



وزارة التعليم العالي والبحث العلمي
جهاز الإشراف والتقويم العلمي
دائرة ضمان الجودة والاعتماد الأكاديمي



وصف البرنامج الأكاديمي للكليات والمعاهد

للعام الدراسي ٢٠٢٥ - ٢٠٢٦

الجامعة :

الكلية / المعهد : كلية الشرق الأوسط الجامعة

القسم العلمي : علوم الحياة

تاريخ ملء الملف : ١٠ / ١٠ / ٢٠٢٥

التوقيع :

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دقق الملف من قبل

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العميد

ا.د. متمر مثنى علوان الجشعمي

التاريخ : ١٠ / ١٠ / ٢٠٢٥

رؤيا ورسالة وأهداف قسم علوم الحياة

١. رؤية البرنامج

برنامج قسم علوم الحياة يتضمن تهيئة خريجين قادرين على فهم التخصصات المتعددة لعلم الأحياء من خلال مجموعة متنوعة من المقررات الدراسية والتجارب المختبرية والبحث والعمل الجماعي. هذا المزيج من الأساليب التعليمية يقود الطلاب إلى فهم متساوٍ للتقنيات العلمية التي يستخدمها علماء الأحياء لبناء التفسيرات وتطوير الرؤى وإنشاء نظريات حول الكائنات الحية التي تسكن الكرة الأرضية. يعمل أعضاء الهيئة التدريسية في قسم علم الأحياء على إنشاء علاقة عمل وثيقة بين أعضاء هيئة التدريس والطلاب في جو طبيعي وبيئة ملائمة.

٢. رسالة البرنامج

يمارس أعضاء هيئة التدريس في قسم الأحياء - كلية الشرق الاوسط الجامعة مهام متعددة الأوجه . يسعى البرنامج إلى تزويد جميع طلاب بالمعرفة النهائية لعلم الأحياء، بالإضافة إلى فهم أعمق في مجال معين من مجالات العلوم البيولوجية. تم اقتراح المناهج الدراسية والمشورة لإعداد الخريجين لمستقبلهم المهني، سواء اختاروا العمل كعالم أحياء متخصص في مجموعة واسعة من المجالات الخاصة مثل علم الأحياء الدقيقة أو علم النبات أو الحياة الطبيعية، أو متابعة درجات علمية متقدمة في علوم الحياة أو العلوم الصحية. يقدم البرنامج في هذا القسم أيضًا المعرفة الأساسية لعلوم الحياة لدعم درجة التمريض ودرجة الدراسات الطبية الحيوية ودرجة مشارك في العلوم في تكنولوجيا الغابات. بالإضافة إلى ذلك، توفر دورات علم الأحياء تجربة العلوم المختبرية الأساسية للطلاب الذين يسعون إلى تحقيق متطلبات التعليم العام.

٣. أهداف البرنامج

١. توفير تعليم شامل في علم الأحياء يؤكد على التفكير العلمي وحل المشكلات عبر مجموعة واسعة من التخصصات داخل علم الأحياء
٢. لإعداد الطلاب لمجموعة واسعة من مسارات ما بعد البكالوريا، بما في ذلك الدراسات العليا، وبرامج التدريب المهني، أو وظائف مستوى الدخول في أي مجال من مجالات علم الأحياء
٣. توفير تدريب عملي مكثف في مجال التكنولوجيا الإلكترونية، والتحليل الإحصائي، والمهارات المعملية، والتقنيات الميدانية
٤. توفير تدريب شامل على التواصل الكتابي والشفوي للمعلومات العلمية
٥. إثراء الطلاب بفرص التعليم البديل في مجال علم الأحياء من خلال البحث الجامعي والتدريب الداخلي والدراسة في الخارج

٤. الاعتماد البرامجي

لا يوجد

٥. المؤثرات الخارجية الأخرى

لا يوجد

٦. هيكلية البرنامج

هيكل البرنامج	عدد المقررات	وحدة دراسية	النسبة المئوية	ملاحظات *
متطلبات المؤسسة	5	16	11%	
متطلبات الكلية	8	37	17%	
متطلبات القسم	33	187	72%	
التدريب الصيفي	لا يوجد			
أخرى				

* ممكن ان تتضمن الملاحظات فيما إذا كان المقرر أساسي او اختياري.

