

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	15. --- Learn about Medical Virology and the history of Virology. 16. --- Learn about the virus shapes and types. 17. --- Study the genetic material of different types of viruses 18. --- Study on viral replication and effect of virus on the cells. 19. ---Study the methods for virus culturing and types of cell cultures. 20. --- Study about viral replication and host rang determination.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students will learn all about Viruses and their structures and families and vaccines that depress the level of infections methods of diagnosis the viruses in the medical labs.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Texts, reading resources (books) , whiteboard, plasma screen

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
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	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	1hr	10% (10)	7	LO # 1-7
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered

Week 1	Definition of Virology, viruses and general characteristics of virus
Week 2	Virus replication
Week 3	Classification and GENETICAS OF VIRUSES
Week 4	Viruses pathogencity
Week 5	Functions of Envelope and Consequences of Properties for Enveloped viruses
Week 6	Host defense mechanism
Week 7	DNA Viruses families
Week 8	RNA Viruses families
Week 9	Mid term exam
Week 10	Vaccines and types of Vaccines
Week 11	Steps of Vaccines production
Week 12	Attenuated, Killed Vaccines and mechanisms of actions
Week 13	Corona virus ,whole virus, protein subunit, viral vector and nucleic acid of the virus
Week 14	Second mid exam
Week 15	Final exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	The virus
Week 2	Measurement of virus size

Week 3	Reaction of virus with chemical and physical agents
Week 4	Cultivation of viruses
Week 5	Cultivation in fertile hen's egg
Week 6	Mid exam
Week 7	Cell culture techniques
Week 8	Preparing primary cell culture in lab for virus cultivation
Week 9	Detection of viral infections- Detection and identification of viral activity in chick embryo
Week 10	Detection and identification of viral activity in cell culture
Week 11	Serological diagnosis of viral infections
Week 12	Viral detection by electron microscopy
Week 13	Viral detection by neutralization test (NT)
Week 14	Latex agglutination test
Week 15	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**1-** Medical Virology by David o white and Frank J Finner 2 - Viruses of Microorganisms. By Paul Hyman and Stephen T. Abedon Published: 2018. 3 - Viruses and interferon: Current Research. Edited by: Karen Mossman Published: 2011	yes
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
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	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Nanobiotechnology**			**Module Delivery**	
Module Type	CORE			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MBt-32-Nb**				
ECTS Credits	**5**				
SWL (hr/sem)	150				
Module Level	**4**		**Semester of Delivery**	**6**	
Administering Department	**Department of Medical and Molecular Technology**		**College**	**Biotechnology @biophsics**	
Module Leader	Dr. Widad Jassim Atia Ali zaid		**e-mail**	Widad.atia@nahrainuniv.edu.iq ali.saffar@nahrainuniv.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	1-10-2025		**Version Number**	1.5	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Biophysics &Principle of Biotechnology	**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This course covers the basics of nanobiotechnology, focusing on nanoparticles, their properties, classification and different methods of their syntheis, such as chemica , physical and green(bio)methods. Last one characterized as eco-friendly biofabrication methods. Students perform practical experiments includes the biosynthesis and their effects on microbes and plants, and explore applications in medicine, pharmaceuticals, and agriculture. Biofabrication is highlighted for its .safety, simplicity, low cost, and high productivity
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the course, students will understand key nanotechnology concepts, properties and classification of nanomaterials, and physical, chemical and bio (green) methods for synthesis them and prfer the biosynthesis one, which used plants and microbes. They will be able to use major detection and characterization tools and explain applications in diagnostics, drug delivery, cancer therapy, and biosensors. Students will compare synthesis methods. They will evaluate nanoparticle effects on biological systems while following safety.
Indicative Contents المحتويات الإرشادية	This course covers nanobiotechnology basics, types of nanomaterials, synthesis methods, and characterization techniques. It explores medical, agricultural, and environmental applications, including drug delivery, diagnostics, nano-fertilizers, and remediation. Students study nanotoxicology, ethical issues, real-world innovations, and conduct practical labs on green synthesis, characterization, and antimicrobial testing.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Texts, reading resources (books) , whiteboard, plasma screen1

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem)	21	**Unstructured SWL (h/w)**	4.5

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5(10)%	All	Continues
	Assignments	2	10(10)%	1-8	8
	Projects / Lab.	1	10(10)%	All	Continues
	Report	1	10(10)%	All	Continues
Summative assessment	**Midterm Exam**	1	10(10)%	All	Continues
	Final Exam	1	50%	All	Continues
Total assessment			100%		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Nanotechnology, History of Nanotechnology
Week 2	Nanoparticle and Nanomaterials: Definitions. And Classification them depended on different bases
Week 3	Studying the properities of Nanomaterials: -Physical and Chemical properities.

Week 4	Synthesis methods of Nanomaterials
Week 5	Chemical and Physical Synthesis methods of Nanomaterials
Week 6	Advantages and Disadvantages properities
Week 7	Mid term exam
Week 8	Green synthesis of Nanomaterials
Week 9	Biosynthsis methods of Nanomaterials by using microorganisms : Bacteria, Fugi, Yeasts, Algae
Week 10	Detection and Charactrrization Techniques of nanomaterials.
Week 11	Antibacterial activity effect of nanomaterials.
Week 12	Antifungal activity effect of nanomaterials.
Week 13	Application of Nanomaterials in different fields of life: Medical(therapeutic and diagnostic), Pharmalogical ,Agricultural and other applications
Week 14	Bio–Nano Interactions
Week 15	Second Midterm

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to Nanobiotechnology & Laboratory Safety
Week 2	Preparation of Biological Extracts for Nanoparticle Synthesis
Week 3	Green Synthesis of Metallic Nanoparticles Using Plant Extracts
Week 4	Nanoparticle Synthesis Using Microbial Systems

Week 5	UV–Visible Spectroscopy for Nanoparticle Characterization
Week 6	FTIR for Functional Group and Surface Chemistry Analysis
Week 7	Microscopic Characterization (SEM/TEM) and AFM.
Week 8	First Mid Exam
Week 9	Atomic Force Microscope (AFM) Characterization.
Week 10	Antibacterial activity of nanomaterials.
Week 11	Antifungal activity of nanomaterials.
Week 12	Application of Nanoparticles in Plant Systems (Seed germination).
Week 13	Application of Nanoparticles in Plant Systems(Plant physiological responses)
Week 14	Foliar spray and soaking techniques with nanomaterials
Week 15	Second Mid Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	■ Plant Nanotechnology Principles and Practices Chittaranjan Kole • D. Sakthi Kumar Mariya V. Khodakovskaya ■ Nanotechnology-and-plant-sciences-Nanoparticles-and-their-impact-on-plants Manzer H. Siddiqui · Mohamed H. Al-Whaibi Firoz Mohammad ■ Intodction to Nanotechnology. Charles P. Poole, Jr. Frank J. Owens ■ Nanobiotechnology. Amultidisplinary field of science.	No

	Ram Prasad (Department of Botany) Mahatma Gandhi Central University Motihari, Bihar, India	
Recommended Texts	Scientific journals, scientific research and articles, theses and dissertations	
Websites	International information network in the course subject	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Medical Immunology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** **Lecture** **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MBt32-MI				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level		3	**Semester of Delivery**		6
Administering Department		**Department of molecular and medical biotechnology**	**College**	**biotechnology**	
Module Leader	Shahlaa M. Salih		**e-mail**	Shahlaa.mahdi@nahrainuniv.edu.iq	
Module Leader's Acad. Title		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		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Immunology	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1-To provide students with the ability to discuss the molecular and cellular basis of diseases affecting the immune system, and the applications of immunological techniques designed to diagnose and monitor them. 2-Explain the immunology of hypersensitivity, autoimmunity, immunodeficiency, transplantation and cancer. 3-Explain the features and applications of immunoassays in the diagnosis and monitoring of diseases affecting the immune system.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Provides the Students with a Knowledge of the Clinical Practices for İnvestigating the Etiology and Pathogenesis Leading to the Occurrence of Signs and Symptoms in the İmmunological diseases. • Describes the types of Urticaria, Angioedema, and Anaphylaxis, Explains their Etiology, Explains their Pathophysiology, Explains their Clinical Features, Explains their Symptoms, Explains their Signs, Explains their Laboratory tests, Explains their other Diagnostic Tests, Explains their Diagnosis Criteria. • Describes the types of Atopic dermatitis, Contact dermatitis, and Food allergy, Explains their Etiology, Explains their Pathophysiology, Explains their Clinical Features, Explains their Symptoms, Explains their Signs, Explains their Laboratory tests, Explains their other Diagnostic Tests, Explains their Diagnosis Criteria. • Describes the types of Allergic Conjunctivitis, and Allergic Rhinitis, Explains their Etiology, Explains their Pathophysiology, Explains their Clinical Features, Explains their Symptoms, Explains their Signs, Explains their Laboratory tests, Explains their other Diagnostic Tests, Explains their Diagnosis Criteria. • Describes the types of Systemic lupus erythematosus, Explains their Etiology, Explains their Pathophysiology, Explains their Clinical Features, Explains their Symptoms, Explains their Signs, Explains their Laboratory tests, Explains their other Diagnostic Tests, Explains their Diagnosis Criteria. • Describes the types of Rheumatoid arthritis, Explains their Etiology, Explains their Pathophysiology, Explains their Clinical Features, Explains their Symptoms, Explains their Signs, Explains their Laboratory tests, Explains their other Diagnostic Tests, Explains their Diagnosis Criteria. • Describes the types of vasculitides, Explains their Etiology, Explains their Pathophysiology, Explains their Clinical Features, Explains their Symptoms, Explains their Signs, Explains their Laboratory tests, Explains their other Diagnostic Tests, Explains their Diagnosis Criteria.

	• Describes the types of Psoriasis, and Myasthenia gravis, Explains their Etiology, Explains their Pathophysiology, Explains their Clinical Features, Explains their Symptoms, Explains their Signs, Explains their Laboratory tests, Explains their other Diagnostic Tests, Explains their Diagnosis Criteria. • Describes the types of Immunodeficiency Diseases, Explains their Etiology, Explains their Pathophysiology, Explains their Clinical Features, Explains their Symptoms, Explains their Signs, Explains their Laboratory tests, Explains their other Diagnostic Tests, Explains their Diagnosis Criteria.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1-Lymphocyte Activation & Control: 2- first and second signals, accessory molecules, soluble immunoregulators (cytokines, interleukins, chemokines).Defence against Infection: vaccination, subversion by pathogens, superantigens. 3- Hypersensitivity : types I to V. 4- Autoimmunity: MHC, rheumatological (SLE, RA, autoantibodies) and kidney(Goodpastures) and organ-specific (thyroid, coeliac, pernicious anaemia, diabetes) diseases. 5- Immunodeficiency: Complement, primary (T & B & NK cell) and secondary (HIV). Transplantation: rejection, solid organs, bone marrow. Cancer : tumour antigens, evasion. 6-Immunoassays: haemagglutination, RIA, ELISA, tissue typing, functional assays.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is encouraging students to interact positively with others, think critically, solve immunology-related problems and to solve problems related to Immunology and think independently and access relevant literature and review information.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.1
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	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction – Basic and clinical immunology**
Week 2	**Antibody immunodeficiency disorders**
Week 3	**T-cells immunodeficiency diorders**
Week 4	**Combined B-cells and T-cells immunodeficiency diorders**
Week 5	**Phagoctyic dysfunction diseases**
Week 6	**Complement deficiences**
Week 7	**Mid-term Exam**
Week 8	**The Atopic diseases**
Week 9	**Anaphylaxis & Ueticaria**
Week 10	**Immune complex allergic diseases**
Week 11	**Cell-mediated hypersensitivity diseases**
Week 12	**Autoimmune diseases**
Week 13	**Autoimmune diseases**
Week 14	**Autoimmune diseases**
Week 15	**Mechanism of tumor immunology**
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Medical immunology by Tristram G. Parslow (Editor), et al Paperback: McGraw-Hill/Appleton & Lange;	Yes

Recommended Texts	Kubby Immunology by Richard A.Goldsby,Thomas J. Kindt and Barbara A. Osborne	yes
Websites	https://www.livescience.com/26579- immune-system. Html. https://www.hopkinsmedicine.org/health/conditions-and-diseases/allergies-and-theimmune- system https://www.healthline.com/health/autoimmune-disorders	

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
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	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

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Molecular BiologyII			**Module Delivery**	
Module Type	**Core**			☒ **Theory** **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MBt-32-MBII				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	**Department of molecular and medical biotechnology**		**College**	**Biotechnology**	
Module Leader	Dr. Hameed M. Jasim Dr. Risala R. Allami		**e-mail**	Hameed.jasim@nahrainuniv.edu.iq risala.allami@nahrainuniv.edu.iq ririallami@yahoo.com	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	1/10/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Molecular biology 1	**Semester**	5
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	4- To provide students with knowledge and information as well as practical experience about Molecular Biology. 5- Studying the composition, structure and interactions of cellular molecules – such as nucleic acids and proteins 6- Carrying out the biological processes essential for the cell's functions and maintenance.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the module a student will be able to: 1. Describe the basic structure and biochemistry of nucleic acids and proteins and discriminate between them. 2. Identify the principles of DNA replication, transcription and translation and explain how they relate to each other. 3. Describe the main principles of methods for preparation of DNA, such as DNA extraction, cloning, transformation and PCR, and analyze their applications. 4. Describe the main principles of methods for analysis of DNA, such as hybridization, restriction analysis and DNA sequencing and analyze their applications. 5. Describe and discuss applications of molecular biology, including the use of bioinformatics and genomics.
Indicative Contents المحتويات الإرشادية	The course study the development of molecular biology, the molecular structure, and the holistic role of the DNA molecule (the function of DNA as the initiator and the regulator of metabolic mechanisms comprehensively). Discussing gene expression related to transcription, translation, and control of expression at the molecular level in prokaryotes and eukaryotes; DNA replication mechanism; gene regulation mechanism; extrachromosomal DNA; proteomics and genomics; DNA repair, DNA mutation and the application of molecular biology in various fields. The module is expected to cover the following topics: • Description and integration of the biochemistry of nucleic acids. • Genetic diversity. • Gene expression. • Basic methods used in molecular biology. • How molecular biology relates to other fields of science.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	A grounding of molecular biology is provided through a combination of recorded lectures (screencasts) and demonstrations. These will cover various aspects of basic molecular biology including nucleic acids and proteins; gene expression; DNA analysis; gene cloning; molecular evolution; typing and diagnostics. A summative assessment will be carried out via a timed Quiz style test on Moodle at the end of the module. This assessment does not count toward the grade.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	121	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7

	Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Regulation of transcription in prokaryotes General features of genes that are regulated, molecules involved in regulation
Week 2	Regulation of gene expression in prokaryotes • Operon • lac Operon • Activation of the lac operon by cyclic AMP and the CAP protein
Week 3	Eukaryotic transcription • The Structure of Eukaryotic mRNAs • Production of Mature mRNA in Eukaryotes • Regulation of gene expression in eukaryotes • Control of Transcription by Activators and Repressors
Week 4	Controls of Gene Expression in Eukaryotes • Methylation of DNA • RNA Interference (RNAi) Micro RNA (miRNA
Week 5	Mutations • Missense mutation

	• Nonsense mutation • Silent mutation • Frameshift mutation
Week 6	• Transposon • • Types and structure of transposons • • The transposition machinery
Week 7	• Recombination: homologous recombination, Site specific recombination, Illegitimate recombination
Week 8	**Mid Term Exam**
Week 9	• Genomics and Proteomics
Week 10	• Epigenetics
Week 11	• Metagenomics
Week 12	• Bacteriophages and eukaryotic viruses: Introduction to viruses, Bacteriophages
Week 13	• Bioinformatics Algorithms: Introduction to bioinformatics
Week 14	• Cancer Molecular basis of cancer
Week 15	**Mid Term Exam**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Personal safety
Week 2	Lab 2: PCR protocol
Week 3	Lab 3: Reverse transcription polymerase chain reaction (RT-PCR)
Week 4	Lab 4: Polymerase Chain Reaction
Week 5	Lab 5: Polyacrylamide Gel Electrophoresis (PAGE) (SDS)

Week 6	Lab 6: cloning vector and its types
Week 7	Mid Exam
Week 8	Lab 8: ligation
Week 9	Lab 9: reflip
Week 10	Lab 10: Isolation of genomic DNA from different sources (animal cells and Bacteria)
Week 11	Lab 11: Isolation of genomic DNA from different sources (animal cells and Bacteria)
Week 12	Lab 12: Isolation of genomic DNA from different sources (animal cells and Bacteria)
Week 13	Lab 13: Isolation of genomic DNA from different sources (animal cells and Bacteria)
Week 14	Lab 14: Isolation of genomic DNA from different sources (animal cells and Bacteria)
Week 15	Lab 15: Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	**Molecular Biology of the Cell** – by Bruce Alberts, Alexander Johnson, Julian Lewis, et al.	Yes
Recommended Texts	**Molecular Cell Biology** – by Harvey Lodish, Arnold Berk, et al.	No
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	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
(0 – 49)	**F –** Fail	راسب	(0-44)	Considerable amount of work required

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Human Cytogenetics معلومات المادة الدراسية					
Module Title	**Human Cytogenetics**			**Module Delivery**	
Module Type	**CORE**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MBt32-HC**				
ECTS Credits	8				
SWL (hr/sem)	200				
Module Level		3	**Semester of Delivery**		6
Administering Department		Molecular &Medical biotechnology	**College**	Biotechnology	
Module Leader	Prof. Dr. Ali Zaid Al-Saffar		**e-mail**	ali.saffar@nahrainuniv.edu.iq	
Module Leader's Acad. Title		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		1/10/2025	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Principles of Genetics	**Semester**	6
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• Understand the fundamental principles and techniques of human cytogenetics. • Gain knowledge of the structure and organization of the human genome. • Explore the various types of chromosomal aberrations and their impact on human health. • Learn about the different methods used in the cytogenetic analysis, including karyotyping and FISH (Fluorescence *in situ* Hybridization). • Understand the role of cytogenetics in the diagnosis and classification of genetic disorders. • Study the principles of prenatal and postnatal cytogenetic testing and their applications. • Explore the use of cytogenetics in cancer research and its implications for diagnosis and treatment. • Develop critical thinking and analytical skills in the interpretation of cytogenetic data. • Understand the ethical, legal, and social implications of cytogenetic testing. • Gain practical laboratory skills for conducting cytogenetic experiments and data analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Demonstrate a comprehensive understanding of the principles and techniques of human cytogenetics. • Apply knowledge of the structure and organization of the human genome to analyze and interpret cytogenetic data. • Identify and classify various types of chromosomal aberrations and their clinical significance. • Perform cytogenetic laboratory techniques, such as karyotyping and FISH, accurately and efficiently. • Evaluate the role of cytogenetics in the diagnosis and management of genetic disorders and cancer. • Critically analyze cytogenetic data and generate accurate interpretations and conclusions. • Recognize and address ethical, legal, and social considerations in cytogenetic

	testing and research. • Demonstrate effective communication skills in presenting cytogenetic findings and discussing their implications. • Work collaboratively in a laboratory setting to conduct cytogenetic experiments and data analysis. • Continuously update knowledge in the field of human cytogenetics through self-directed learning and research.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to Human Cytogenetics: Overview of cytogenetics and its importance in human genetics. History and milestones in the field of human cytogenetics. Basic concepts of chromosome structure and function. Chromosomal Abnormalities: Types of chromosomal aberrations, such as numerical and structural abnormalities. Down syndrome, Turner syndrome, Klinefelter syndrome, and other common chromosomal disorders. Relationship between chromosomal abnormalities and phenotypic manifestations. Cytogenetic Techniques: Karyotyping: sample collection, cell culture, staining, and analysis. Fluorescence In Situ Hybridization (FISH): principles, probes, and applications. Array Comparative Genomic Hybridization (aCGH) and next-generation sequencing techniques. Prenatal and Postnatal Cytogenetic Testing: Methods and procedures for prenatal genetic testing, including amniocentesis and

	chorionic villus sampling. Postnatal testing for genetic disorders, cancer, and infertility. Genetic counseling and informed consent in cytogenetic testing. Cytogenetics in Cancer Research: Role of cytogenetics in identifying chromosomal abnormalities associated with various types of cancers. Molecular cytogenetics techniques for cancer diagnosis, prognosis, and targeted therapies. Emerging Technologies and Applications: Advances in cytogenetic techniques, such as whole-genome sequencing and single-cell analysis. Non-invasive prenatal testing (NIPT) and cell-free fetal DNA analysis. Cytogenomics and its integration with other genomic approaches. Ethical, Legal, and Social Implications: Ethical considerations in cytogenetic testing and research. Legal regulations and guidelines governing genetic testing and privacy. Psychosocial impact on individuals and families receiving cytogenetic results. Case Studies and Data Analysis: Interpretation and analysis of cytogenetic data from patient samples. Case studies highlighting the diagnostic and prognostic value of cytogenetics. Integration of cytogenetic findings with other clinical and molecular data. Laboratory Skills: Hands-on training in cytogenetic laboratory techniques, including sample processing, chromosome analysis, and image interpretation. Quality control and assurance in cytogenetic testing. Current Research and Future Directions: Emerging trends and research topics in human cytogenetics. Potential applications of cytogenetics in personalized medicine and gene therapy.

	Challenges and future directions in the field of human cytogenetics.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Lab.	1	10% (10)	Continuous	All

	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction: What are Chromosomes
Week 2	Chromosomes and Cell Cycle
Week 3	Variation in Chromosomal Structure Part I
Week 4	Variation in Chromosomal Structure Part II
Week 5	Variation in Chromosome Number Part I
Week 6	Variation in Chromosome Number Part II
Week 7	Mid–Course Exam
Week 8	Y and X Chromosomes, X-Inactivation
Week 9	Sex Related Disorders
Week 10	Nomenclature and formulation of chromosomal disorders
Week 11	The biology of cancer cells
Week 12	Introduction to Cancer Cytogenetics
Week 13	Epigenetics and Cancer
Week 14	Modern Techniques Used in Human Cytogenetic Analysis (Part 1)
Week 15	Modern Techniques Used in Human Cytogenetic Analysis (Part 2)

Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction: definition of genetics laboratory requirements.
Week 2	Chromosome structure
Week 3	Cytogenetics techniques
Week 4	Presentation in cytogenetics techniques (Q- banding, G-banding).
Week 5	Presentation in cytogenetics techniques (R-banding, C-banding).
Week 6	Chromosome abberration
Week 7	First mid exam
Week 8	Rules for nomenclature of chromosome aberrations
Week 9	Cytogenetics testing
Week 10	Micronucleus test
Week 11	Second mid exam
Week 12	Report dissuction
Week 13	Reporr disscution
Week 14	Final exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the**

		Library?
Required Texts	Cancer Cytogenetics Chromosomal and Molecular Genetic Aberrations of Tumor Cells, Sverre Heim	No (Available as an e-book)
Recommended Texts	The Principles of Clinical Cytogenetics, Steven L. Gersen Martha B. Keagle Editors	No (Available as an e-book)
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Enzymology			**Module Delivery**	
Module Type	S			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MBt31-EN				
ECTS Credits	100				
SWL (hr/sem)					
Module Level	3		**Semester of Delivery**	5	
Administering Department	Molecular &Medical Biotechnology		**College**	Biotechnology	
Module Leader	Dr. maha Hameed		**e-mail**	Maha.albahrani@nahrainuniv.edu.iq	
Module Leader's Acad. Title	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	01/10/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Biochemistry	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The main goal of the course is to emphasize the structure-function relationship of enzymes, the understanding of catalytic strategies of the major classes of enzymes,

	the role of enzymes in nucleic acid metabolism and their contribution in recombinant DNA technology, the benefits of protein/enzyme engineering, the strategies of selection and improvement of enzymes from pathogens and, finally, highlight current applications of enzymology in therapeutics and industry.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Recognize how enzymatic reactions occurs • List the various terms associated with enzymes. • Summarize what is meant by enzyme active sites. • Discuss the enzymatic reactions • Describe the optimum conditions for enzyme production • Discuss purification techniques. • Discuss characterization of enzyme • Discuss the effect of PH and temperatures on enzyme activity. • Discuss the relationship between substrate concentration and enzyme activity. • Explain the kinetics of enzymes. • Discuss the medical applications of enzymes
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A - Enzymes</u> Biocatalysis, Proteins and enzymes Enzyme active sites Cofactor, coenzymes, Prosthetic group, structure of enzymes <u>Part B – Purification</u> Ammonium sulfate precipitation, Ion exchange chromatography, Gel filtration chromatography Part C- Enzyme Kinetics Michaelis menton, lineweaver burg, Velocity

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	

	The main strategy that will be adopted in this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	تملا من قبل القسم	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل			

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Understand basic principles of enzyme function, enzyme naming
Week 2	-classification – structure

Week 3	Define the mechanisms of enzyme reactions, Enzymatic and non-enzymatic reactions
Week 4	Enzyme theories
Week 5	Factors affecting enzyme activity
Week 6	Mid-term Exam
Week 7	enhancers of enzyme activity
Week 8	inhibitors of enzyme activity
Week 9	Types of microbial enzymes
Week 10	Types of plant enzymes
Week 11	Report
Week 12	Mid-Exam
Week 13	Enzymes in Industry: Production And Applications
Week 14	Discuss current applications and prospects in the field of Medical Enzymology-1
Week 15	Discuss current applications and prospects in the field of Medical Enzymology-2
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to practical enzymology
Week 2	Lab 2: Enzyme assay
Week 3	Lab 3: Extraction and preliminary purification of invertase from yeast or bacteria
Week 4	Lab 4: Determination of Protein concentration
Week 5	Lab 5: Optimum Conditions for Enzyme Production and Activity
Week 6	Lab 6: Exam
Week 7	Lab 7: Enzyme purification techniques
Week8	Lab8: Ion exchange chromatography
Week9	Lab9: Gel filtration chromatography
Week10	Lab10: HPLC
Week11	Lab11: Characterization (Check up for the final purified enzyme)
Week12	Lab12: Liver enzyme assay

Week13	Lab13: Cardiac enzyme assay
Week14	Lab14: Stone enzyme assay
Week15	Lab15: Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	ENZYMES: Catalysis, Kinetics and Mechanisms, N. S. Punekar, 2018 Enzyme Technology , Published by N.K. Muraleedharan for Asiatech Publishers Inc.,2006	No
Recommended Texts	Biochemistry seventh edition, JAYPEE BROTHERS MEDICAL PUBLISHERS (P) LTD 2013	No
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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Ethics**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** **Lecture** **Lab** **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**URETH**				
ECTS Credits	**1**				
SWL (hr/sem)	**25**				
Module Level		3	**Semester of Delivery**		6
Administering Department		**Department of molecular and medical biotechnology**	**College**	**Biotechnology**	
Module Leader	Dr. Hameed M. Jasim		**e-mail**	Hameed.jasim@nahrainuniv.edu.iq	
Module Leader's Acad. Title		Profess1or	**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		01/9/2025	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	**Objectives of Professional Ethics in a Career** 1. **To ensure professional, responsible behavior** in the workplace. 2. **To improve trust** between employees, employers, and clients. 3. **To create a fair, safe, and respectful work environment.** 4. **To promote transparency and honesty** in all job activities. 5. **To reduce conflicts, misunderstandings, and ethical violations.** 6. **To improve job performance and organizational success.** 7. **To support accountability** in decision-making and problem-solving. 8. **To develop strong professional relationships and teamwork.**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**Knowledge Outcomes** 1. **Define** the concept of professional ethics and its importance in the workplace. 2. **Identify** major ethical principles such as integrity, responsibility, confidentiality, and fairness. 3. **Explain** the role of ethics in professional behavior, decision-making, and workplace culture. 4. **Recognize** common ethical issues and dilemmas in different careers. **2. Skills Outcomes** 5. **Apply** ethical principles to real workplace situations and make responsible decisions. 6. **Demonstrate** professional communication and respectful interaction with colleagues and clients. 7. **Evaluate** ethical challenges and propose appropriate solutions. 8. **Practice** accountability, teamwork, and proper use of workplace resources. **3. Attitude Outcomes** 9. **Show commitment** to honesty, fairness, and respect in professional settings. 10. **Demonstrate** positive work ethics such as punctuality, reliability, and confidentiality. 11. **Develop** a sense of social responsibility and professional integrity. 12. **Value** the importance of continuous learning and maintaining professional competence.

	•
Indicative Contents المحتويات الإرشادية	**Introduction to Professional Ethics** • Definition and importance of ethics in the workplace • Ethical theories and moral reasoning • Ethics vs. laws and regulations **2. Core Ethical Principles** • Integrity and honesty • Responsibility and accountability • Respect and dignity at work • Confidentiality and privacy • Fairness, justice, and non-discrimination **3. Professional Conduct and Behavior** • Professional appearance and communication • Work discipline: punctuality, reliability, and commitment • Ethical use of technology and workplace resources • Social media ethics and digital professionalism **4. Workplace Relationships** • Ethics in teamwork and collaboration • Respectful communication with colleagues and clients • Managing conflicts ethically • Avoiding harassment, bullying, and discrimination **5. Ethical Decision-Making** • Steps in ethical problem-solving • Identifying and analyzing ethical dilemmas • Case studies from real workplace situations **6. Organizational Ethics** • Code of conduct and corporate ethics policies • Whistleblowing and reporting unethical practices • Employer–employee ethical obligations • Leadership ethics and professional accountability **7. Professional Competence and Development** • Lifelong learning and updating skills • Ethical responsibility in professional growth • Maintaining standards and quality in work performance

	8. Ethical Issues in Different Careers • Healthcare ethics • Business and management ethics • Education ethics • Laboratory and scientific ethics • Public service ethics **9. Global and Cultural Perspectives** • Ethics in multicultural workplaces • International codes of ethics • Cultural influences on ethical behavior **10. Contemporary Ethical Challenges** • Artificial intelligence and automation • Data protection and cybersecurity • Workplace diversity and inclusion • Sustainability and corporate social responsibility

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Lectures (Theoretical Presentation)** • Introduce key ethical concepts, principles, and workplace standards. • Provide structured explanations and foundational knowledge. **2. Interactive Discussions** • Encourage students to express opinions about ethical issues. • Promote critical thinking and multiple perspectives. **3. Case Study Analysis** • Present real or simulated workplace scenarios. • Students identify ethical dilemmas and propose solutions. • Enhances decision-making and problem-solving skills. **4. Group Work / Team Activities** • Collaborative tasks on ethical topics.

- Students learn teamwork, communication, and respectful discussion.

5. Role-Playing

- Simulate workplace conflicts, ethical violations, or communication situations.
- Helps students practice applying ethics in real-life contexts.

6. Brainstorming Sessions

- Generate ideas around ethical challenges in different careers.
- Encourages creativity and active participation.

7. Reflective Journals

- Students write about their own values and experiences.
- Promotes self-awareness and ethical sensitivity.

8. Problem-Based Learning (PBL)

- Students work on complex ethical problems without direct answers.
- Encourages independent thinking and judgment.

9. Multimedia and Videos

- Use documentaries, interviews, or short films showing ethical dilemmas.
- Visual examples help students understand real-world practices.

10. Guest Lectures / Industry Experts

- Professionals share real ethical challenges from workplaces.
- Connects theory with practice.

11. Workshops and Seminars

- Focus on specific topics such as confidentiality, workplace culture, or codes of conduct.
- More interactive and skill-focused.

12. Peer Teaching

- Students present ethical topics to the class.
- Develops communication, leadership, and responsibility.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	8
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	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered

Week 1	Introduction to Professional Ethics
Week 2	Ethical Theories and Moral Reasoning
Week 3	Core Ethical Principles
Week 4	Confidentiality and Privacy
Week 5	Professional Conduct and Behavior
Week 6	Workplace Relationships
Week 7	**Mid-term Exam**
Week 8	Ethical Decision-Making Models
Week 9	Organizational Ethics
Week 10	Professional Competence
Week 11	Industry-Specific Ethics (Sector Examples)
Week 12	Global and Cultural Perspectives
Week 13	Contemporary Ethical Challenges
Week 14	Case Study Presentations
Week 15	Final Review and Assessment
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• **Shapiro, J.P., & Stefkovich, J.A.** (2022). Ethical Leadership and Decision Making in Education: Applying Theoretical Perspectives to Complex Dilemmas (5th Edition). Routledge.	

Recommended Texts	• **Kidder, R.M.** (2020). How Good People Make Tough Choices: Resolving the Dilemmas of Ethical Living (2nd Edition). HarperCollins.	
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.

Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
Directorate of Quality Assurance and Academic Accreditation
Accreditation Department

Academic Program and Course Description Guide

2025

Introduction:

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

In this regard, we can only emphasize the importance of writing an academic programs and course description to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a brief summary of its vision, mission and objectives, including an accurate description of the targeted learning outcomes according to specific learning strategies.

Course Description: Provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the students to achieve, proving whether they have made the most of the available learning opportunities. It is derived from the program description.

Program Vision: An ambitious picture for the future of the academic program to be sophisticated, inspiring, stimulating, realistic and applicable.

Program Mission: Briefly outlines the objectives and activities necessary to achieve them and defines the program's development paths and directions.

Program Objectives: They are statements that describe what the academic program intends to achieve within a specific period of time and are measurable and observable.

Curriculum Structure: All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.

Learning Outcomes: A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.

Teaching and learning strategies: They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

Academic Program Description Form

University Name: ….**AL–Nahrain University**……

Faculty/Institute: …..**College of Biotechnology**……

Scientific Department: ..**Molecular and Medical Biotechnology**……

Academic or Professional Program Name: **Bachelor's**……

Final Certificate Name: **Bachelor's.in Molecular and Medical Biotechnology**……

Academic System: …**Semester**

Description Preparation Date: **1/9/2025**

File Completion Date: **1/11/2025**

Signature:

Head of Department Name:

Date:

Signature:

Scientific Associate Name:

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date:

Signature:

Approval of the Dean

1. Program Vision

Graduating students equipped with excellent theoretical knowledge, practical skills and attaining new heights in molecular and medical biotechnology research, to become a pioneering tool in applied scientific research for diagnosis and therapy on a global level and employing it to serve society

2. Program Mission

To provide students with an education that incorporates academic study with intense practical education in a research-producing environment and creativity and to contribute to enhancing scientific research and community partnership through optimal investment of human and technical resources and building an effective partnership.

3. Program Objectives

1. To give students the essential theoretical background, analytical abilities, and foundational research knowledge skills in various disciplines of molecular and medical biotechnology that will enable them to seek higher education at reputable institutions nationally as well as internationally.
2. Providing technicians capable of applying knowledge and skills to solve theoretical and practical problems and creating a strong and reliable infrastructure to implement advanced applications in the field of molecular and medical biotechnology and genetic sequencing as a diagnostic and therapeutic tool for genetic and immunological diseases and malignant tumors.
3. Encourage the concept of teamwork and communication skills and promoting entrepreneurship among graduate's students in medical biotechnology.
4. Enhancing students' scientific and practical skills and contributing to enhancing scientific research and community partnership through optimal investment of human and technical resources and building an effective partnership.
5. To encourage students to start their own businesses in fields related to medical biotechnology.
6. Exhibit a high level of experience and professionalism in the ethical consequences of the medical sector and in accordance with the values of the profession in society.

7. Aligning academic outputs with the needs of the labor market and keeping pace with its developments to promote academic programs.
8. To plan and participate in events, conferences, symposiums, workshops, and interactions with scholars and academic institutions both locally and globally.

General statements describing what the program or institution intends to achieve.

4. Program Accreditation

NO

5. Other external influences

Ministry of Higher Education and Scientific Research

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	8		16%	
College Requirements	8		16%	
Department Requirements	34		68%	
Summer Training	YES			
Other				

* This can include notes whether the course is basic or optional.