٧. وصف البرنامج

عدد الوحدات	عدد الساعات		أسم المقرر	رمز المقرر	صنف المقرر	المرحلة الفصل الدراسي
	عملي	نظري				
٣	٢	٢	Bacterial Toxins سموم بكتيرية	MEBIO404	أساسي	(الفصل الأول) الرابعة
٣	٢	٢	Food Microbiology أحياء مجهرية الأغذية	MEBIO401	أساسي	
٣	٢	٢	Biotechnology التقانة الحيوية والهندسة الوراثية & Genetic Engineering	MEBIO406	أساسي	
٣	٢	٢	Evolution & Biodiversity التطور والتنوع الحيوي	MEBIO408	أساسي	
٣	٢	٢	Pathogenic Bacteria بكتريا مرضية	MEBIO411	أساسي	
٣	٢	٢	Molecular Biology البايولوجي الجزيئي	MEBIO412	أساسي	
٣	٢	٢	Mycology علم الفطريات	MEBIO409	أساسي	
١	٢	-	Research Project مشروع بحث	MEBIO415	أساسي	
٢	-	٢	English Language اللغة الانكليزية	MEBIO431	عام	
٢٤	١٦	١٦	مجموع عدد الساعات والوحدات			
٣	٢	٢	Industrial أحياء مجهرية صناعية Microbiology	MEBIO402	أساسي	التدريب الصيفي

٣	٢	٢	الحبليات Cordates	MEBIO405	أساسي
٣	٢	٢	علم الفيروسات Virology	MEBIO407	أساسي
٣	٢	٢	وراثة أحياء مجهرية Microbial Genetics	MEBIO403	أساسي
٣	٢	٢	تصنيف فطريات Fungi Taxonomy	MEBIO410	أساسي
٣	٢	٢	مضادات حيوية Antibiotics	MEBIO413	أساسي
٣	٢	٢	علم الغدد الصماء Endocrinology	MEBIO414	أساسي
١	٢	-	مشروع بحث Research Project	MEBIO431	أساسي
٢٢	١٦	١٤	مجموع عدد الساعات والوحدات		
٤٦	٣٢	٣٠	العدد الكلي للساعات والوحدات للمرحلة الرابعة		
١٥٦			العدد الكلي لوحدات البرنامج		

٨. مخرجات التعلم المتوقعة للبرنامج	
المعرفة	
تحديد العلاقات المعقدة	سيكون الخريجون قادرين على توضيح بنية ووظيفة المكونات الخلوية وشرح كيفية تفاعلها في الخلية الحية.
المهارات	
التواصل الشفهي والكتابي	سيكون الخريجون قادرين على توصيل نتائج التحقيقات البيولوجية رسميًا باستخدام مهارات الاتصال الشفهية والكتابية.
الدراسات المختبرية والميدانية	سيكون الخريجون قادرين على إجراء التجارب المعملية والدراسات الميدانية، باستخدام المعدات العلمية وتكنولوجيا الكمبيوتر مع مراعاة بروتوكولات السلامة المناسبة.
القيم	
المعرفة العلمية	سيكون الخريجون قادرين على إظهار مفهوم متوازن لكيفية تطور المعرفة العلمية، بما في ذلك التطور التاريخي للنظريات والقوانين التأسيسية وطبيعة العلم.
تحليل البيانات	سيكون الخريجون قادرين على إظهار المهارات الكمية العلمية، مثل القدرة على إجراء تحليلات بسيطة للبيانات.
التفكير النقدي	سيكون الخريجون قادرين على استخدام مهارات التفكير النقدي وحل المشكلات لتطوير مشروع بحثي أو ورقة.