Program Description

Credit Hours		Course Code	Course Name	Year/Level
practical	theoretical			
2	2	MBt11-GB	General Biology-I	First stage/first semester
2	2	MBt11-AC	Analytical Chemistry	
2	2	MBt11-PB	Principles ofBiotechnology- |	
2	2	MBt11-Bp	Biophysics	
-	2	MBt12-BS	Biostatistics	
-	2	MBt 11-CS	Computer Science	
-	2	UN11-Eng	English	
2	2	MBt12-GB	General Biology-II	First stage/Sec.semester
2	2	MBt12-PB	Principles of Biotechnology	
2	2	MBt12-OC	Organic Chemistry	
2	2	MBt12-PG	Principles of Genetics	
-	2	MBt12-BRM	Biosafety and Risk management	
-	2	UN12-HR-D	Human rights and Democracy	
-	2	UN12-Ab	Arabic	
2	2	BTM21-His	**Histology**	Second stage/first semester
2	2	BTM21-BicI	**Biochemistry I**	
2	2	BTM22-Em	**Embryology**	
2	2	BTM21-GMic	**General Microbiology**	
2	2	BTM21- EvBt	**Environmental Biotechnology**	
-	2	BTM21-BiSa	**Biosafety and Risk Management**	

-	2	UN21-HR	Human Rights	
-	1	UN21-EnI	English Language I	
-	-	-	Physical Education	
2	2	BTM22– APhy	Animal Physiology	Second stage/Sec. semester
2	2	BTM22– BicII	Biochemistry II	
2	2	BTM22– MeMi	Medical Microbiology	
2	2	BTM22– MiGe	Microbial Genetics	
2	2	BTM22– MiPhy	Microbial Physiology	
2	2	BTM22– Myc	Mycology	
-	2	UN22– Dem	Democracy	
-	1	UN22-EnII	English Language II	
-	-	-	Physical Education	
2	2	BTM31-Im	Immunology	Third stage/first semester
2	2	BTM31-MoBI	Molecular Biology- I	
-	2	BTM31-GeEnI	Genetic Engineering- I	
2	2	BTM31-InMi	Industrial Microbiology	

2	2	BTM31-ATC	Animal Tissue Culture	
-	2	BTM31-MoTech	Molecular Technologies	
-	2	BTM31-ExDe	Experimental Design and Academic Writing	
-	1	UN31-EnI	English Language I	
-	-	-	Physical Education	
2	2	BTM32-HuCy	Human Cytogenetic	Third stage/Sec.semester
2	2	BTM32-Vi	Virology and Vaccines	
-	2	BTM32-GeEnII	Genetic Engineering II	
-	2	BTM32-NaBt	Nanobiotechnology	
2	2	BTM32-AnVa	Antibiotics	
2	2	BTM32-MoBII	Molecular Biology-II	
-	2	BTM32-MoDia	Molecular Diagnostics	
-	1	UN31-EnII	English Language II	
-	-	-	Physical Education	
2	2	BMT41-Ez	Enzymology	fourth stage/first semester
2	2	BTM41-To	Toxicology	
2	2	BTM41-DnaTy	Forensic Science and DNA Typing	
-	2	BTM42-PrGe	Genomics and Proteomics	
2	-	BTM41-RePro	Graduation Research Project I	
-	1	UN41-EnI	English Language I	
-	2	BTM41I-E	Elective I	
-	-	-	Physical Education	
2	2	BTM42-MoGe	Molecular Genetics	
-	2	BTM42-MeBt	Medical Biotechnology	
2	2	BTM41-Binfo	Bioinformatics	
-	2	BTM42-PhBt	Pharmaceutical Biotechnology	

2	-	BTM42-ReProII	Graduation Research Project II	fourth stage/Sec.semester
-	1	UN42-EnII	English Language II	
-	2	BTM42E-II	Elective II	
-	-	-	Physical Education	

8. Expected learning outcomes of the program

Knowledge	
Enabling students to obtain knowledge and understanding of the intellectual framework in the department	Clarification and explanation of study materials by academic staff through available modern capabilities Providing students with knowledge through classroom and extracurricular vocabulary assignments
Enabling students to obtain knowledge and understanding of the various standards in the Department	Asking students to visit the library to obtain academic knowledge related to academic vocabulary
Skills	

. Deep understanding of basic concepts in life sciences and biotechnology. 2. The ability to use and apply different techniques and methods used in biological research, such as molecular, cellular and genetic techniques. 3. Develop basic laboratory skills, including the correct preparation, analysis, and interpretation of biological data. 4. Understand professional ethics and social responsibilities related to working in the field of biotechnology. 5. Developing the ability to think critically and analytically and evaluate vital research and results. 6. Develop scientific communication skills, including scientific writing, reports, and presentations.	1 - Providing advanced study programs and research projects that aim to deal with microorganisms in the medical and immunological fields. 2 - Familiarity with the vocabulary of the specialty is able to work in medical laboratories and conduct laboratory analyzes and molecular examinations while meeting quality standards and raising professional skills related to this specialty to contribute to building a society and strengthening scientific ties with Arab and international universities and research centers. 3 - Teaching skills and techniques for early detection of the genes responsible for many hereditary diseases by following modern techniques of genetic and immunological engineering and tissue culture of animal cells, thus making the specialty capable of providing society with knowledge and distinguished cadres with scientific specialization in the field of molecular and medical life technologies. 4- Interpreting biological phenomena using scientific concepts and appropriate techniques. 5-. Application of advanced biotechnology in research and industrial laboratories. 6. Analyze vital data using approved statistical software and tools.
Ethics	

. Quality: Achieving high standards in understanding biological concepts and applying biotechnology effectively. 2. Sustainability: The ability to use acquired knowledge and skills permanently and effectively in various life and professional contexts. 3. Innovation: The ability to think creatively and provide new and innovative solutions to vital challenges. 4. Responsibility: Dealing ethically and responsibly in using and applying biotechnology to solve problems and achieve scientific and social development.	. Deep understanding of biological concepts and advanced technologies used in research and industrial applications. 2. Develop laboratory work skills including preparation, analysis, and correct interpretation of biological data. 3. The ability to use software and statistical tools specialized in analyzing vital data. 4. Develop effective communication skills, whether in scientific writing, reports, or presentations. 5. Commitment to professional ethics and social responsibility in the field of biotechnology.

7. **Teaching and Learning Strategies**

Using modern methods to deliver information in a scientific and understandable way, such as using the interactive whiteboard with students, modern presentation methods, and progressive video to facilitate the delivery of information to students.

8. Evaluation methods
Conducting daily exams and interactive participation within the classroom, in addition to preparing scientific reports and holding discussion circles to present . modern scientific topics in the scientific specialization, in addition to conducting quarterly and final exams for practical and theoretical subjects.
11. Faculty
Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	Biotechnology	Molecular Biology			3	
Assistant Professor	Biotechnology	Molecular Biology			2	
Lecturer	Biotechnology	Molecular Biology			6	
Assistant Lecturer	Biotechnology	Molecular Biology			5	
Professor	Biotechnology	Microbiology			1	
Assistant Professor	Biotechnology	Microbiology			3	
Lecturer	Biotechnology	Microbiology			6	
Assistant Lecturer	Biotechnology	Microbiology			5	
Professor	Biotechnology	Immunology			1	
Assistant Professor	Biotechnology	Immunology			1	
Lecturer	Biotechnology	Immunology			1	
Assistant Lecturer	Biotechnology	Immunology			2	

Professor	Biotechnology	Enzymology			3	
Lecturer	Biotechnology	Enzymology			1	
Assistant Lecturer	Biotechnology	Enzymology			1	
Professor	Biotechnology	Animal tissue culture			1	
Assistant Professor	Biotechnology	Animal tissue culture			1	
Assistant Lecturer	Biotechnology	Animal tissue culture			1	
Professor	Biotechnology	Cytogenetic			1	
Assistant Professor	Biotechnology	Cytogenetic			1	

Professional Development

Mentoring new faculty members

Briefly describes the process used to mentor new, visiting, full-time, and part-time faculty at the institution and department level.

Professional development of faculty members

Briefly describe the academic and professional development plan and arrangements for faculty such as teaching and learning strategies, assessment of learning outcomes, professional development, etc.

9. Acceptance Criterion

Graduates of preparatory school / biological scientific branch / central admission

10. The most important sources of information about the program

- University requirements - Local scientific trends - International scientific requirements - Coverage of locally specialized staff

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11. Program Development Plan

The proposed development plans for an academic program in biotechnology vary according to market needs and modern scientific and technological developments. Among the proposed plans are:

1. Updating the curriculum to include recent developments in the fields of biotechnology.
2. Introducing new courses covering emerging topics such as genomics, gene editing, and personalized medicine.
3. Developing specialized educational programs in advanced biotechnology such as genetic engineering and complex biological systems.
4. Promote practical training and laboratory experiments to enhance students' skills in the practical application of biotechnologies.
5. Providing hands-on training opportunities and collaborating with industry and research institutions to enhance students' understanding of real-world applications of biotechnology.

Program Skills Outline															
Required program Learning outcomes															
Ethics				**Skills**				**Knowledge**				**Basic or optional**	**Course Name**	**Course Code**	**Year/Level**
C4	**C3**	**C2**	**C1**	**B4**	**B3**	**B2**	**B1**	**A4**	**A3**	**A2**	**A1**				
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	General Biology-I	**MBt11-GB**	First stage/first semester
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	Analytical Chemistry	**MBt11-AC**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	Principles ofBiotechnology- |	**MBt11-PB**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	Biophysics	**MBt11-Bp**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	Biostatistics	**MBt12-BS**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	Computer Science	**MBt 11-CS**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	English	**UN11-Eng**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	General Biology-II	**MBt12-GB**	irst stage/Sec.semester
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	Principles of	**MBt12-PB**	
													Biotechnology	**EvBt**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Biosafety and Risk Management**	**BTM21-BiSa**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Human Rights**	**UN21-HR**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**English Language I**	**UN21-EnI**	

√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Physical Education**	-	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Animal Physiology**	**– APhy BTM22**	Second stage/Sec. semester
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Biochemistry II**	**– BicII BTM22**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Medical Microbiology**	**– MeMi BTM22**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Microbial Genetics**	**– MiGe BTM22**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Microbial Physiology**	**– MiPhy BTM22**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Mycology**	**– Myc BTM22**	

												Biotechnolo gy		
√	√	√	√	√	√	√	√	√	√	√	**Basic**	Organic Chemistry	**MBt12-OC**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	Principles of Genetics	**MBt12-PG**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	Biosafety and Risk manageme Nt	**MBt12-BRM**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	Human rights and Democracy	**UN12-HR-D**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	Arabic	**UN12-Ab**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Histology**	**BTM21-His**	Second stage/first semester
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Biochemistry I**	**BTM21-BicI**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Embryology**	**BTM22-Em**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**General Microbiology**	**BTM21-GMic**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Environment al**	**BTM21-**	

												Biotechnolog y	**EvBt**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Biosafety and Risk Management**	**BTM21-BiSa**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Human Rights**	**UN21-HR**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**English Language I**	**UN21-EnI**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Physical Education**	-	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Animal Physiology**	**– APhy BTM22**	Second stage/Sec. semester
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Biochemistry II**	**– BicII BTM22**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Medical Microbiology**	**– MeMi BTM22**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Microbial Genetics**	**– MiGe BTM22**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Microbial Physiology**	**– MiPhy BTM22**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Mycology**	**– Myc BTM22**	

√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Democracy**	**UN22– Dem**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**English Language II**	**UN22-EnII**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Physical Education**	-	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Immunology**	**BTM31-Im**	Third stage/first semester
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Molecular Biology- I**	**-MoBI BTM31**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Genetic Engineering- I**	**-GeEnI BTM31**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Industrial Microbiology**	**-InMi BTM31**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Animal Tissue Culture**	**-ATC BTM31**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Molecular Technologies**	**-MoTech BTM31**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Experimental Design and Academic Writing**	**-ExDe BTM31**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**English Language I**	**UN31-EnI**	

√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Democracy**	**UN22– Dem**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**English Language II**	**UN22-EnII**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Physical Education**	**-**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Immunology**	**BTM31-Im**	Third stage /first semester
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Molecular Biology- I**	**-MoBI BTM31**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Genetic Engineering- I**	**-GeEnI BTM31**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Industrial Microbiology**	**-InMi BTM31**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Animal Tissue Culture**	**-ATC BTM31**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Molecular Technologies**	**-MoTech BTM31**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Experimental Design and Academic Writing**	**-ExDe BTM31**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**English Language I**	**UN31-EnI**	

√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Physical Education**	**-**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Human Cytogenetic**	**BTM32-HuCy**	Third stage/Sec.semester
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Virology and Vaccines**	**BTM32-Vi**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Genetic Engineering II**	**-GeEnII BTM32**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Nanobiotechno logy**	**-NaBt BTM32**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Antibiotics**	**-AnVa BTM32**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Molecular Biology-II**	**-MoBII BTM32**	
√	√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Molecular Diagnostics**	**-MoDia BTM32**	

√	√	√	√	√	√	√	√	√	√	√	**Basic**	**English Language II**	**UN31-EnII**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Physical Education**	**-**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Enzymology**	**BMT41-Ez**	fourth stage/first semester
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Toxicology**	**BTM41-To**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Forensic Science and DNA Typing**	**-DnaTy BTM41**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Genomics and Proteomics**	**-PrGe BTM42**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Graduation Research Project I**	**-RePro BTM41**	
√	√	√	√	√	√	√	√	√	√	√	**optional**	**Elective I**	**BTM41I-E**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Molecular Genetics**	**BTM42-MoGe**	fourth stage/Sec.semester
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Medical Biotechnology**	**-MeBt BTM42**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Bioinformatics**	**-Binfo BTM41**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Pharmaceutical Biotechnology**	**-PhBt BTM42**	
√	√	√	√	√	√	√	√	√	√	√	**Basic**	**Graduation Research Project II**	**-ReProII BTM42**	
√	√	√	√	√	√	√	√	√	√	√	**optional**	**Elective II**	**BTM42E-II**	

Course Description Form

Course Name:
Enzymology
Course Code:
BMT41-Ez
Semester / Year:
Semester 1, Year 4
Description Preparation
Date: 1\9\2025
Available Attendance Forms:
Attendance
Number of Credit Hours (Total) / Number of Units (Total): unit
60 hrs 3units
Course administrator's name (mention all, if more than one name)
Name: Dr. Asmaa Ali Hussein Email: asmaa.ali@nahrainuniv.edu.iq

e Objectives	
Course Objectives	• This course deals with the basic concept of enzymology. • The outcomes of this course provide students with knowledge and information as well as practical experience about enzymes / definition • To understand differences between enzymatic and non enzymatic reactions • To understand structure and function of enzymes. 5- Students learn about the importance of enzymatic reactions in clinical and industrial fields

Teaching and Learning Strategies	
Strategy	Effective teaching and learning strategies involve pre-lab preparation, demonstrations, guided inquiry, collaborative learn feedback, reflection, theory-application integration, and a strong emphasis on safety. These strategies aim to engage stud actively, reinforce theoretical concepts, develop critical thinking skills, and ensure a safe learning environment.

1. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
	2	Introduction, History & Course purpose	Introduction on biochemical reactions	PowerPoint, white board	Daily exams and homework
	2	Explaining the Enzyme nomenclature for the students	Enzyme nomenclature and classifications	Whiteboard Presentation	Daily exams and homework
	2	Explaining the differences between Enzymatic and non enzymatic reactions	Enzymatic and non enzymatic reactions	Whiteboard Presentation	Daily exams and homework
	2	Explaining the importance of Enzyme structure	Enzyme structure and active site	Whiteboard	Daily exams and homework
	2	Mid Exam	Mid exam		
	2	Definition of an isoenzymes	Isoenzymes and their importance in disease diagnosis	Presentation	Daily exams and homework
	2	Explaining optim conditions for enzy production	Optimum conditions for enzyme production	Whiteboard Power Point	Daily exams and homework
	2	Discussing the outline for purification techniques	Purification of enzymes using chromatographi c techniques	Whiteboard	Daily exams and homework
	2	Studying the importance of one step purification technique	Affinity chromatography purification	Whiteboard Power point	Daily exams and homework
	2	Mid	Mid exam	Whiteboard	Daily exams

		Exam			and homework
	2	Studying the factors affecting Enzyme activity	Characterization of purified enzyme	Whiteboard Power point	Daily exams and homework
	2	Studying enzyme kinetics	Enzyme kinetics	Whiteboard	Daily exams and homework
	2	Studying the importance for Medical applications of enzymes	Medical applications of enzymes	Whiteboard	Daily exams and homework
	2	Studying the industrial applications of enzymes	Industrial applications of enzymes	Whiteboard	Daily exams and homework
	2	Revision	revision		Daily exams and homework

2. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

3. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	No single textbook is used for the lecture material. But useful reference text is Structure and Mechanism in Protein Science: -A Guide to Enzyme Catalysis and Protein Folding, 2nd edition (1999), Alan Fersht, W.H. Freeman and Co. New York, NY 1999. – https://www.sciencedirect.com/bookseries/methods-in-enzymology -Webb E.C., NC-IUBMB. (1992) Enzyme Nomenclature: Recommendations of the Nomenclature Committee of the International Union of Biochemistry and Molecular Biology on the Nomenclature and Classification of Enzymes. Academic Press, New York, NY.
Recommended books and references (scientific journals, reports…)	Enzyme Technology , Published by N.K. Muraleedharan for Asiatech Publishers Inc.,2006 Enzymes

	A Practical Introduction to Structure, Mechanism, and Data Analysis By Robert A. Copeland · 2023
Electronic References, Websites	https://www.brenda-enzymes.org/

Course Description Form

Course Name:
Toxicology
Course Code
BTM41-To
Semester/Year
Semester 1, Year 4
Description Preparation Date:
1-9-2025
Avialable Attendance Form
Attendance
number of Credit Hours (Total) number of Units (Total)
60h 3 units
Course administrator's name (mention all, if more than one name)
Dr. Ruqaia mohammed, dr. Ali Zaid
Course Objectives
The outcomes of this course provide students with knowledge and information as well as practical experience ab how toxic compounds and mechanism of disease progression in human body, where they act?, what they c Students learn how toxic materials affected our body
Teaching and Learning Strategies
The number of teaching units are three units which consists of approximately 14-15 week timetabled study ov two hours lecturing with a three-hour practical laboratory every week. The teaching methods invo interactive/active learning lectures, videos, tutorial sessions, laboratory classes and homework assignment hours will be independent or self-directed study.

4. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2		Introduction, History & Course objective	PowerPoint, white board	Daily exams and homework

2	2		Principles of toxicology	Whiteboard Presentation	Daily exams and homework
3	2		Chemical toxin part 1	Whiteboard Presentation	Daily exams and homework
4	2		Chemical toxin part 2	Whiteboard	Daily exams and homework
5	2		Bacterial toxin part 1		
6	2		Bacterial toxin part 1	Presentation	Daily exams and homework
7	2		Fungal toxin part 1	Whiteboard Power Point	Daily exams and homework
8	2		Fungal toxin part 1	Whiteboard	Daily exams and homework
9	2		**Exam**	Whiteboard Power point	Daily exams and homework
10	2		Food toxin	PowerPoint, white board	Daily exams and homework

11	2		Factor affected activity of food tox	Whiteboard Presentation	Daily exams and homework
12	2		Immunotoxicity	Whiteboard Presentation	Daily exams and homework
13	2		Disease related to toxin	Whiteboard	Daily exams and homework
14	2		How could our body eliminate toxi		
15	2		Seminar	Presentation	Daily exams and homework
16	2		**Exam**	Whiteboard Power Point	Daily exams and homework

5. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning

6. Learning and Teaching Resources

Required textbooks (curricular books, if any)	A text book of modern toxicology, 4 th edition ISBN: 978-46206-5 Internet source
Main references (sources)	Power point presentation, videos
Recommended books and references (scientific journals, reports...)	
Electronic-References, Website	

Course Description Form

Course Name:
Bioinformatics
Course Code
BTM41-Binfo
Semester/Year
Semester 1, Year 4
Description Preparation Date:
1-9-2025
Avialable Attendance Form
Attendance
number of Credit Hours (Total) number of Units (Total)
60h 3 units
Course administrator's name (mention all, if more than one name)
Dr. Zaid altammimi,
Course Objectives
• Understand fundamental concepts of bioinformatics and computational biology. • Retrieve, analyze, and interpret biological sequences using databases and bioinformatics tools. • Perform sequence alignment, phylogenetic analysis, and motif prediction. • Explore genomic, transcriptomic, and proteomic datasets for biological insights.
Teaching and Learning Strategies
The number of teaching units are three units which consists of approximately 14-15 week timetabled study ov two hours lecturing with a three-hour practical laboratory every week. The teaching methods inv interactive/active learning lectures, videos, tutorial sessions, laboratory classes and homework assignment hours will be independent or self-directed study.
urse Structure

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

		Outcomes			
1	2		Introduction to Bioinformatics	PowerPoint, white board	Daily exams and homework
2	2		Sequence Analysis	Whiteboard Presentation	Daily exams and homework
3	2		Sequence Analysis		
4	2		Genomics and Transcriptomics		
5	2		Genomics and Transcriptomics		
6	2		Proteomics		
7	2		Phylogenetics		
8	2		structural Bioinformatics		
9	2		MID-EXAM		
10	2		Systems Biology and Network Analysis		
11	2		Computational Tools and Programming Basics		
12	2		Computational Tools and Programming Basics		
13	2		Computational Tools and Programming Basics		
14	2		Revision		
15	2		Seminar		
16	2		Exam		

7. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning

8. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	• Mount DW – *Bioinformatics: Sequence and Genome Analysis*, 3rd Edition, Cold Spring Harbor Laboratory Press, 2020. • Lesk AM – *Introduction to Bioinformatics*, 6th Edition, Oxford University Press, 2022. • Pevsner J – *Bioinformatics and Functional Genomics*, 5th Edition, Wiley-Blackwell, 2021.
Main references (sources)	Power point presentation, videos
Recommended books and references (scientific journals, reports...)	
Electronic-References, Website	

Course Description Form

Course Name:	
Molecular Genetics	
Course Code:	
BTM42-MoGe	
SemsterYear:	
2nd Semester / 4th year	
Description Preparation Date:	
1 / 10 / 2025	
Available Attendance Forms:	
Attendance	
Number of Credit Hours (Total) / Number of Units (Total)	
60 Hours / 3 Units	
Course administrator's name (mention all, if more than one name)	
Name	Sahar M. Hussein, Saja Ali Shareef Sahar.hussain@nahrainuniv.edu.iq, saja.ali@nahrainuniv.edu.iq
Course Objectives	
Course Objectives	• Covering the basics of molecular biology genetics. • Understanding and appreciating the potential of using modern applications of molecular biology. • Learning outcomes, teaching, learning, and assessment methods..
eaching and Learning Strategies	
Strategy	Teaching and Learning Methods 1- Lecture Method 2- PowerPoint System 3- Homework and Seminar System Learning Methods

	1- Weekly Quick Exams 2- Discussion, Questions, and Answers 3- International Network for Information on the Subject of Specialization Evaluation Methods 1- Weekly and Termly Exams 2- Student Performance Evaluation through Seminars 3- Grades Based on Homework

9. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2T+2L	Understand the theoreti and practica principles a foundations related to th subject	Introduction of molecular genetics, Genomestructure and function	Lectures and Seminars	1- Oral and written exams 2- Seminars
2	2T+2L	"	Eukaryotic gene regulation	"	"
3	2T+2L	"	Differences between Prokaryotes and Eukaryotes mechanisms of regulation.	"	"
4	2T+2L	"	Transcription factors	"	"
5	2T+2L	"	Structure and Function of RNA	"	"
6	2T+2L	"	Mid exam	"	"
7	2T+2L	"	Micro RNA	"	"
8	2T+2L	"	Oncogenes and Tumor Suppressor Genes	"	"
9	2T+2L	"	Mutation and SNPs	"	"
10	2T+2L	"	Personality medicine	"	"
11	2T+2L	"	Protein folding & Stability	"	"

12	2T+2L	″	Protein folding and stability	″	″
13	2T+2L	″	Genes and environment	″	″
14	2T+2L	″	Human genetic projects	″	″
15	2T+2L	″	Final exam	″	″

10. Course Evaluation
Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning.

11. Learning and Teaching Resources	
Required textbook (curricular books, any)	Text books Book of Molecular biology of gene Biology 304 –Spring 2016 Section 1001
Main referer (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic- References, Websi	

Course Description Form

12.Course Name:
Biomarkers in diseases
13.Course Code:
BTM41-E1
14.Semester /
Year: 1st/4th
15.Description Preparation Date:
1-9-2025
16.Available Attendance Forms:
Attendance
7.Number of Credit Hours (Total) / Number of Units (Total) 2
30 h/ 2units
18.Course administrator's name (mention all, if more than one name) P

Dr.Hanaa almahmoodi	hana.almahmoodi@nahrainuniv.edu.iq

19. Course Objectives	
Course Objectives	1. **Understand the concept of biomarkers** and explain their biological significance in the diagnosis and monitoring of different diseases. 2. **Identify different types of biomarkers** including diagnostic, prognostic, predictive, and therapeutic biomarkers used in clinical practice. 3. **Explain the molecular and cellular mechanisms** underlying biomarker production and their association with disease development and progression ..

20. Teaching and Learning Strategies	
• Effective teaching and learning strategies include pre-lab preparati demonstrations, guided inquiry, collaborative learning, feedba reflection, integration of theory and practice, and a strong focus safety. These strategies aim to actively engage students, reinfo theoretical concepts, develop critical thinking skills, and ensure a s learning environment.	

21. Course Structure

Week	Hours		Unit or subject name	Learning method	Evaluation method
Week1	Hrs		Introduction to biomarkers	White boar smart scre	
2	2		Characteristics of ideal biomarkers: sensitivity, specificity, and clinical relevance.	White boar Smart scree	
3	2		Types of biomarkers: diagnostic, prognostic, predictive, and therapeutic biomarkers.	White board Smart screen	
4	2		Molecular basis of biomarkers: genes, protein and metabolites.	White board Smart screen	
5	2		Techniques for biomarker detection: immunoassays, ELISA, and molecular methods.	White board Smart screen	
6	2		**First Monthly Exam**	White board Smart screen	First monthly exam
7	2		Bomarkers in cancer diagnosis and prognosis	White board Smart screen	
8	2		.Biomarkers in cancer diagnosis and prognosis	White board Smart screen	
9	2		.Biomarkers in cancer diagnosis and prognosis .	White board Smart screen	

10	2		Biomarkers in infectious diseases	White board Smart screen	
11	2		Biomarkers in infectious diseases	White board Smart screen	
12	2		Biomarkers in cardiovascular diseases.	White board Smart screen	
13	2		Biomarkers in cardiovascular diseases.	White board Smart screen	
14	2		Seminar	White board Smart screen	
15	2		2nd exam	White board Smart screen	Second mont exam

22. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning

23. Learning and Teaching Resources

- **Biomarkers: In Medicine, Drug Discovery, and Environmental Health** – by Kewal K. Jain.

- **Biomarkers in Disease: Methods, Discoveries and Applications** – edited by Venkataramana K. Sidharth

Course Description Form

24.Course Name:
Stem cells and gene therapy
25.Course Code:
BTM41-E1
26.Semester /
Year: 1st/4th
27.Description Preparation Date:
1-9-2025
28.Available Attendance Forms:
Attendance
9.Number of Credit Hours (Total) / Number of Units (Total) 2
30 h/ 2units
30.Course administrator's name (mention all, if more than one name) P
Prof. Dr. Zahraa k. Zedan & Asst. Prof. Moyasser B. Hadi

31. Course Objectives	
Course Objectives	• Enabling students to acquire the practical skills necessary to isolate and grow stem cells in the laboratory for therapeutic applications and laboratory studies, maintain stem cells in the laboratory, manipulate stem cells in the laboratory, and differentiate them into different cell types as needed. The main objectives can be listed below: • 1. Developing students' skills in isolating stem cells from various tissues, such as bone marrow, and growing them in culture dishes. • 2. Developing students' skills in understanding and identifying ideal applications of stem cells in therapeutic and medical applications. • 3. Developing skills in successfully growing stem cells in the laboratory. • 4. Developing skills in preserving stem cells under laboratory conditions. • 5. Developing students' skills in modifying stem cells in the laboratory according to experimental conditions..

32. Teaching and Learning Strategies
• Effective teaching and learning strategies include pre-lab preparati demonstrations, guided inquiry, collaborative learning, feedba

reflection, integration of theory and practice, and a strong focus safety. These strategies aim to actively engage students, reinfo theoretical concepts, develop critical thinking skills, and ensure a s learning environment.	

33. Course Structure

Week	Hours		Unit or subject name	Learning method	Evaluation method
1	2		Introduce students to the fundamentals an history of stem cells and gene therapy	White boar Smart scree	Quizes Monthly exam seminar
2	2		Identify the main types and classifications stem cells and gene therapy	White board Smart screen	
3	2		Explain main medical applications of stem cells	White board Smart screen	
4	2		Explain induced pluripotent stem cell (iPS generation	White board Smart screen	
5	2		**First Monthly Exam**	White board Smart screen	
6	2		Introduce methods of stem cell isolation a cultivation	White board Smart screen	
7	2		Explain methods of stem cell preservation and biobanking	White board Smart screen	

8	2		Introduce embryonic stem cells and their significance	White board Smart screen	
9	2		Explain adult stem cells and their applications	White board Smart screen	
10	2		Discuss key clinical cases treated with stem cell therapy	White board Smart screen	
11	2		Identify stem cell sources and their specific applications	White board Smart screen	
12	2		Explain challenges and limitations in gene therapy	White board Smart screen	
13	2		Present successful cases of targeted gene therapy	White board Smart screen	
14	2		Medical application of gene therapy	White board Smart screen	
15	2		2nd exam	White board Smart screen	Second month exam

34. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning

35. Learning and Teaching Resources

- st**em Cells: An Insider's Guide** – by Paul Knoepfler.
- **Stem Cells: Scientific Facts and Fiction** – by Christine L. Mummery, Anja van de Stolpe, and Bernard Roelen.
- **Principles of Gene Manipulation and Genomics** – by Sandy B. Primrose and Richard Twym

Course Description Form

Course Name:	
Pharmaceutical biotechnology	
Course Code: PTM, PP	
BTM42-PhBt	
Semester / Year	
2nd semester/ 4th year	
Description Preparation Date:	
1-10-2025	
Available Attendance Forms:	
Attendance	
Number of Credit Hours (Total) / Number of Units (Total)	
30 h/2 units	
Course administrator's name (mention all, if more than one name)	
Prof.Dr.Zahraa K. Zedan	zahraa.kamel@nahrainuni.edu.iq
Course Objectives	
Course Objectives	• **Training specialized personnel in pharmaceutical biotechnology fields, such as biopharmaceutical manufacturing, gene therapy, and treatment.** • **Understanding the mechanisms of drug production and development using technologies such as genetic engineering, nanotechnology, and code replication techniques.** • **Developing innovative treatments and understanding the mechanisms of biopharmaceutical production using modern biotechnology tools.** • **Designing innovative drug delivery systems that contribute to improving treatment efficacy and reducing side effects.** • **Contributing to the production of vaccines and serums using advanced biotechnology, thus enhancing global health security.** • **Developing sustainable biological solutions to address environmental and health challenges, such as reducing pollution and improving production quality..**
g and Learning Strategies	

Strategy	**First: Advanced Theoretical Education** **- Focusing on the integration of fundamental sciences such as biochemistry, genetics, molecular biology, and pharmacology.** **- Utilizing interactive lectures that combine presentations, educational videos, and scientific discussions.** **- Analyzing real-world case studies from biopharmaceutical companies to illustrate industry challenges and solutions.** **For Research-Based Learning** **- Encouraging students to participate in scientific research within research teams or graduation projects.** **- Publishing research in peer-reviewed scientific journals to develop scientific writing and academic communication skills.** **- Participating in workshops and scientific conferences to enhance knowledge exchange and networking with experts.** **Fourth: E-Learning and Technology** **- Utilizing digital learning platforms to provide interactive content and simulate laboratory experiments.** **- Employing artificial intelligence and virtual reality to explain complex biological processes.** **- Assessing performance through online tests and educational applications.**

36. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2**	Introducing the student to the fundamentals and history of pharmaceutical biotechnology.	An introduction to pharmaceutical biotechnology and a brief overview of the history of this field.	The whiteboar The screen	Daily quizzes and homework assignments in addition to monthly exams
2	**2**	Introducing the student to the most important pharmaceutical materials produced using rDNA	A detailed explanation of hov to use the rDNA method and necessary steps for doing so.	The whiteboar The screen	Daily quizzes and homework assignments in addition to monthly

		technology			exams
3	**2**	Introducing the student to t most important application of pharmaceutical biotechnology.	Applications of pharmaceutic biotechnology in medicine	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly exams
4	**2**	Introducing the student to t thod of producing insulin ar wth hormone using bacteria ls through gene cloning.	Key applications of insulin ar growth hormone production using biotechnology; detailed explanation.	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly exams
5	**2**	First monthly exam	First monthly exam	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly exams
6	**2**	Introducing the student to t trade and scientific names drugs produced using biotechnology	The most important methods used in naming and commercially marketing pharmaceutical materials produced using biotechnolog	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly exams
7	**2**	Pharmaceutical Biotechnology: Legal & Ethical Issues.	The most important ethical protocols for pharmaceutical drug industry	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly exams
8	**2**	Introducing the student to methods of producing medical enzymes using biotechnology, with examples.	Medical enzymes, their cloni and their applications in detai	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly exams
9	**2**	Introducing the student to	Manufactured vaccines and	The	Daily quizzes and

		vaccine production using biotechnology methods	their production methods in detail	whiteboard The screen	homework assignments in addition to monthly exams
10	**2**	Definition and explanation the most important cases o treatment using biotechnology-manufactur drugs	Applications of treatment wit bio produced drugs	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly exams
11	**2**	Introducing the student to t most important sources of cells used in drug manufacturing	Sources of cells used in drug manufacturing, their types, ar reasons for their use.	The whiteboard The screen	Daily quizzes a homework assignments in addition to monthly exam
12	**2**	Identifying the main obstac that accompany gene thera	A detailed explanation of the types of gene therapy	The whiteboard The screen	Daily quizzes a homework assignments in addition to monthly exam
13	**2**	Introducing the student to t most important cases of treatment with genetically engineered pharmaceutical materials.	Types of cases in which treatment with gene-based drugs has been successful, an the most important companie specializing in this line of production.	The whiteboard The screen	Daily quizzes a homework assignments in addition to monthly exam
14	**2**	The student is required to define the vectors used to transfer the genes responsil for drug manufacturing.	Types of vectors used to transfer genes used in pharmaceutical manufacturin and methods of modifying th	The whiteboard The screen	Daily quizzes a homework assignments in addition to monthly exam
15	**2**	2nd monthly exam	2nd monthly exam	The whiteboard The screen	Daily quizzes homework assignments addition monthly exam

37. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning

38. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction to biotechnology Book,2020 Pharmaceutical Biotechnology, Basics 2023
Main references (sources)	**Introduction: Trends and Developments in the Pharmaceutical and Life Sciences Industry** • **Chapter** • **Open Access** • **First Online: 20 February 2020** • **pp 1–5** **Application of Biotechnology in Pharmaceutical Manufacturing Control** • **Chapter** • **First Online: 21 May 2024** • **pp 31–42**
Recommended books and references (scientific journals, reports...)	**Harnessing synthetic biology for advancing RNA therapeutics and vaccine design** ○ Review Article ○ Open access ○ Published: 30 November 2023 ○ Volume 9, article number 60, (2023)
Electronic-References, Websites	https://link.springer.com/10.1007/978-3-030-3591 8_1?fromPaywallRec=tr

Course Description Form

Course Name:	
Forensic and DNA typing	
Course Code:	
BTM41-DnaTy	
Semester / Year:	
First 2025-2026	
Description Preparation Date:	
1-9-2025	
Available Attendance Forms:	
Attendance	
Number of Credit Hours (Total) / Number of Units (Total)	
60 h/3 units	
Course administrator's name (mention all, if more than one name)	
Dr sahar huseein + dr. mays T. abdallah	
se Objectives	
Course Objectives	• Understand the scientific fundamentals of forensic science. • Identify the molecular structure of DNA and the importance of mutations and genetic variations. • Use PCR, STR, and SNP techniques for DNA fingerprinting. • Apply methods for collecting and preserving biological samples for investigative purposes. • Analyze results using specialized software such as BioEdit, MEGA, and GeneMapper. • Discuss the ethical and legal issues associated with forensic genetic testing..
hing and Learning Strategies	
Strategy	- Lecture Method 2- PowerPoint System 3- Homework and Seminar System Learning Methods 1- Weekly Quick Exams

	2- Discussion, Questions, and Instant Answers 3- International Network for Information on the Subject of Specialization

39. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2+2	Understanding the theoretical and practical principles and foundation related to the subject	Introduction of Foren Science	Lecture styl	- Oral and written exams 2- Seminars
2	2+2	″	Collection and Preservation of Biologi Evidence	″	″
3	2+2	″		″	″
4	2+2	″	Forensic Serology	″	″
5	2+2	″		″	″
6	2+2	″	Mid exam	″	″
7	2+2	″	Crime Scene	″	″
8	2+2	″		″	″
9	2+2	″	'Short Tandem Repeat STR)	″	″
10	2+2	″		″	″
11	2+2	″	Mitochondrial DNA in Forensics	″	″
12	2+2	″	Y-Chromosome Analy	″	″
13	2+2	″		″	″
14	2+2	″	Statistical Analysis in D Typing	″	″
15	2+2	″	Bioinformatics in Forer DNA Analysis	″	″
16	2+2	″	Final exam	″	″

40. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning

41. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Text books Book of Molecular biology of gene 2013 Next Generation Sequencing in Forensic Science https://taylorandfrancis.com Kelly M. Elkins and Cynthia B. Zeller 2022
Main references (sources)	○
Recommended books and references (scientific journals, reports...)	Text books
Electronic-References, Websites	

Course Description Form

Course Name:
Medical biotechnology
Course Code:
BTM42−PhBt
Semester / Year
Semester 2, Year 4
Description Preparation Date:
1\10\2025
Available Attendance Forms:
Attendance
Number of Credit Hours (Total) / Number of Units (Total): 2\2 unit
30h/2 units
strator's name (mention all, if more than one name)
Name: Prof. Dr. Zahraa k. Zedan Email: Zahraa.kamil@nahrainuniv.edu.iq

ourse Objectives	
Course Objectives	The outcomes of this course provide students with knowledge and information as well as practical experience about how to use of living cells and cell materials to research and produce pharmaceutical and diagnostic products that help treat and prevent human diseases. Also knowledge to use a multidisciplinary approach to solving complex problems in the biotechnological field.

ching and Learning Strategies	
Strategy	The number of teaching units are three units which consists of approximately 14-15 week timetabled st over a two hours lecturing with a three-hour practical laboratory every week. The teaching meth involve interactive/active learning lectures, videos, tutorial sessions, laboratory classes and homew assignment 15 hours will be independent or self-directed study.