٩. استراتيجيات التعليم والتعلم
<p>يركز هذا البرنامج على الكائن الحي بأكمله الذي يرتبط به كل شيء، سواء كان ذلك الجزيئات التي تشكل البروتينات أو مجتمعات الكائنات الحية في نظامنا البيئي. يتمتع جميع الطلاب بفرصة الانتقال إلى شهادتنا المتخصصة في علم الوراثة وعلم الحيوان والأحياء الدقيقة في نهاية السنة الأولى.</p> <p>في المستوى الأول، يتعرف الطلاب على موضوعات أساسية مثل علم الأحياء الدقيقة العام والسلامة والأمن الحيوي بالإضافة إلى موضوعات أخرى مناسبة للتقدم إلى جميع البرامج ضمن مجموعة برنامج علم الأحياء. تتم تغطية غالبية المواضيع الأساسية الخاصة بالبرنامج في المستوى ٢ للتحضير للوحدات المتخصصة في المواضيع التي تفوقها الأبحاث في المستويين ٣ و٤. ولذلك يتم توجيه خريج علم الأحياء بالجامعة لاكتساب كيفية قيام البحث بإرشاد التدريس، وفقاً لبيانات مهمة الجامعة.</p>

في المستوى الرابع، يتمتع الطلاب بفرصة اختبار موضوع أو موضوعين من وحداتهم الدراسية بشرط أن يتم اختيار مجموعة من الوحدات التي تعكس مدى تعقيد أشكال الحياة من الجزيئات، مرورًا بالكائنات الحية، سواء النباتات أو الحيوانات، إلى المجموعات السكانية لضمان اتساع نطاقها. المعرفة المتوقعة من خريج بدرجة علم الأحياء. يتيح ذلك للطلاب تطوير اهتماماتهم واسعة النطاق في علم الأحياء العضوي. يتم اتخاذ القرارات بشأن ما سيتم دراسته بمدخلات من المعلمين الشخصيين.

يتم تطوير روح البحث وتعزيزها منذ البداية من خلال التطبيقات العملية، والتي تكون إما مضمنة في وحدات المحاضرات أو يتم تدريسها في وحدات عملية وندوات بحثية ودروس تعليمية. هناك دورة ميدانية إلزامية في المستوى ١، والتي يجب على الطلاب اجتيازها من أجل التقدم إلى المستوى ٢، ودورات ميدانية اختيارية في المستوى ٤. في المستوى ٤، يقوم جميع الطلاب بتنفيذ مشروع بحث مستقل أو مشروع معلمي أو مزيج من كل ما سبق ذكره.

يتم عقد الدروس الأكاديمية في المستويين ١ و ٢ مع نفس التدريسي، مما يوفر الاستمرارية والتوجيه التدريجي. تشتمل البرامج التعليمية للمستوى الأول والثاني على عدد من ورش العمل لإظهار المهارات مثل استخدام المكتبة ومهارات العرض، تليها تمارين تقييمية (مقالات ومحادثات) كفرص لممارسة هذه المهارات في سياق موضوع محدد.

١٠. طرائق التقييم

اختبارات، تقارير، مشاريع، العمل في مجموعات، امتحان نصفي، امتحان نهائي

١١. الهيئة التدريسية

أعضاء هيئة التدريس

اعداد الهيئة التدريسية		المتطلبات/المهارات الخاصة (ان وجدت)		التخصص		الرتبة العلمية
محاضر	ملاك			عام	خاص	
	1			علم الاحياء	احياء مائية	أستاذ
	1			علم الاحياء	علم النبات	
	1			علوم سياسية	علوم سياسية	
١	1			علم الاحياء	احياء مجهرية	أستاذ مساعد
	1			علم الاحياء	علم النبات	
	1			علوم زراعية	علم التربة	
	1			علم الفيزياء	علوم الجو والفضاء	
١				علم الاحياء	هندسة وراثية	مدرس /باحث
١				علوم زراعية	علم النبات	
	1			علوم بيطرية	علم الانسجة	
	1			علم الكيمياء	كيمياء حياتية	
١	1			علم الاحياء	احياء مجهرية	مدرس مساعد
١				علوم زراعية	حشرات	
١				علم اللغة	لغة انكليزية	
	1			علم القانون	قانون جنائي	

التطوير المهني

توجيه أعضاء هيئة التدريس الجدد

عادةً ما يقوم رئيس القسم بتعيين مرشد لأعضاء هيئة التدريس الجدد بناءً على الاهتمامات البحثية ويتطلب ذلك أن يلتقي المرشد والمتدرب عدة مرات. يمكن للمسؤولين أن يسعوا جاهدين لخلق جو يفضي إلى الإرشاد. قد يتضمن ذلك أحداثًا تشجع على مشاركة أبحاث أعضاء هيئة التدريس ومن خلال تقييم العمل التعاوني والإرشاد بشكل واضح في التقييمات.