42. Course Structure

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

	2	Introducing to medical biotechnology	Study biotechnology and medicine	White board and power points	Quizzes and homework Seminar or written exams
	2	Introducing to biotechnology and Healthcare	Study how biotechnol has made a huge impact c healthcare such diagnostics biopharmaceuticals	White board and power points	Quizzes and homework Seminar or written exams
	2	Introducing to Detecting and Diagnosing Human Disease Conditions	Study the identification of disease and test therapies before clinical trial in human	White board and power points	Quizzes and homework Seminar or written exams
	2	Introducing to Medical Products and Applications of Biotechnology	Study the use of uses living cells and cell materials to research and then produce pharmaceutical and diagnosing products	White board and power points	Quizzes and homework Seminar or written exams
	2	Mid Exam	Mid exam		
	2	Introducing to Gene therapy	Study treating disease by inserting functional genes to replace defective ones.	White board and power points	Quizzes and homework Seminar or written exams
	2	Introducing to Application of Antise Technology to Medicine	Study the Antisense technology as a formidable tool for investigating physiologic and pathologic processes	White board and power points	Quizzes and homework Seminar or written exams
	2	Introducing to The importance of Triplex Technology to Medicine	Study the Triplex technology	White board and power points	Quizzes and homework Seminar or written exams
	2	Introducing to Applications of Nanotechnology in Medicine	Study the applications of nanoparticles	White board and power points	Quizzes and homework Seminar or written exams

	2	Mid Exam	Mid exam		
	2	Introducing to Regenerative medical biotechnologies	Study the applications of regenerative medicine	White board and power points	Quizzes and homework Seminar or written exams
	2	Introducing to Functional biomaterials in medicine	Study the applications of biomaterials in medicine	White board and power points	Quizzes and homework Seminar or written exams
	2	Introducing to The genetic basis of Disease	Study the basis of gen disease	White board and power points	Quizzes and homework Seminar or written exams
	2	Introducing to RNA-based therapeutics	Study the applications of RNA-based therapeutics	White board and power points	Quizzes and homework Seminar or written exams
	2	Revision	revision	White board and power points	Quizzes and homework Seminar or written exams

43. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

44. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Medical biotechnology Bernard R. Glick, 2014
Main references (sources)	2. Medical biotechnology, book, Oxford , university press. 3. Prescott's Microbiology 10th. Joanne Willey
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

Course Name:	
Human Genetic Diseases	
Course Code:	
BTM42E-II	
Semester / Year:	
Second /Fourth class/Elective	
Description Preparation Date:	
1-9-2025	
Attendance Forms:	
endance	
Credit Hours (Total) / Number of Units (Total)	
30 hours /2 units	
Course administrator's name (mention all, if more than one name)	
Dr. Mays Talib Mays Talib@nahrainuniv.edu.iq	
Course Objectives	
Course Objectives	• **Understand the basic principles of human genetics**, including gene structure, function, and patterns of inheritance. • **Explain the molecular basis of genetic diseases**, including mutations, chromosomal abnormalities, and epigenetic modifications. • **Differentiate between types of genetic disorders**, such as single-gene disorders, chromosomal disorders, multifactorial diseases, and mitochondrial diseases. • **Describe the mechanisms of inheritance**, including autosomal dominant, autosomal recessive, X-linked, and mitochondrial inheritance. .
ing Strategies	
Strategy	• Deliver core concepts through structured lectures. • Use interactive presentations and classroom discussions to reinforce understanding. • Assign reports and short research projects to integrate theory with practice. • Encourage active participation and teamwork in solving immunochemistry-related problem

45. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2 Theory		Introduction to Human Genetics a Genetic Diseases DNA Structure, Gene Organizatic and Gene Expression	Presentation &white board	Quiz, Attendance seminar and written examination
	2 Theory		DNA Structure, Gene Organizatic and Gene Expression		
	2 Theory		Types of Genetic Mutations and Their Effects		
	2 Theory		Patterns of Inheritance (Autosom Dominant, Autosomal Recessive		
	2 Theory		Sex-Linked and Mitochondrial Inheritance		
	2 Theory		Chromosomal Abnormalities and Aneuploidy		
	2 Theory		Common Chromosomal Disorders (e.g., Down syndrome, Turner syndrome)		
	2 Theory		Mid Term		
	2 Theory		Multifactorial and Polygenic Diseases		
	2 Theory		Genetic Basis of Cancer		
	2 Theory		Molecular Diagnostic Techniques (PCR, Sequencing, Karyotyping)		
	2 Theory		Multifactorial and Polygenic Diseases		
	2 Theory		Genetic Screening and Prenatal Diagnosis		
	2 Theory		Gene Therapy and Modern Genetic		

			Technologies		
	2 Theory		Genetic Counseling and Ethical Considerations		
			Final exam		

46. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning

47. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. **Thompson & Thompson Genetics in Medicine** Nussbaum RL, McInnes RR, Willard HF. *Thompson & Thompson Genetics in Medicine.* 9th ed. Philadelphia: Elsevier; 2016.
Main references (sources)	**Genetics and Genomics in Medicine** Cooper DN, Chen JM, et al. *Genetics and Genomics in Medicine.* Garland Science; 2015.
Recommended books and references (scientific journals, reports...)	
Electronic-References, Website	

Course Description Form

Course Name:	
Genomics and proteomics	
Course Code:	
BTM4Ge2-Pr	
Semester / Year:	
Second /Fourth class	
Description Preparation Date:	
1-9-2025	
ble Attendance Forms:	
tendance	
(Total)	
30 hours /2 units	
Course administrator's name (mention all, if more than one name)	
Dr. Zaid Nsaif Abbas	zaid.altameemi@nahrainuniv.edu.iq

Course Objectives	
Course Objectives	The aim of the Genomics and Proteomics module is to provide students with a comprehensive understanding of the principles, techniques, and applications of genomics and proteomics in modern biological research. This module will delve into the study of genomes and proteomes, exploring their structures, functions, and interactions. Through a combination of theoretical knowledge and practical exercises, students will gain insights into the vast amount of genetic and protein information encoded within living organisms and how this knowledge can be harnessed to advance various areas of biological science, including medicine, biotechnology, and personalized healthcare..
eaching and Learning Strategies	
Strategy	• Lectures: Engage students through interactive lectures that provide theoretical knowledge, foundational concepts, and recent research advancements in genomics and proteomics. Use multimedia aids such as visuals, videos, and case studies to enhance understanding and promote critical thinking. • Group Discussions: Organize group discussions to facilitate active learning and exchange of ideas. Assign topics or case studies related to genomics and proteomics for students to analyze, discuss, and present their findings. • Case Studies: Introduce real-life case studies and scenarios that highlight the application of genomics and proteomics in different fields. Challenge students to apply their knowledge and problem-

	solving skills to analyze complex genomic and proteomic data and propose solutions.

48. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 Theory		Introduction to Genomics	Presentation &white board	Quiz, Attendance seminar and written examination
	2 Theory		DNA Sequencing Techniques		
	2 Theory		Genome annotation and gene prediction		
	2 Theory		Genomic variation and SNP analysis		
	2 Theory		Metagenomics		
	2 Theory		Epigenetics		
	2 Theory		Functional genomics and transcriptomics		
	2 Theory		Mid Exam		
	2 Theory		Introduction and scope of Proteomics		
	2 Theory		Steps in Proteomic Analysis		

	2 Theory		Protein Purification		
	2 Theory		Strategies for protein identification		
	2 Theory		Protein Modifications and Proteomics		
	2 Theory		Protein Engineering		
	2 Theory		Irrational design of protein engineering		
			Exam		

49. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning

50. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Introduction to Proteomics: Principles and Applications Nawin C. Mishra, Günter Blobel (Foreword by) ISBN: 978-0-471-75402-2 May 2010 Lesk Arthur M. 2017. *Introduction to Genomics* Third ed. Oxford United Kingdom: Oxford University Press
Main references (sources)	-
Recommended books and references (scientific journals, reports...)	
Electronic-References, Website	

Course Description Form

Course Name:	
Cancer biology	
Course Code:	
BTME42-II	
Semester / Year:	
Second /Fourth class	
Description Preparation Date:	
1-9-2025	
ble Attendance Forms:	
tendance	
(Total)	
30 hours /30 units	
Course administrator's name (mention all, if more than one name)	
Dr. Dr. Hanaa AL-Mahmoodi	Hana.almahmoodi@nahrainuniv.edu.iq

Course Objectives	
Course Objectives	The objective of this course is to learn the principles of cancer biology and identify the main cellular and molecular mechanisms underlying the initiation and progression of neoplastic growth. The main focus of this course is on the comparative overview of proliferation control and signal transduction in malignant cells and normal cells. We will explore the molecular pathways responsible for genome instability in cancer cells and the multi-step process of tumor 2 progression leading to invasive metastatic growth. The course will also examine the role of stem cells and their potential for differentiation in different types of malignancies. Class discussions will include recent advances in molecular diagnostics and therapy of cancer and the modern methods in cancer research using molecular probes, genomics and high resolution cell imaging.
eaching and Learning Strategies	
Strategy	• Lectures: Engage students through interactive lectures that provide theoretical knowledge, foundational concepts, and recent research advancements in genomics and proteomics. Use multimedia aids such as visuals, videos, and case studies to enhance understanding and promote critical thinking. • Group Discussions: Organize group discussions to facilitate active learning and exchange of ideas. Assign topics or case studies related to genomics and proteomics for students to analyze, discuss, and

	present their findings. • Case Studies: Introduce real-life case studies and scenarios that highlight the application of genomics and proteomics in different fields. Challenge students to apply their knowledge and problem-solving skills to analyze complex genomic and proteomic data and propose solutions.

51. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 Theory		Cancer Types: Understanding different types of cancer, including their characteristics, risk factors, and prevalence	Presentation &white board	Quiz, Attendance seminar and written examination
	2 Theory		Differences in Cell Biology of Normal Cells and Cancer Cells. Oncogenes, Tumor Suppression Genes and Control of Cell Cycle.		
	2 Theory		Cellular and Molecular Mechanisms of Cancer Initiation and Progression. Premalignant and Malignant Cell Characteristics. Tumorigenesis as a Multi-Step Process. Role of Mutations and Genetic Instability in Neoplastic Growth		
	2 Theory		Development of Invasive Properties and Mechanisms of Metastatic Growth.		

	2 Theory		Cancer Screening and Early Detection: Exploring methods and guidelines for early cancer detection, such as mammographyand genetic testing		
	2 Theory		Cellular and Molecular Mechanisms Underlying the Evolution of Malignant Cell Populations.		
	2 Theory		1st Midterm exam		
	2 Theory		Responses of Cancer Cells to Extracellular Signals. Role of Growth Factors, Growth Factor Receptors and Hormones in Neoplastic Growth. Signal Transduction and Control of Apoptosis in Normal and Malignant Cells.		
	2 Theory		Cytoplasmic Signaling Circuitry in Cancer Cells. Functional Activity of Cytoplasmic Structures and Organelles in Cancer Cells: Cytoskeleton, Lysosomes and Mitochondria, Changes in Energy Metabolism and Warburg Effect.		
	2 Theory		Cancer Genetics and Genomics: Examining the role of genetic mutations, oncogenes, tumor suppressor genes, and genomic instability in cancer development and progression		
	2 Theory		Cancer Cell Differentiation and Epigenetics. Interrelations of Cell Proliferation and Differentiation during Progression of Different		

			Tumor Types.		
	2 Theory		Cancer Treatment Modalities: Discussing various treatment options, including surgery, radiation therapy, chemotherapy, immunotherapy, targeted therapy, hormonal therapy, and stem cell transplant		
	2 Theory		Supportive Care and Symptom Management: Addressing strategies for managing treatment side effects, pain management, nutrition, mental health, and palliative care		
	2 Theory		Modern Methods in Studies of Cellular and Molecular Mechanisms of Neoplastic Growth. Cancer Genomics and Proteomics.		
	2 Theory		**revision**		
			Exam		

52. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning

53. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Biology of Cancer by RW Ruddon. 2) Introduction to Cellular and Molecular Biology of Cancer by RA Knowles. As additional resources, we will use selected chapters from two other texts also electronically available from the WSU library as: Primer of the Molecular Biology of Cancer, Edited by DeVita V et al., Kluwer, 2015 Principles of Stem Cell Biology and Cancer. Edited by T.Regal et al, Willey-Blackwell, 2015
Main references (sources)	-

Course Description Form

Course Name:	
Blood diseases	
Course Code:	
BTME42-II	
Semester / Year:	
Second /Fourth class	
Description Preparation Date:	
1-9-2025	
ble Attendance Forms:	
Attendance	
(Total)	
30 hours /2 units	
Course administrator's name (mention all, if more than one name)	
Dr. Dr. Zahraa K.Zaidan	Zahraa zaidan@nahrainuniv.edu.iq

Course Objectives	

Course Objectives	• **Understanding Hematology Fundamentals**
	  • Gain in-depth knowledge of normal blood composition, hematopoiesis, and physiological functions of blood components.
	  • Understand the regulation of red cells, white cells, platelets, and plasma proteins.
	• **Pathophysiology of Blood Disorders**
	  • Analyze the mechanisms underlying various hematologic disorders including anemia, leukemias, lymphomas, myeloproliferative and myelodysplastic disorders, and coagulation disorders.
	  • Identify genetic, acquired, infectious, and immune-mediated causes of blood diseases

eaching and Learning Strategies	
Strategy	• Lectures: Engage students through interactive lectures that provide theoretical knowledge, foundational concepts, and recent research advancements in genomics and proteomics. Use multimedia aids such as visuals, videos, and case studies to enhance understanding and promote critical thinking. • Group Discussions: Organize group discussions to facilitate active learning and exchange of ideas. Assign topics or case studies related to genomics and proteomics for students to analyze, discuss, and

	present their findings. • Case Studies: Introduce real-life case studies and scenarios that highlight the application of genomics and proteomics in different fields. Challenge students to apply their knowledge and problem-solving skills to analyze complex genomic and proteomic data and propose solutions.

54. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 Theory		Introduction to Hematology	Presentation &white board	Quiz, Attendance seminar and written examination
	2 Theory		Red Blood Cell Disorders		
	2 Theory		White Blood Cell Disorders		
	2 Theory		Platelet and Coagulation Disorders		
	2 Theory		Platelet and Coagulation Disorders		
	2 Theory		Bone Marrow Failure and Pancytopenia		
	2 Theory		1st Midterm exam		
	2 Theory		Laboratory Diagnosis		
	2 Theory		Transfusion Medicine and Therapeutics		
	2 Theory		Recent Advances and Research in Hematology		

	2 Theory		Clinical Case Discussions		
	2 Theory		Clinical Case Discussions		
	2 Theory		Clinical Case Discussions		
	2 Theory		REVISION		
	2 Theory		**SEMINAR**		
			FINAL Exam		

55. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning

56. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• **Hoffbrand AV, Moss PAH** – *Essential Haematology*, 8th Edition, Wiley-Blackwell, 2021. • **Lichtman MA, Kipps TJ, et al.** – *Williams Hematology*, 10th Edition, McGraw-Hill, 2021. • **Kaushansky K, Lichtman MA, Beutler E, et al.** – *Hematology: Basic Principles and Practice*, 8th Edition, Elsevier, 2021.
Main references (sources)	-

المقررات الدراسية لدراسة الماجستير

First Semester

ت	الموضوع	Subject	الرمز	عدد الساعات	عدد الوحدات
1	علم الحياة الجزيئي المتقدم	Adv. Molecular Biology	MBIO51	2	2
2	علم المناعة المتقدم	Adv. Immunology	MBIO52	2	2
3	علم الاحياء المجهرية الطبية المتقدم	Adv. Medical Microbiology	MBIO53	2	2
4	المعلوماتية الحياتية والاحصاء الحياتي	Bioinformatics and Biostatistics	MBIO54	2	2
5	كمياء حياتية متقدم	Adv. Biochemistry	MBIO55	2	2
6	طرائق بحث	Research Methodology	MBIO56	2	2
7	اللغة الإنكليزية 1	English language I	MBIO57	1	1

الفصل الثاني
Second Semester

ت	الموضوع	Subject	الرمز	عدد الساعات	عدد الوحدات
1	التلاعب الجيني	Gene Manipulation	MBIO58	2	2
2	علم الوباء الجزيئي	Molecular Epidemiology	MBHO59	2	2
3	علم السموم المتقدم	Adv. Toxicology	MBIO501	2	2
4	علم الانزيمات	Enzymology	MBIO502	2	2
5	الاختياري 2	Elective II	MBIO503	2	2
6	ندوه	Seminar	MBIO504	-	-

Course Description Form

Course Name:	
Advanced Immunnolgy	
Course Code:	
MBIO52	
mester/Y	
First Semester /Master	
Description Preparation Date:	
1-9-2025	
Available Attendance Forms:	
Attendance	
Number of Credit Hours (Total) / Number of Units (Total)	
30 Hours /2 units	
Course administrator's name (mention all, if more than one name)	
Name: Profess Shahlaa Mahdi Salih Email:shahlaa.mahdi@ahrainuniv.edu.iq	Name: Assistant Prof. Rawaa Nazar Email:rawaa.alchalabi@nahrainuniv.edu.iq
ourse Objectives	
Course Objectives	•
hing and Learning Strategies	
Strategy	• Lectures **& Expert Seminars** Delivered by faculty and guest specialists to provide in-depth theoretical foundations and current advances in immunology. • Interactive **Discussions & Case-Based Learning** Students engage in group discussions, problem-based scenarios, and analysis of clinical case studies (e.g., autoimmunity, cancer immunotherapy, HIV) to strengthen critical thinking and clinical correlation.

57. Course Structure

Week	Hour	Required Learning	Unit or subject	Learning method	Evaluation

	s	Outcomes	name		method
Week 1	2	Explain hematopoiesis and immune cell differentiation	Fundamentals of Bloo Cell Biology	Power point presentation and white board	Written Examinations Seminars and class disussion ,reports
Week 2	2	Describe innate defense mechanisms and PRRs	Innate Immunity	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 3	2	Identify structure & function of lymphoid organs	Lymphoid & lymphoid tissue	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 4	2	Integrate stages of immune response	The immune response	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 5	2	Distinguish immunogens, antigens & vaccine principles	Immunogen, antigens, and vaccines	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 6	2	Explain antigen processing MHC pathways	Antigen presentation and MHC complex	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 7	2	Describe immunoglobulin structure, genes and diversity	Immunoglobulins & Immunoglobulin genes	Power point presentation and white board	Written Examinations Seminars and class

					disussion
Week8	2	Analyze B-cell development & humoral immunity	B- cells development & Humoral response	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 9	2	Compare T-cells & NK functions	T-lymphocytes & NK cells	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 10	2	Classify cytokines & their signaling Pathways	Cytokines	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 11	2	Explain chemokine roles in cell trafficking	Chemokines	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 12	2	Describe-complement pathways & kinin system	Complement & kinin	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 13	2	Evaluate applications of engineered NK cells	Engineered NK cells	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 14	2	Explain CAR T-cell	CAR T-cell therap	Power point	Written Examinations

		therapy design & applicati		presentation and white board	Seminars and c disussion
Week 15	2	Final exam			

58. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning

59. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Parslow, T. G., Stites, D. P., Terr, A. I., & Imboden, J. B.). Medical immunology. McGraw-Hill.. • Roitt, I., Brostoff, J., & Male, D.). *Essential immunology* (10th ed.). Blackwell Science.
Main references (sources)	• Parslow, T. G., Stites, D. P., Terr, A. I., & Imboden, J. B.). Medical immunology. McGraw-Hill..
Recommended books and references (scientific journals, reports...)	• Owen, J. A., Punt, J., & Stranford, S. A.). Kuby immunology. New York, NY, USA:: WH Freeman.
Electronic-References, Website	Immunopaedia. (n.d.). *Immunopaedia: educational immunology resource*. Retrieved from http://www.immunopaedia.org.za/ Immune Epitope Database (IEDB). (n.d.). *Immune Epitope Database and Analysis Resource*. http://www.iedb.org/

Course Description Form

Course Name:	
Adv. Molecular Biology	
Course Code:	
MBIO51	
Semester / Year:	
First Semester /Master	
Description Preparation Date:	
1-9-2025	
Available Attendance Forms:	
Attendance	
Number of Credit Hours (Total) / Number of Units (Total)	
30 Hours /2 units	
Course administrator's name (mention all, if more than one name)	
Name: Professor: Dr. Hameed M. Jasim Dr. Resala R. Allami	Hameed.jasim@nahrainuniv.edu.iq ririallami@yahoo.com
Course Objectives	
Course Objectives	• **Understand advanced molecular mechanisms** governing DNA replication, repair, recombination, transcription, and translation in prokaryotic and eukaryotic systems. • **Analyze gene regulation pathways**, including epigenetic regulation, chromatin remodeling, non-coding RNAs, and transcription factor networks. • **Apply modern molecular biology techniques**, such as PCR variants, qPCR, next-generation sequencing (NGS), CRISPR/Cas systems, RNA-seq, and cloning strategies. • **Interpret genomic, transcriptomic, and proteomic data** using bioinformatic tools to understand molecular pathways and regulatory networks. • **Evaluate molecular mechanisms underlying human diseases**, including cancer, genetic disorders, immune dysregulation, and infectious diseases.

Teaching and Learning Strategies	
Strategy	• Lectures **& Expert Seminars** Delivered by faculty and guest specialists to provide in-depth theoretical foundations and current advances in immunology. • Interactive **Discussions & Case-Based Learning** Students engage in group discussions, problem-based scenarios, and analysis of clinical case studies.

Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	2		DNA replication , Bacterial DNA replication	Power point presentation and white board	Written Examinations Seminars and class disussion ,reports
Week 2	2		Transcription in prokaryotes , Transcription of DNA to RNA , The genetic code	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 3	2		Regulation of Gene Expression in prokaryotes , Transfer RNA	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 4	2		Control of Gene Expression in Prokaryotes	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 5	2		Regulation of Transcription Initiation in Bacteria	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 6	2		Post-translational processing of proteins	Power point	Written

				presentation and white board	Examinations Seminars and class disussion
Week 7	2		Mid-term Exam 1	Power point presentation and white board	Written Examinations Seminars and class disussion
Week8	2		Eukaryotic Chromosomes	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 9	2		Eukaryotic promoters, Eukaryotic RNA Polymerases	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 10	2		Eukaryotic mRNAs, Production of Mature mRNA in Eukaryotes	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 11	2		Processing of pre-mRNA, Processing of Pre-mRNA to Mature mRNA	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 12	2		Regulation of Gene Expression in Eukaryotes, Regulation of Transcription Initiation by Activators, Inhibiting Transcription Initiation by Repressors	Power point presentation and white board	Written Examinations Seminars and class disussion

Week 13	2		Combinatorial Gene Regulation, Gene Silencing	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 14	2		Regulation by Antisense RNA, Micro RNA, Repetitive-Sequence DNA	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 15	2		Mid-term Exam 2		

Course Evaluation
Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning

Learning and Teaching Resources	
Required textbooks (curricular books, if any)	• Molecular Biology of the Cell • Alberts, Bruce et al.6th Edition, Garland Science, 2014. • . Molecular Biology Techniques: A Classroom Laboratory Manual • Heather Miller, 4th Edition, Academic Press, 2019.Good for hands-on laboratory application
Main references (sources)	• Lewin's Genes XII • Krebs, Jocelyn E., et al. Jones & Bartlett Learning, 2020. • A key reference for DNA replication, transcription, translation, and gene expression.
Recommended books and references (scientific journals, reports...)	
Electronic-References, Website	

Course Description Form

60.Course Name: **Advanced Biochemistry**
61.Course Code: **MBIO55**
62.Semester / First Year: 2025-2026
63.Description Preparation Date:
1-9-2025
Available Attendance Forms: 1. Manual/Traditional Attendance Sheet 2. Paper-based sign-in sheet where students write their names and signatures for each class.
Attendance
3. Number of Credit Hours (Total) / Number of Units (Total):
30h 2 units
4. Course administrator's name (mention all, if more than one name
Professor Dr. Maha Hameed Al-Bahrani maha.albahrani@ced.nahrainuniv.edu.iq
5. Course Objectives

Course Objectives	• **Deepen Theoretical Knowledge** • Provide an in-depth understanding of biochemical principles, including the structure, function, and regulation of biomolecules. • **Explore Advanced Metabolism** • Analyze complex metabolic pathways, their integration, and regulation in health and disease. • **Molecular Mechanisms** • Explain molecular mechanisms of enzymology, signal transduction, gene expression, and cellular communication. • **Critical Thinking & Problem Solving** • Develop analytical skills to interpret experimental data and solve advanced biochemical problems. • **Laboratory Skills** • Train students in advanced biochemical and molecular biology techniques for research applications.

	•

6. Teaching and Learning Strategies

Strategy	**Lectures with Interactive Discussions** **Problem-Based Learning (PBL)** **Laboratory Practical Sessions** • Hands-on training in advanced biochemical and molecular biology techniques, encouraging experimental design and data interpretation. **Seminars & Student Presentations** **Independent Learning & Self-Study** **E-learning Tools & Online Resources**. **Research-Oriented Assignments**

7. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1			Buffers and acid-base		
2			Blood Gases		
3			Electrolyte and Water Balance		
4			Clinical applications of electrolytes		
5			Hemoglobin (Structure, Oxygen and Carbon Dioxide, Transport, Abnormal Hemoglobins		
6			Tissue Proteins in Health and Disease - Part 1		

7			Tissue Proteins in Health and Disease - Part 2		
8			Exam-1		
9			Metabolic Pathways of Carbohydrates		
10			Regulation of Blood Glucose, Insulin and Diabetes Mellitus		
			Mechanisms of Action of Hormones/ Thyroid Hormones		
11			Exam-2		
12			Reports		
13			General Amino Acid Metabolism (Urea Cycle, One Carbon Metabolism		
14			Biochemistry of AIDS and HIV		
15			Clinical Laboratory: Screening of Metabolic Diseases; Quality Control		

8. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning

9. Learning and Teaching Resources

Required textbooks (curricular books, if any)	TEXTBOOK OF BIOCHEMISTRY For Medical Students
Main references (source	. Medical Biotechnology: Advancement and Ethics Lippincott's Illustrated Reviews: Biochemistry Fifth Edition
Recommended books and references (scientific journals, reports...)	http://hwmaint.clsjournal.ascls.org/ https://www.uhcw.nhs.uk/
Electronic-References, Websites	

Course Description Form

Course Name:	
Adv. Medical Microbiology	
Course Code:	
MBIO53	
Semester / Year:	
First Semester /Master	
Description Preparation Date:	
1-9-2025	
Available Attendance Forms:	
Attendance	
Number of Credit Hours (Total) / Number of Units (Total)	
30 Hours /2 units	
Course administrator's name (mention all, if more than one name)	
Name: **Dr.Bushra hindi Sal Dr.Ahmed Ali+ DR. Dhafer a alamer**	Bushra.aftan@nahrainuniv.edu.iq Ahmed.ali@nahrainuniv.edu.iq dhafar.alugaili@nahrainuniv.edu.iq
Course Objectives	
Course Objectives	The outcomes of this course provide students with the knowledge and information about the principles of Adv. Medical microbiology , Most important families of bacteria, and most common diseases caused by important *spp* of bacteria, bacterial classification, virulence factors and their role in mechanism of pathogenesis of diseases , clinical sings ,diagnosis, prevention and treatment.
Teaching and Learning Strategies	
Strategy	• Lectures **& Expert Seminars** Delivered by faculty and guest specialists to provide in-depth theoretical foundations and current advances in immunology. • Interactive **Discussions & Case-Based Learning** Students engage in group discussions, problem-based scenarios, and analysis of clinical case studies.

Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	2		Introduction into Adv. medical microbiology,	Power point	Written

			classification of bacteria	presentation and white board	Examinations Seminars and class disussion ,reports
Week 2	2		Family Micrococcaceae, Staphylococcus most important *spp*, most important diseases caused by each *spp* , pathogenesis of food poisoning ,most important clinical sings, diagnosis , prevention and treatment	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 3	2		Streptococcus**.** classification of bacteria ,Diseases caused by each *spp*, scarlet fever ,causative agent ,most important clinical sings, pathogenesis **of** disease**,** diagnosis and treatment	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 4	2		Family Enterobacteriacae, most important characters of it..*E.coli* most important diseases caused by each species. pathogenesis Salmonella, classification, virulence factors, typhoid fever ,stages of pathogenesis, diagnosis	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 5	2		Brucella *spp*, virulence	Power point	Written

			factors ,Malta fever	presentation and white board	Examinations Seminars and class disussion
Week 6	2		Vibrio cholera ,causative agent ,virulence factors, pathogenesis of disease	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 7	2		*Mycobacterium .tuberculosis*,, route of transmission, mechanism of disease.	Power point presentation and white board	Written Examinations Seminars and class disussion
Week8	2		Bacillus *spp*, *Bacillus .anthracis*, , anthrax, most important clinical sings, pathogenesis of bacteria, Clostridia, virulence factors, Gas gangrene, Coryne bacteria, virulence factors, Diphtheria. Listeria ,virulence factors, Listeriosis, clinical sings and pathogenesis	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 9	2		**Exam**	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 10	2		Classification of fungi Ecology of fungi Disease mechanism of fungi	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 11	2		Overview of fungal diseases	Power point	Written Examinations

			Predisposing factors Fungal Immunity Laboratory Diagnosis (of Fungal Infection	presentation and white board	Seminars and class disussion
Week 12	2		Superficial and Cutaneous Mycoses Subcutaneous mycoses; Systemic mycoses; Opportunistic Mycoses	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 13	2		Introduction: General aspects in Parasitology Protozoans of Clinical) Importance) ;Free living amoeba (Naegleria species	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 14	2		Intestinal and Urogenital Parasites Entamoeba) ;histolytica Entamoeba coli; Giardia lamblia) ;Cryptosporidium ;species Balantidium coli; Trichomonas vaginalis	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 15	2		Mid-term Exam 2		

Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning

Learning and Teaching Resources

Required textbooks (curricular books, if any)	1-- Murray,p.R;Rosenthal,K.S.and Pfaller,M.A.(2020).Medical Microbiology. E-Book.9th(ed.).Elsevier Health science.Houston 2- Warren,L.and Ernest,J.(2000).Medical microbiology and immunology.Hall

	international.6th(ed,).Lange Medical Books/McGraw-Hill.Medical publishing.New York.
Main references (sources)	3-Forbes,B.A,;Sahm,D.F.;Weissfeld,A.S.and Baron,E.(2007).In Bailey and Scotts diagnostic microbiology.2nd(ed),Mosby,Elsevier,Inc.USA.10-840 4-James,C.and Natalie.(2014).Microbiology.A laboratory manual. 10th (ed.).Pearson.Boston. •
Recommended books and references (scientific journals, reports...)	
Electronic-References, Website	

Course Description Form

Course Name:	
Research Methodology	
Course Code:	
MBIO56	
Semester / Year:	
First Semester /Master	
Description Preparation Date:	
1-9-2025	
Available Attendance Forms:	
Attendance	
Number of Credit Hours (Total) / Number of Units (Total)	
30 Hours /2 units	
Course administrator's name (mention all, if more than one name)	
Name: Ali ZAID Fadhl	

Course Objectives

Course Objectives	• U**nderstand the fundamental principles of scientific research**, including the nature of scientific inquiry, research ethics, and characteristics of good research design. • **Identify and formulate research problems**, develop research questions, and construct hypotheses with clarity and precision. • **Learn various research designs**, including qualitative, quantitative, mixed-method, descriptive, experimental, and analytical approaches.

Teaching and Learning Strategies

Strategy	• Lectures **& Expert Seminars** Delivered by faculty and guest specialists to provide in-depth theoretical foundations and current advances in immunology. • Interactive **Discussions & Case-Based Learning** Students engage in group discussions

Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	2		Introduction to Research	Power point	Written Examinations

			Methodology	presentation and white board	Seminars and class disussion ,reports
Week 2	2		Research Proposal	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 3	2		Literature Review	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 4	2		Experimental Design	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 5	2		Sampling Techniques	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 6	2		Biotechnological Tools and Techniques	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 7	2		Data Collection and Analysis in Medical Biotechnology	Power point presentation and white board	Written Examinations Seminars and class disussion
Week8	2		1st Mid Exam	Power point presentation	Written Examinations

				and white board	Seminars and class disussion
Week 9	2		Research Ethics	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 10	2		Case stidies in medical biotechnology	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 11	2		Ideal supervisor – student relationship	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 12	2		Writing and puplishing research papers	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 13	2		EndNote referencing programmer	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 14	2		Mendeley Referencing Programmer	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 15	2		Final Exam		

Course Evaluation	
Distributing the score out of 100 according to the tasks assigned to the student such as： Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning	
Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Sharma, J. (2016). Research Methodology in Biological Sciences. CRC Press Kothari, C. R. (2004). Research Methodology: Methods and Techniques (2nd ed.). New Age International Neumann, K. H., Kumar, A., & Imani, J. (2009). Plant Cell and Tissue Culture – A Tool in Biotechnology: Basics and Application (1st ed.). Springer.
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic-References, Website	

Course Description Form

Bioinformatics and biostatistics	
:Course Code .	
MBIO54	
2025−1016	
Date	
2025−9−1	
5. Attendance Mode:	
Attendace	
Total Credit Hours / Units:	
30 h/2 units	
7. Course Instructors:	
Asst. Prof. Dr. Ali Hafidh Abbas	Asst. Prof. Dr. Sahar Medhat Hussein
urse Objectives	
• **Biostatistics** Biostatistics: 1. Expanding students' understanding of statistical tests used in research experiments. 2. Introducing students to different types of data for their research. 3. Enhancing scientific reasoning to solve research-related obstacles.	**Course Objectives**

4. Preparing graduates with statistical competence for the job market.

Bioinformatics:

1. Providing fundamental knowledge of bioinformatics, its importance, and applications.

2. Introducing students to biological databases (genomic, proteomic, microRNA, SNP, etc.) and their usage.

3. Developing skills in sequence analysis (DNA, RNA, protein) using computational tools such as BLAST and ClustalW.

4. Enabling students to construct and interpret phylogenetic trees.

5. Introducing next-generation sequencing (NGS) concepts and RNA-seq analysis.

6. Explaining clinical applications of bioinformatics in diagnostics, biomarker discovery, personalized medicine, and cancer genomics.

7. Enhancing critical thinking through practical data analysis projects.

8. Promoting ethical awareness in handling genomic and clinical data.

:g and Learning Strategies

Strategies

1. Using LCD projector, PowerPoint, Acrobat Reader, and video-based explanations.

2. Assigning homework to reinforce learning.

3. Improving skills through accessing scientific websites.

4. Using the Genome Browser as a reference tool in bioinformatics for genomics, clinical genetics, pharmaceutical development, and more.

In bioinformatics use the genome browser as a reference tool in many different disciplinary fields. It can be used in bioinformatics, clinical genetics, genomic research, pharmaceutical development, and many others. Scientists can navigate the entire human genome, as well as other species, base pair by base pair.

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Evaluation method	Learning method	Unit or subject name	Required Learning Outcomes	Hours	Week
1- Oral and	Lectures a	**Introduction to Bioinformatic**	Used bioinformatics	2	1

written exams 2- Seminars	Seminars	○ Definition, scope, applications molecular biology and medicine ○ Overview of biological data (DNA, RNA, protein). • **Practical:** ○ Introduction to bioinformatics resources (NCBI, Ensembl, UniP	toolse , websi		
		Biological Databases ○ Primary vs. secondary databas ○ Nucleotide databases: GenBank, EMBL, DDBJ. ○ Protein databases: UniProt, PDB. • **Practical:** ○ Data retrieval using NCBI, PubMed, Ensembl.		2	2
		Sequence File Formats & Tool ○ FASTA, FASTQ, GenBank, GFF PDB formats. • **Practical:** ○ Download and interpret sequence files. ○ Basic use of BioEdit and MEG software. **Sequence Alignment Basics** ○ Pairwise alignment (global vs local). ○ Algorithms: Needleman–Wunsch, Smith–Waterman. • **Practical:** ○ Hands-on BLAST search (nucleotide & protein).		2	3
		Multiple Sequence Alignment Phylogenetics ○ Multiple Sequence Alignment (ClustalW, MUSCLE).		2	4

		○ Phylogenetic trees (UPGMA, Neighbor-Joining). • **Practical:** ○ Building and interpreting phylogenetic trees using MEGA.			
		Mid exam		2	5
		Genomics & NGS Data ○ Genome sequencing strategies ○ Next-Generation Sequencing (NGS): concepts and workflow. • **Practical:** ○ Introduction to Galaxy server for NGS analysis		2	6
		Transcriptomics (RNA-seq) ○ RNA-seq basics: expression profiling, normalization. • **Practical:** ○ Analyzing RNA-seq data (HISAT2/STAR, visualization wi IGV		2	7
		Seminar		2	8
		Starting SPSS Entering Data Defining Variables Loading and Saving Data Files Running the First Analysis Examining and Printing Output Files Modifying Data Files Exercises	استخدام البرامج الاحصائية ادخال البيانات الإحصائية والاحصاء الوصفي رسم الاشكال البيانية وعوامل الارتباط والانحدار اختبار الفرضيات الاحصائية الاختبارات الغير	2	9
		Entering and Modifying Data Variables and Data		2	10

		Representation Transformation and Selection of Data Exercises Descriptive Statistics Frequency Distributions and Percentile Ranks for a Single Variable Frequency Distributions and Percentile Ranks for Multiple Variables Measures of Central Tendency and Measures of Dispersion for a Single Group Measures of Central Tendency and Measures of Dispersion for Multiple Groups Standard Scores Exercises	معلمية اختبارات الأنماط والاليلات الوراثية		
		Graphing Data Graphing Basics Bar Charts, Pie Charts, and Histograms Scatterplots Advanced Bar Charts Prediction and Association Pearson Correlation Coefficient Spearman Correlation Coefficient Simple Linear Regression		2	11

		Multiple Linear Regression Exercises			
		Parametric Inferential Statistics Review of Basic Hypothesis Testing (Null and Alternative Hypotheses(Single Sample t-Test The Independent Samples t-Test Paired Samples t-Test One-Way ANOVA Factorial ANOVA Repeated Measures ANOVA Mixed-Design ANOVA Analysis of Covariance Multivariate Analysis of Variance (MANOYA(		2	12
		Mid exam		2	13
		Nonparametric Inferential Statistics Chi-Square Goodness of Fit Chi-Square Test of Independence Mann-Whitney U Test Wilcoxon Test Kruskal-Wallis H Test Friedman Test Exercises		2	14
		Genotyping and alleles frequencies Hardy-Weinberg equilibrium calculation		2	15

		Pearson's chi-square Odds ratio and 95% confidence interval Fisher's exact probability and Bonferroni corrected probability Exercises			
		Seminar		2	16

64. Course Evaluation
Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning.

65. Learning and Teaching Resources	
Essential bioinformatics by Jin Xiong Bioinformatics and Functional Genomics by Jonathan Pevsner	Required textbooks (curricular books, if any)
Essential bioinformatics by Jin Xiong Bioinformatics and Functional Genomics by Jonathan Pevsner	Main references (sources)
PubMed	Recommended books and references (scientific journals, reports...)
Goggle , fire fox , Ncbi , EMB, SPSS	المراجع الإلكترونية ، مواقع الانترنيت

Course Description Form

Course Name:	
Gene Manipulation	
Course Code:	
MBIO58	
Semester / Year:	
Second Semester /Master	
Description Preparation Date:	
1-9-2025	
Available Attendance Forms:	
Attendance	
Number of Credit Hours (Total) / Number of Units (Total)	
30 Hours /2 units	
Course administrator's name (mention all, if more than one name)	
Name: Professor: Dr. Hameed M. Jasim Dr. Resala R. Allami	Hameed.jasim@nahrainuniv.edu.iq ririallami@yahoo.com
Course Objectives	

Course Objectives	• **Understand fundamental principles of gene manipulation:**
	  • DNA cloning, recombinant DNA technology, plasmids, and vectors.
	  • Mechanisms of gene expression and regulation in prokaryotes and eukaryotes.
	• **Learn modern gene editing techniques:**
	  • CRISPR/Cas systems, TALENs, ZFNs, and RNA interference.
	  • Compare their specificity, efficiency, and applications.
	• **Apply molecular techniques in the laboratory:**
	  • Transformation, transfection, PCR, restriction enzyme digestion, ligation.
	  • Expression of recombinant proteins in bacterial, yeast, or mammalian cells.