التطوير المهني لأعضاء هيئة التدريس

يشمل تطوير أعضاء هيئة التدريس المشاركة في الأنشطة ويمكن التحقق منها (وجهًا لوجه، أو عبر الإنترنت، أو ممزوجة [وجهًا لوجه مع عناصر عبر الإنترنت]) حول أي موضوعات تساهم في تعزيز وتنمية القدرات. المعرفة أو المهارات أو التقنيات أو الوعي أو السلوكيات كتدريسي أو عالم

١٢. معيار القبول

يتم تنظيم معايير القبول من قبل وزارة التعليم العالي والبحث العلمي

١٣. أهم مصادر المعلومات عن البرنامج

عن طريق موقع الكلية

١٤. خطة تطوير البرنامج

- 1 - تخصيص مبالغ مالية خاصة بالقسم للعمل على سد النواقص والاحتياجات للقسم
- 2 - تخصيص تدريسيين للتعليم المستمر للمعنيين الجدد
- 3 - تخصيص موقع خاص بالقسم
- 4 - إعادة تأهيل المختبرات بالأجهزة والمستلزمات الضرورية
- 5 - تعيين بكالوريوس جدد لسد النقص الموجود في كادر المختبرات التعليمي

مخطط مهارات البرنامج

مخرجات التعلم المطلوبة من البرنامج												اساسي أم عام	اسم المقرر	رمز المقرر	السنة / المستوى
القيم				المهارات				المعرفة							
ج ٤	ج ٣	ج ٢	ج ١	ب ٤	ب ٣	ب ٢	ب ١	أ ٤	أ ٣	أ ٢	أ ١				
				*	*	*	*	*	*	*	*	اساسي	البيولوجي الجزئي	MEBio- ٤١٢	Level 7
				*	*	*	*	*	*	*	*	اساسي	احياء مجهرية الاغذية	MEBio- ٤٠١	
				*	*	*	*	*	*	*	*	اساسي	سموم بكتيرية	MEBio- 404	
				*	*	*	*	*	*	*	*	اساسي	تقانة حيوية وهندسة وراثية	MEBio- 406	
				*	*	*	*	*	*	*	*	اساسي	بكتريا مرضية	MEBio- 411	
				*	*	*	*	*	*	*	*	اساسي	فطريات	MEBio- 409	
				*	*	*	*	*	*	*	*	اساسي	تنوع وتطور حيوي	MEBio- 408	
*	*	*	*	*	*	*	*	*	*	*	*	عام	لغة انكليزية	MEBio- 431	
*	*	*	*	*	*	*	*	*	*	*	*	اساسي	مشروع بحث	Bio- 415	
				*	*	*	*	*	*	*	*	اساسي	وراثة احياء مجهرية	MEBio- 403	
				*	*	*	*	*	*	*	*	اساسي	احياء المجهرية الصناعية	MEBio- 402	
				*	*	*	*	*	*	*	*	اساسي	تصنيف فطريات	MEBio- 410	
				*	*	*	*	*	*	*	*	اساسي	فيروسات	MEBio- 407	
				*	*	*	*	*	*	*	*	اساسي	مضادات حيوية	MEBio- 413	
				*	*	*	*	*	*	*	*	اساسي	حبيبات	MEBio- 405	
				*	*	*	*	*	*	*	*	اساسي	علم الغدد الصماء	MEBio- 414	
*	*	*	*	*	*	*	*	*	*	*	*	اساسي	مشروع بحث	MEBio- 431	