	• **Analyze and interpret experimental data:**
	  • Verify gene editing events using sequencing, PCR, or reporter assays.
	  • Troubleshoot molecular experiments.
	• **Evaluate ethical, legal, and safety considerations:**
	  • Discuss biosafety levels, ethical concerns, and regulatory frameworks.
	  • Assess risks of gene manipulation in medicine, agriculture, and research.
	• **Explore applications of gene manipulation:**
	  • Gene therapy, synthetic biology, genetically modified organisms (GMOs).
	  • Functional genomics and molecular medicine.
	• **Develop critical thinking and research skills:**
	  • Design gene manipulation experiments.
	  • Critically read and evaluate current literature in genetic engineering

Teaching and Learning Strategies

Strategy	• Lectures **& Expert Seminars** Delivered by faculty and guest specialists to provide in-depth theoretical foundations and current advances in immunology. • Interactive **Discussions & Case-Based Learning** Students engage in group discussions, problem-based scenarios, and analysis of clinical case studies.

1. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	2		Steps in a gene manipulation experiment, PCR and gene manipulation, Vectors for Gene manipulation, Plasmids, Bacteriophages	Power point presentation and white board	Written Examinations Seminars and class disussion ,reports
Week 2	2		Cloning Vectors for E. coli, pBR322, Other E. coli cloning vectors, pUC8—a Lac	Power point presentation	Written Examinations

			selection plasmid	and white board	Seminars and class disussion
Week 3	2		Bacteriophages, The phage infection cycle, Gene organization in the λ phage, The linear and circular forms of λ DNA	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 4	2		Vectors derived from lambda phage, λ insertion and λ replacement vectors, Cosmid vectors	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 5	2		Manipulation of Purified DNA, DNA manipulative enzymes, DNA modifying enzymes, Enzymes for cutting DNA-restriction endonucleases	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 6	2		Ligation and joining DNA molecules, Linkers, Adaptors,	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 7	2		Mid-term Exam 1	Power point presentation and white board	Written Examinations Seminars and class disussion
Week8	2		Introduction of DNA into Living Cells, Selection for transformed cells,	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 9	2		Vectors for expression of foreign genes in *E. coli*, Promoters used in expression vectors	Power point presentation	Written Examinations Seminars

				and white board	and class disussion
Week 10	2		Gene manipulation in Medicine, Recombinant insulin, Synthesis of human growth hormones, Recombinant factor VIII	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 11	2		The Polymerase Chain Reaction, Designing the oligonucleotide primers for a PCR, studying PCR products	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 12	2		Sequencing Genes and Genomes, Chain termination DNA sequencing	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 13	2		Studying Gene Expression and Function, studying the RNA transcript of a gene,	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 14	2		Transcript mapping by hybridization between gene andRNA	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 15	2		Final exam		

Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning

Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Brown, T.A. – Gene Cloning and DNA Analysis: An Introduction • 8th Edition, Wiley Blackwell, 2016. • Glick, B.R., & Pasternak, J.J. – Molecular Biotechnology: Principles

	and Applications of Recombinant DNA 5th Edition, ASM Press, 2017. • Focuses on recombinant DNA technology, vectors, and applications.Heather Miller, 4th Edition, Academic Press, 2019.Good for hands-on laboratory application
Main references (sources)	• Cox, M.M., Doudna, J.A., & O'Donnell, M. – Molecular Biology: Principles and Practice 2nd Edition, W.H. Freeman
Recommended books and references (scientific journals, reports...)	
Electronic-References, Website	

Course Description Form

urse Name.66
Molecular Epidemiology
urse Code: MBIO59
ear: .67
2nd Semester / master
Preparation Date:
1 /10/ 2025
Attendance Forms:
Attendance
of Credit Hours (Total) / Number of Units (Total)
30 Hours / 2 Units

administrator's name (mention all, if more thanone name)	
Name	Sahar M. Hussein, Yasen esmael umran Sahar.hussain@nahrainuniv.edu.iq,

Course Objectives	
Course Objectives	• Understand key concepts in epidemiology and molecular biology as they apply to population studies. • Explain molecular mechanisms of disease emergence, transmission, and progression. • Perform and interpret molecular diagnostic assays (PCR, Real-time PCR, sequencing). • Analyze genetic markers used in epidemiology (SNPs, VNTRs, STRs). • Apply molecular tools to outbreak investigation , public health, cancer epidemiology and pathogen typing. • Use bioinformatics databases (NCBI, GISAID) in epidemiological research. • Interpret phylogenetic trees and molecular clock analyses. • Evaluate scientific literature in molecular epidemiology.

hing and Learning Strategies	
Strategy	Teaching and Learning Methods 1- Lecture Method

	2- PowerPoint System 3- Homework and Seminar System Learning Methods 1- Weekly Quick Exams 2- Discussion, Questions, and Answers 3- International Network for Information on the Subject of Specialization Evaluation Methods 1- Weekly and Termly Exams 2- Student Performance Evaluation through Seminars 3- Grades Based on Homework

68. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2T	Understanding the theoretica and practical principles and foundations related to the subject	• **Introduction** • Definition, history, scope of Molecular Epidemiology • Differences between classical vs. molecular epidemiology	Lectures and Seminars	1- Oral and written exams 2- Seminars
2	2T	″	**Basic Concepts in Epidemiology** • Incidence, prevalence, risk, outbreak definitions • Study designs (case–control, cohort, cross-sectional)	″	″
3	2T	″	**Diagnosis in molecular epidemiology** **Molecular Markers** • Host genetic markers • Pathogen genetic markers (virulence genes, resistance genes)	″	″

			PCR-based Methods • Conventional PCR • Real-time PCR • Multiplex PCR • Gel electrophoresis interpretation		
4	2T	″	**Complete diagnosis Genotyping Methods** • SNP analysis • RFLP • MLST (Multi-Locus Sequence Typing) • PFGE • MLVA **Sequencing Technologies** • Sanger sequencing • Next-Generation Sequencing (Illumina, Nanopore) • WGS in outbreak investigation	″	″
5	2T	″	Cancer epidemiology • Define epidemiological measures in cancer research. • Understand determinants of cancer at population and molecular levels.	″	″
6	2T	″	• Cancer epidemiology • Apply epidemiological reasoning to cancer surveillance	″	″

			and control. • Develop public health recommendations based on evidence.		
7	2T	″	Mid exam	″	″
8	2T	″		″	″
9	2T	″		″	″
10	2T	″		″	″
11	2T	″		″	″
12	2T	″		″	″
13	2T	″		″	″
14	2T	″		″	″
15	2T	″	Final exam	″	″

69. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning.

70. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**Epigenetic Epidemiology, Second Edition . Editor Karin B. Michels**
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic-References, Websites	

Course Description Form

urse Name:	
Gene therapy	
urse Code:	
MBIO508	
mester / Year:	
2nd/MSc	
scription Preparation Date:	
1-9-2025	
Available Attendance Forms:	
Attendance	
Number of Credit Hours (Total) / Number of Units (Total)	
30 h/2 units	
Course administrator's name (mention all, if more than one name)	
Prof. Dr. Zahraa k. Zedan & Asst. Prof. Moyasser B. Hadi	Zahraa.kamel@nahrainuniv.edu.iq moyassar.basil@nahrainuniv.edu.iq
Course Objective	
Course Objectives	• Enabling students to acquire the practical skills necessary to understand the gene therapy technology and the main therapeutic applications, **as well as Understand the molecular basis of gene therapy**, including gene regulation, vector design, and delivery mechanisms. • **Critically evaluate different gene therapy strategies**, such as in vivo vs. ex vivo approaches, viral vs. non-viral vectors, and genome editing technologies. • **Analyze ethical, legal, and social implications** of gene therapy in clinical and research contexts. • **Interpret preclinical and clinical trial data** related to gene therapy applications for genetic and acquired diseases. • **Design experimental protocols** for gene therapy research, including vector construction, transfection techniques, and efficacy/safety assessments. • **Apply knowledge of regulatory frameworks** governing gene

	therapy products and clinical trials. • **Explore emerging technologies**, such as CRISPR/Cas systems, RNA-based therapies, and personalized medicine in the context of gene therapy. • Would you like me to help you turn these into a syllabus outline or learning outcomes next?

Teaching and Learning Strategies

• Effective teaching and learning strategies include pre-lab preparation, demonstrations, guided inquiry, collaborative learning, feedback, reflection, integration of theory and practice, and a strong focus on safety. These strategies aim to actively engage students, reinforce theoretical concepts, develop critical thinking skills, and ensure a safe learning environment.

Course Structure

Week	Hrs	Required learning outcomes	Lecture Objective (English)	Learning method	Evaluation method
1	2	Introduction to gene thera	Introduce students to the fundamentals and history gene therapy	White boar Smart scre	homework assignments in addition to monthly exams
2	2	Types of gene therapy	Identify the main types an classifications of gene therapy	White board Smart screen	homework assignments in addition to monthly exams
3	2	Medical application for gene therapy	Explain main medical applications of gene therap	White board Smart screen	homework assignments in addition to monthly exams
4	2	*In vivo* gene therapy	Explain in details the method for *in vivo* gene Therapy	White board Smart screen	homework assignments in addition to monthly exams
5	2	*In vitro* gene therapy	Explain in details the method for *in vitro* gene Therapy	White board Smart screen	homework assignments in addition to monthly exams

6	2	1st monthly exam	1st monthly exam	-	1st monthly exam
7	2	Somatic gene therapy	Explain in details the method for *somatic* gene Therapy	White board Smart screen	assignments in addition to monthly exams
8	2	Cleaning genes meanings	The theory of using the selective genes in gametes ideal human generation	White board Smart screen	homework assignments in addition to monthly exams
9	2	The types of vectors used in Gene therapy	Main types and applications of each type Of vectors	White board Smart screen	homework assignments in addition to monthly exams
10	2	Importance of viral and cellular Vectors used in gene therapy	Main types of viral and Non-viral vectors with Their properties and Packaging capacity	White boarc Smart scree	homework assignments addition to monthly exar
11	2	Successful cases of gene therapy With approaches used	The main diseases which successfully treated via gene therapy	White boarc Smart scree	homework assignments addition to monthly exar
12	2	challenges and limitations in ge therapy	Explain challenges and limitations in gene therapy	White boarc Smart scree	homework assignments addition to monthly exar
13	2	Ethical issues of gene therapy and Advantages and disadvantages Of gene therapy	Main global ethical issues c using gene therapy proced	White boarc Smart scree	homework assignments addition to monthly exar
14	2	Medical application of gene thera	Medical application of ge therapy in details	White boarc Smart scree	homework assignments addition monthly exar
15	2		2nd exam	White boarc Smart scree	Second mont exam
71. Course Evaluation					

Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning	
72. Learning and Teaching Resources	
Advances in gene therapy 2022 Book series Application of Innovative Techniques in Genetic and Cellular Therapies,**Yuan Xiong, Jingfeng Li, Yori E** **Frontiers Media SA** Gene Therapy and Tissue Engineering in Orthopaedic and Sports Medicine - Methods in Bioengineering (Paperback **Johnny Huard** (editor), **Freddie H. Fu** (editor) 2023	

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Course Description Form

Course Name:	
Advan.Enzymology	
Course Code:	
MBIO502	
Semester / Year:	
2nd/MSc	
Description Preparation Date:	
1-9-2025	
Available Attendance Forms:	
Attendance	
Number of Credit Hours (Total) / Number of Units (Total)	
30 h/2 units	
Course administrator's name (mention all, if more than one name)	
Prof. Dr. Asmma Ali Hussein	asmaa.ali@ced.nahrainuniv.edu.iq
Course Objective	
Course Objectives	• **Understand the fundamental principles of enzymology**, including enzyme structure, classification, and catalytic mechanisms. • **Explain enzyme kinetics and regulation**, including concepts such as the Michaelis–Menten model, enzyme inhibition, and allosteric regulation. • **Describe the role of enzymes in metabolic pathways** and their importance in maintaining normal cellular functions. • **Identify factors affecting enzyme activity**, including pH, temperature, substrate concentration, and cofactors. • gene therapy.
Teaching and Learning Strategies	
Lectures Presentation of fundamental concepts of enzymology such as enzyme structure, classification,	

kinetics, and mechanisms using slides and multimedia.

Interactive Discussions
Encouraging students to participate in discussions about enzyme functions, metabolic pathways, and clinical relevance.

develop critical thinking skills, and ensure a safe learning environment.

Course Structure

Week	Hrs	Required learning outcomes	Lecture Objective (English)	Learning method	Evaluation method
1	2		Introduction to Enzymolo	White boa Smart scre	assignments in addition to monthly exams
2	2		Classification and Nomenclature of Enzyme	White board Smart screen	assignments in addition to monthly exams
3			Structure and Function o Enzymes py	White board Smart screen	assignments in addition to monthly exams
4			Mechanism of Enzyme Action	White board Smart screen	assignments in addition to monthly exams
5			Enzyme Kinetics	White board Smart screen	homework assignments in addition to monthly exams
6		1st monthly exam	1st monthly exam	-	1st monthly exam
7			Enzyme Inhibition	White board Smart screen	assignments in addition to monthly exams
8			Allosteric Enzym and Regulation	White board	assignments in addition to monthly

				Smart screen	exams
9			Coenzymes and Cofacto	White board Smart screen	assignments in addition to monthly exams
10			Enzymes in Metabolic Pathways	White boar Smart scre	assignments addition to monthly exa
11			Clinical Enzymology	White boar Smart scre	assignments addition to monthly exa
12			Industrial and Biotechnological Applicati of Enzymes	White boar Smart scre	assignments addition to monthly exa
13			Laboratory Techniques i Enzymology	White boar Smart scre	assignments addition to monthly exa
14			Student Presentations	White boar Smart scre	assignments addition to monthly exa
15			2nd exam	White boar Smart scre	Second mont exam

73. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning

74. Learning and Teaching Resources

Advances in gene therapy 2022

Book series

Nelson DL, Cox MM. *Lehninger Principles of Biochemistry.* 8th ed. New York: W.H. Freeman; 2021.Gene Therap and Tissue Engineering in Orthopaedic and Sports Medicine - Methods in Bioengineering (Paperback)

Rodwell VW, Bender DA, Botham KM, Kennelly PJ, Weil PA. *Harper's Illustrated Biochemistry.* 32nd ed. New York: McGraw-Hill; 2021.

Course Description Form

Course Name:	
Research Methodology	
Course Code:	
MBIO56	
Semester / Year:	
First Semester /Master	
Description Preparation Date:	
1-9-2025	
Available Attendance Forms:	
Attendance	
Number of Credit Hours (Total) / Number of Units (Total)	
30 Hours /2 units	
Course administrator's name (mention all, if more than one name)	
Name: Ali Z. Fadhl	ali.zaid @nahrainuniv.edu.iq
Course Objectives	
Course Objectives	• U**nderstand the fundamental principles of scientific research**, including the nature of scientific inquiry, research ethics, and characteristics of good research design. • **Identify and formulate research problems**, develop research questions, and construct hypotheses with clarity and precision. • **Learn various research designs**, including qualitative, quantitative, mixed-method, descriptive, experimental, and analytical approaches.
Teaching and Learning Strategies	
Strategy	• Lectures **& Expert Seminars** Delivered by faculty and guest specialists to provide in-depth theoretical foundations and current advances in immunology. • Interactive **Discussions & Case-Based Learning** Students engage in group discussions

Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	2		Introduction to Research	Power point	Written Examinations

			Methodology	presentation and white board	Seminars and class disussion ,reports
Week 2	2		Research Proposal	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 3	2		Literature Review	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 4	2		Experimental Design	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 5	2		Sampling Techniques	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 6	2		Biotechnological Tools and Techniques	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 7	2		Data Collection and Analysis in Medical Biotechnology	Power point presentation and white board	Written Examinations Seminars and class disussion
Week8	2		1st Mid Exam	Power point presentation	Written Examinations

				and white board	Seminars and class disussion
Week 9	2		Research Ethics	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 10	2		Case stidies in medical biotechnology	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 11	2		Ideal supervisor – student relationship	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 12	2		Writing and puplishing research papers	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 13	2		EndNote referencing programmer	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 14	2		Mendeley Referencing Programmer	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 15	2		Final Exam		

Course Evaluation	
Distributing the score out of 100 according to the tasks assigned to the student such as： Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning	
Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Sharma, J. (2016). Research Methodology in Biological Sciences. CRC Press Kothari, C. R. (2004). Research Methodology: Methods and Techniques (2nd ed.). New Age International Neumann, K. H., Kumar, A., & Imani, J. (2009). Plant Cell and Tissue Culture – A Tool in Biotechnology: Basics and Application (1st ed.). Springer.
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic-References, Website	

Course Description Form

75. Course Name:
Academic Skills II / MSc
76. Course Code:
MBIO57
77. Semester / Year:
1st Semester - Master
78. Description Preparation Date:
1/9/2024
79. Available Attendance Forms:
Attendance
80. Number of Credit Hours (Total) / Number of Units (Total):
30h /1 Unit
81. Course administrator's name (mention all, if more than one name)
Name: Moyassar Basil Hadi Email: moyassar.basil@nahrainuniv.edu.iq

82. Course Objectives	
Course Objectives	1- The foundations of standard and general conversation in English. 2- The foundations of scientific and academic writing in the English language. 3- Strengthening English listening skills. 4- Understanding and realizing how to read texts in the English language and distinguishing the important substantive texts in a particular article and giving them more attention than other sub-texts to shorten the time of correct general understanding

	of the content to be read.