وصف المقرر
الدراسي لمواد
المرحلة الرابعة

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Bacterial toxins		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MEBio-404		
ECTS Credits	3		
SWL (hr/sem)	---		
Module Level	4	Semester of Delivery	
Administering Department	Bio	College	Meddle east
Module Leader	Aeshah Muhnah Mohammed	e-mail	Aeshah M.M.@meuc.edu.iq
Module Leader's Acad. Title	Assistant Prof	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	None	e-mail	None
Scientific Committee Approval Date	01/10/2025	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 Objectives أهداف المادة الدراسية	1. This class discusses the fundamental aspects of bacterial toxins . 2. its importance to mankind in a brief and articulate explanation of this newly

	<p>originated science.</p> <ol style="list-style-type: none"> Highlights the most important toxins produced by bacteria, their types, mechanism of action and effects. Recognizing the importance of toxins produced by different bacterial species and their important role in the virulence of bacterial cells.
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> A- Knowledge and understanding: The undergraduate student will be introduced to the most important toxins secreted by bacteria as virulence factors that increase the bacteria's susceptibility to pathogens. B- Subject-specific skills: the student at the undergraduate level acquires the ability to distinguish between virulence factors and learn about toxins produced by bacteria of different types. Methods of teaching and learning: It is a direct explanation with students with drawings, as well as a power point presentation, in addition to educational video clips regarding the subject. Assessment methods: daily exams (cozzes), monthly exams, reports on the subject in addition to final exams. C- Thinking skills: the student in the bachelor's degree acquires the ability to distinguish between virulence factors and learn about toxins produced by bacteria of different types. D - general and transferable skills (other skills related to employability and personal development). Gaining scientific knowledge, the ability to diagnose and know the causes of diseases..
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Bacteria toxins which can be classified as either exotoxins or endotoxins. Exotoxins are generated and actively secreted; endotoxins remain part of the bacteria. Usually, an endotoxin is part of the bacterial outer membrane, and it is not released until the bacterium is killed by the immune system. The body's response to an endotoxin can involve severe inflammation. In general, the inflammation process is usually considered beneficial to the infected host, but if the reaction is severe enough, it can lead to sepsis. Exotoxins are typically proteins with enzymatic activity that interfere with host cells triggering the symptoms associated with the disease. Exotoxins are also relatively specific to the bacteria that produce it; for example, diphtheria toxin is only produced by <i>Corynebacterium diphtheriae</i> bacteria and is required for the diphtheria disease. Some bacterial toxins can be used in the treatment of tumors. Endotoxins most commonly refer to the lipopolysaccharide (LPS) or lipooligosaccharide (LOS) that are in the outer plasma membrane of Gram-negative bacteria. Not all strains of a bacteria species are virulent; there are some strains of <i>Corynebacterium diphtheriae</i> that do not produce diphtheria toxin and are considered nonvirulent and nontoxicogenic. Additional classifications used to describe toxins include enterotoxin, neurotoxin, leukocidin or hemolysin which indicate where in the host's body the toxin targets. . Enterotoxins target the intestines, neurotoxins target neurons, leukocidin target leukocytes (white blood cells), and hemolysins target red blood cells. Exotoxin activity can be separated into specific cytotoxic activity or broad cytotoxic activity based on whether the toxin targets specific cell types or various cell types and tissues, respectively. Lethal toxins refers to the</p>

group of toxins that are the obvious agents responsible for death associated with the infection.

Toxinosis is pathogenesis caused by the bacterial toxin alone, not necessarily involving [bacterial infection](#) (e.g. when the bacteria have died, but have already produced toxin, which are ingested). It can be caused by [Staphylococcus aureus](#) toxins, for example.

Clostridial

There are over 200 [Clostridium](#) species in the world that live in mundane places such as soil, water, dust, and even our digestive tracts. Some of these species produce harmful toxins such as botulinum toxin and tetanus toxin among others. Most clostridium species that do have toxins typically have binary toxins with the first unit involved in getting the toxin into the cell and the second unit cause cellular stress or deformation. Clostridial toxins are widespread and aid in the production of many diseases in humans and other organisms. Clostridial toxins are known to aid in gastrointestinal diseases and there is a wide range of mechanisms that clostridial toxins take to invade or enter the cell of the host. Pore forming bacterial toxins are common and have a very interesting way of entering or invading the host's cell. The mechanism that clostridial toxins follow includes clostridia forming pores and then the pores inserting themselves into the cell membrane of cells. Clostridial toxins have the ability to damage or alter the cell membrane damaging the extracellular matrix of the organism.