83. Teaching and Learning Strategies

Strategy	Learning and strategies with high impact teaching focus on planning, teaching and assessment to equip students to excel their role in state associations after graduation. These include: • Planning for lecture • Lecture structure • Explicit teaching and inquiry • Questioning generation • Feedback from students • Effective assessment for the students • Greater understanding of planning expectations • Assessment skills that will change teaching style

84. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st	2	Structure and uses of Perfect tense	Reading Methods	Whiteboard and PPT	Quiz & Hom Work
2nd	2	Differences and uses of Adj &Adv	Effective Reading	Whiteboard and PPT	Quiz & Hom Work
3rd	2	Structure and uses of verbs	Skimming and scanning	Whiteboard and PPT	Quiz & Hom Work
4th	2	Understanding of vocabulary from text meaning	Brainstorming idea and linking ideas	Whiteboard and PPT	Quiz & Hom Work
5th	2	Descriptive writing	Writing an article	Whiteboard and PPT	Quiz & Hom Work

6th	2	Predicting content	Reading an article	Whiteboard and PPT	Quiz & Hom Work
7th	2	Written Exam	Midterm Exam	Whiteboard and PPT	Quiz & Hom Work
8th	2	Meaning from context	Reading an article	Whiteboard and PPT	Quiz & Hom Work
9th	2	Sentence and paragraph	Writing an article	Whiteboard and PPT	Quiz & Hom Work
10t	2	Identifying the main message	Reading an article	Whiteboard and PPT	Quiz & Hom Work
11t	2	Organizing ideas	Writing an article	Whiteboard and PPT	Quiz & Hom Work
12t	2	Avoiding repetition	Writing an article	Whiteboard and PPT	Quiz & Hom Work
13t	2	Writing discursive essay	Writing an article	Whiteboard and PPT	Quiz & Hom Work
14t	2	Cause and effect	Writing an article	Whiteboard and PPT	Quiz & Hom Work
15t	2	Using formal expression	Writing an article	Whiteboard and PPT	Quiz & Hom Work

85. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as:

- Midterm Written Exam (20%).
- Weekly Quizzes (5%).
- Home Works and Assignments (5%).
- Final Exam (70%)

86. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1. Headway Academic Skills: Reading, Writing, and Study Skills. Student's Book. Sarah Philpot, Editors: Liz and John Soars. Oxford. Headway Academic Skills: Reading, Writing, and Study Skills. Teacher's Guide. Sarah Philpot, Editors: Liz and John Soars. Oxford.
Main references (source	Headway Academic Skills: Reading, Writing, and Study Skills. Student's Book. Sarah Philpot, Editors: Liz and John Soars. Oxford.
Recommended books and references (scientific journals, reports...)	2. Headway Academic Skills: Reading, Writing, and Study Skills. Student's Book. Sarah Philpot, Editors: Liz and John Soars. Oxford. Headway Academic Skills: Reading, Writing, and Study Skills. Teacher's Guide. Sarah Philpot, Editors: Liz and John Soars. Oxford.
Electronic References, Websites	1. Academic Skills https://www.indeed.com/career-advice/career-development/academic-skills

Course Description Form

87.Course Name: **Applied genetics**	
88.Course Code:	
MBIO513	
89.Semester / Year: second semester \master	
90.Description Preparation Date: 1-3-2025	
1-9-2025	
91.Available Attendance Forms: Attendance	
Attendance	
92.Number of Credit Hours (Total) / Number of Units (Total) 2 hours \3 units	
30h 2 units	
93.Course administrator's name (mention all, if more than one name)	
ا م د زينه فوزي حسين	zena.alobaeady@nahrainuniv.edu.iq
94. Course Objectives	
Course Objectives	• To develop the ability to design, conduct, and analyze genetic experiments. • • To train students in cytogenetic, molecular, and statistical methods for genetic analysis. • To introduce modern genetic tools such as genetic engineering, CRISPR, cloning, and recombinant DNA technology. • • To explain applications in disease diagnosis, therapy, and genetic counseling..
95. Teaching and Learning Strategies	
Strategy	Lectures & Interactive Sessions Use of multimedia presentations, animations, and models to explain genetic principles. Incorporation of case studies (e.g., genetic disorders, crop improvement) to link theory with practice.Laboratory PracticalsHands-on experiments in cytogenetics, molecular biology (DNA extraction, PCR, gel electrophoresis).

	Demonstrations of plant/animal breeding techniques and microbial genetics.

96. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Explain the fundamental principles of classical and molecular genetics (Mendelia inheritance, DNA structure, gene expression, mutation, recombination). Describe the role of applied genetics in agriculture, medicine, industry, and conservation. Identify modern genetic technologies (e.g., PCR, DNA sequencing, genetic engineeri CRISPR, cloning). Recognize ethical, legal, social implications of gen research and applications.	Introduction Of applied genetics	Black bord and slides+ power point	Daily exam and homework
2	2	Explain the principles of recombinant DNA technology including restriction enzymes vectors, cloning, and host systems. Understand the molecular too (restriction endonucleases, ligases, polymerases, plasmid phages, etc.) and their roles. Describe the steps involved i gene cloning: isolation, cuttin ligation, transformation, and selection.	Recombinant DNA Technology	Black board and power point	Daily exam and homework

		Recognize applications of rD technology in medicine, agriculture, industry, and research. Understand biosafety, bioeth and regulations associated v genetic engineering.			
3	2	Understand the principle of ridoma technology (cell fusio ymphocytes with myeloma cel Describe the histor velopment of monoclo ibody production (Köhler lstein's work).	Hybridoma technology	You tube and power point	Daily exam and homework
4	2	explain the principles and importance of gene mapping genetics and biotechnology. Differentiate between genetic mapping (linkage maps) and physical mapping (based on DNA sequences). Describe the historical development of gene mappin (classical linkage studies to modern genome sequencing). Understand concepts of recombination frequency, linkage, and crossing over. Identify various gene mapp techniques (e.g., link analysis, restriction mapp FISH, genome sequencing,	Gene mapping	Black board and power point	Daily exam and homework
5	2	Define preimplantation genet diagnosis/testing (PGD/PGT) and its role in assisted	Pre-implantation Genetics diagnosis	You tube and power point	Daily exam and

		reproductive technology (AR Explain the indications PGD/PGT (e.g., monoge diseases, chromoso abnormalities, sex-lin disorders, aneuploidy).			homework
6	2	Define what genetic testing is and describe different types (e.g., diagnostic, predictive, carrier, prenatal, newborn screening, pharmacogenomic Explain the scientific basis genetic testing, including DI genes, mutations, inheritance patterns.	Genetic testing	Black board and power point	Daily exam and homework
7	2	Define biotechnology and explain its scope. Describe the historical development and milestones biotechnology. Differentiate between traditic and modern biotechnology.	Biotechnology and its applicatin	Black board and power point	Daily exam and homework
8	2	Midterm Exam	Midterm Exam		
9	2	Define sex linkage – explain what sex-linked inheritance is and why certain genes are located on sex chromosomes or Y). Differentiate autosomal vs. s linked inheritance – underst the distinction between tr controlled by autosomes those linked to chromosomes.	Sex Linkage	Black board and power point	Daily exam and homework
10	2	Define multifactorial inherita and explain how it differs fro single-gene (Mendelian)	Multifactorial Inheritance and	Black board power po	Daily exam a homework

		inheritance. Describe the role of genetic factors (polygenic contributic and environmental influences complex diseases. Explain the concept of thresh liability and how it applies to multifactorial disorders.	complex disease		
11	2		MED Exam		
12	2	Seminar			
13	1				

97. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning

98. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Applied Genetics: Recent Trends and Techniques A text that deals with molecular aspects and recent applications in genetics.
Main references (sources)	Foundations laid by Gregor Mendel's laws of inheritance. Provides the basis for understanding inheritance patterns in plants, animals, and humans.
Recommended books and references (scientific journals, reports...)	
Electronic-References, Website	

Course Description Form

urse Name:
Antibiotic Resistance
urse Code:
MBIO514
mester / Year:
2nd/MSc
scription Preparation Date:
1-9-2025
Available Attendance Forms:
Attendance
Number of Credit Hours (Total) / Number of Units (Total)
30 h/2 units
Course administrator's name (mention all, if more than one name)

ظفر نجم عبد الامير	dhafar.alugaili@nahrainuniv.edu.iq

Course Objective	
Course Objectives	This course provides a comprehensive overview of antibiotics, their historical development, and their profound impact on human health. We will explore the mechanisms of action of major antibiotic classes,

Teaching and Learning Strategies
• 1- The theoretical principles and foundations related to the scientific subject of cognitive sciences 2- The foundations of scientific research, methods of measurement, analysis, and finding solutions to scientific problems 3- The importance of theoretical scientific aspects related to the applications of various sciences 4- Scientific and linguistic terms and their definition of various scientific subjects 5- Methods related to analyzing and designing scientific experiments for various scientific subjects Education methods

Course Structure					
Week	**Hrs**	**Required learning outcomes**	**Lecture Objective (English)**	**Learning method**	**Evaluation method**
1	2		• Chemotherapeutic agents and antimicrobials. • Antibiotics Discovery and Development. Sources of antimicrobials.	White boar Smart scre	assignments in addition to monthly exams
2	2		The biosynthesis and regulation of the production of antibiotics in microorganisms. The production of synthetic and semi-synthetic antibiot	White board Smart screen	assignments in addition to monthly exams
3	2		**Mechanisms of Action of Antibiotics**	White board Smart screen	homework assignments in addition to monthly exams
4	2		Antimetabolites and Other Mechanisms. Factors Affecting Choice Antimicrobial Agent	White board Smart screen	homework assignments in addition to monthly exams
5	2		Pharmacokinetics and Pharmacodynamics of Antibiotics	White board Smart screen	homework assignments in addition to monthly exams
6	2		1st monthly exam	-	1st monthly exam
7	2		Superbugs origin and dissemination	White board Smart screen	assignments in addition to monthly exams
8	2		Common Infections and Antibiotic Treatment. Antibiotics for Gram positi	White board Smart	homework assignments in addition to monthly

			bacteria	screen	exams
9	2		Antibiotics for Gram negat bacteria	White board Smart screen	assignments in addition to monthly exams
10	2		Antibiotics for an aerobic infections	White boarc Smart scree	assignments addition to monthly exar
11	2		Classes of antibiotics and some potential side effects.	White boarc Smart scree	assignments addition to monthly exar
12	2		Herbal antibiotics	White boarc Smart scree	assignments addition to monthly exar
13	2		Final Topics antibiotics (general concepts)	White boarc Smart scree	assignments addition to monthly exar
14	2		Seminar	White boarc Smart scree	assignments addition monthly exar
15	2		2nd exam	White boarc Smart scree	Second mont exam

99. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning

100. Learning and Teaching Resources

CLSI AST News Update. Volume 7, Issue 1, June 2022.

Mechanisms of Antibiotic Resistance (20216). Microbiol Spectr. April ; 4(2)

Ahmad, M. and Khan, A.U. (2019) 'Global economic impact of antibiotic resistance: A review.' Journal of Global Antimicrobial Resistance, 19 pp. 313-316Molecular Genetics of Bacteria, Snyder, L. and Champness, W. 2007. 3rd edition, American Society for Microbiology, Washington, D. C.

Centers for Disease Control and Prevention. (2019) US antibiotic use rates by state. NHS. (2019) Antibiotic resistance**.**	
https://www.cdc.gov/antibiotic-use/community/images/materials/Antibiotic-Prescriptions-Map https://www.nhs.uk/conditions/antibiotics/antibiotic-antimicrobial-resistance/	

Course Description Form

Course Name:	
Advan. Microbial physiology	
Course Code:	
MBIO512	
Semester / Year:	
First Semester /Master	
Description Preparation Date:	
1-9-2025	
Available Attendance Forms:	
Attendance	
Number of Credit Hours (Total) / Number of Units (Total)	
30 Hours /2 units	
Course administrator's name (mention all, if more than one name)	
Name: Mayada S. Mahd	mayada. mahdi @nahrainuniv.edu.iq

Course Objectives

Course Objectives	**Course Objectives** 1. Understand the **physiological processes of microorganisms** and how they adapt to different environmental conditions. 2. Explain the **metabolic pathways in bacteria, fungi, and other microorganisms**. 3. Analyze **microbial growth, regulation, and cellular responses** to environmental stress. 4. Study **energy generation and nutrient utilization** in microorganisms.

Teaching and Learning Strategies

Strategy	• Lectures **& Expert Seminars** Delivered by faculty and guest specialists to provide in-depth theoretical foundations and current advances in microbial pysiology • Interactive **Discussions & Case-Based Learning** Students engage in group discussions

Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	2		Introduction to	Power point	Written

			Microbial Physiologygy	presentation and white board	Examinations Seminars and class disussion ,reports
Week 2	2		Microbial Cell Structure and Function	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 3	2		Microbial Growth	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 4	2		Nutritional Requirements	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 5	2		Energy Production	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 6	2		Microbial Metabolism	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 7	2		Regulation of Microbial Metabolism	Power point presentation and white board	Written Examinations Seminars and class disussion
Week8	2		1st Mid Exam	Power point	Written

				presentation and white board	Examinations Seminars and class disussion
Week 9	2		Stress Responses	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 10	2		Signal Transduction and Communication	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 11	2		Microbial Adaptation to Extreme Environments	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 12	2		Physiology of Biofilmss	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 13	2		Microbial Physiology in Pathogenesis	Power point presentation and white board	Written Examinations Seminars and class disussion
Week 14	2		Applications in Biotechnology	Power point presentation and white board	Written Examinations Seminars and class disussion

Week 15	2		Final Exam		

Course Evaluation
Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning

Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Brock Biology of Microorganisms – Madigan MT et al., 16th ed., Pearson, 2021. • Microbial Physiology – Moat AG, Foster JW, Spector MP, 4th ed., Wiley-Liss, 2002. • Principles of Microbiology – Atlas RM, 2nd ed., McGraw-Hill, 1997.
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic-References, Website	

Course Description Form

101. Course Name:
Academic Skills II / MSc
102. Course Code:
MBIO505
103. Semester / Year:
2nd Semester – Master
104. Description Preparation Date:
1/10/2025
105. Available Attendance Forms:
Attendance
106. Number of Credit Hours (Total) / Number of Units (Total):
30/1 unit
107. Course administrator's name (mention all, if more than one name)
Name: Moyassar Basil Hadi Email: moyassar.basil@nahrainuniv.edu.iq

108. Course Objectives	
Course Objectives	1- The foundations of standard and general conversation in English. 2- The foundations of scientific and academic writing in the English language. 3- Strengthening English listening skills. 4- Understanding and realizing how to read texts in the English language and distinguishing the important substantive texts in a particular article

	and giving them more attention than other sub-texts to shorten the time of correct general understanding of the content to be read.

109. Teaching and Learning Strategies

Strategy	Learning and strategies with high impact teaching focus on planning, teaching and assessment to equip students to excel their role in state associations after graduation. These include: • Planning for lecture • Lecture structure • Explicit teaching and inquiry • Questioning generation • Feedback from students • Effective assessment for the students • Greater understanding of planning expectations • Assessment skills that will change teaching style	will change teaching style

110. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st	2	Interpreting meaning	Reading sk	Whiteboard a PPT	Quiz & Home Work
2nd	2	Paraphrasing & summarizing	Writing ski	Whiteboard a PPT	Quiz & Home Work
3rd	2	Writing a summary	Writing	Whiteboard a PPT	Quiz & Home Work
4th	2	Using original sources	Reading sk	Whiteboard a PPT	Quiz & Home Work
5th	2	Developing a search plan	Research skills	Whiteboard a PPT	Quiz & Home Work

6th	2	Adding extra information, organizing ideas	Writing ski	Whiteboard ar PPT	Quiz & Home Work
7th	2	Written Exam	Midterm Exam	Whiteboard ar PPT	Quiz & Home Work
8th	2	Rephrasing and explaining	Reading sk	Whiteboard ar PPT	Quiz & Home Work
9th	2	Liking ideas, coherent writing	Writing skills	Whiteboard ar PPT	Quiz & Home Work
10t	2	Acknowledgements	Research skills	Whiteboard ar PPT	Quiz & Home Work
11t	2	The passive voice	Writing ski	Whiteboard ar PPT	Quiz & Home Work
12t	2	Writing a descriptive process	Writing ski	Whiteboard ar PPT	Quiz & Home Work
13t	2	Interpreting data	Writing ski	Whiteboard ar PPT	Quiz & Home Work
14t	2	Illustrating data	Writing ski	Whiteboard ar PPT	Quiz & Home Work
15t	2	Describing a graph or chart	Writing ski	Whiteboard ar PPT	Quiz & Home Work

111. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as:

- Midterm Written Exam (20%).
- Weekly Quizzes (5%).
- Home Works and Assignments (5%).
- Final Exam (70%)

112. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	3. Headway Academic Skills: Reading, Writing, and Study Skills. Student's Book. Sarah Philpot, Editors: Liz and John Soars. Oxford. Headway Academic Skills: Reading, Writing, and Study Skills. Teacher's Guide. Sarah Philpot, Editors: Liz and John Soars. Oxford.
Main references (sources)	Headway Academic Skills: Reading, Writing, and Study Skills. Student's Book. Sarah Philpot, Editors: Liz and John Soars. Oxford.
Recommended books and references (scientific journals, reports...)	4. Headway Academic Skills: Reading, Writing, and Study Skills. Student's Book. Sarah Philpot, Editors: Liz and John Soars. Oxford. Headway Academic Skills: Reading, Writin and Study Skills. Teacher's Guide. Sarah Philpot, Editors: Liz and John Soars. Oxforc
Electronic References, Websites	2. Academic Skills https://www.indeed.com/career-advice/career-development/academic-skills