[Toxin A](#) and [toxin B](#) are two toxins produced by *Clostridium difficile*. Toxin A and toxin B are [glycosyltransferases](#) that cause the antibiotic-associated pseudomembranous colitis and severe diarrhea that characterize disease presentation of [C. diff infections](#).

Botulinum

[Botulinum neurotoxins](#) (BoNTs) are the causative agents of the deadly food poisoning disease botulism, and could pose a major biological warfare threat due to their extreme toxicity and ease of production. They also serve as powerful tools to treat an ever expanding list of medical conditions that benefit from its paralytic properties, an example drug with BoNTs as the active ingredient is Botox.¹ They also serve as powerful tools to treat an ever expanding list of medical conditions that benefit from its paralytic properties delivered through localized injections, an example drug with BoNTs as the active ingredient is Botox. Botulinum neurotoxins (BoNTs) are protein neurotoxins that are produced by the bacteria Clostridium. BoNTs are now largely being studied due to their ability to aid in chronic inflammatory diseases such as acne, multiple sclerosis, and for cosmetic purposes

Tetanus

[Clostridium tetani](#) produces tetanus toxin (TeNT protein), which leads to a fatal condition known as [tetanus](#) in many vertebrates (including humans) and invertebrates. While tetanus toxin is produced from *Clostridium tetani*, a spore forming bacteria found in soil, Tetanus is a paralytic disease that is global and commonly affects newborns as well as non-immunized individuals. Tetanus enters the body of organisms through wounds or skin breaks and can be found in manure, soil, and dust. Tetanus mechanism includes tetanus preventing the transmission of glycine and γ -aminobutyric acid from inhibitory interneurons in the spinal cord, leading to spastic paralysis. Glycine is an important amino acid that is essential for adequate nervous system function aiding in cell communication

throughout the body. When tetanus toxin enters the body it is taken up by cholinergic nerve endings traveling axonally into the brain and spinal cord, disrupting motor function in individuals. Although tetanus is a damaging toxin that has a multitude of symptoms it can be prevented through vaccination.

Perfringolysin O toxin

Clostridium perfringens is an anaerobic, gram-positive bacteria that is often found in the large and small intestines of humans and other animals. *Clostridium perfringens* has the ability to reproduce quickly producing toxins relating to the cause of diseases. The pore-forming toxin perfringolysin has the ability to cause gangrene in calves with the presence of alpha toxin.

Staphylococcal

Immune evasion proteins from *Staphylococcus aureus* have a significant conservation of protein structures and a range of activities that are all directed at the two key elements of host immunity, complement and neutrophils. These secreted virulence factors assist the bacterium in surviving immune response mechanisms.

Examples of toxins produced by strains of *S. aureus* include enterotoxins that cause food-poisoning, exfoliative toxins that cause [scalded skin syndrome](#), and [toxic-shock syndrome toxin](#) (TSST) that underlies [toxic shock syndrome](#).^[7] These toxin examples are classified as [superantigens](#).^[7]

Multi-drug resistant *S. aureus* strains also produce alpha toxin, classified as a [pore-forming toxin](#), which can cause [abscesses](#).

Shiga

[Shiga toxins](#) (Stxs), responsible for foodborne illnesses, are a classification of toxins produced by [Shiga toxin-producing Escherichia coli](#) (STEC) and [Shigella dysenteriae](#) serotype 1. Stx was first identified in *S. dysenteriae* and was later found to be produced by certain strains of *E. coli*.^[8] Stxs act through inhibiting protein synthesis of infected cells and can be divided into two antigenically different groups: Stx/Stx1 and Stx2.^[7] Stx1 is immunologically equivalent to Stx; however, it received a separate name to distinguish that it's produced by STEC not *S. dysenteriae*. Stx2 is produced only by STEC and is antigenically different from Stx/Stx1. The term shiga-like toxins was previously used to further distinguish the shiga toxins produced by *E. coli*, but nowadays, they are collectively referred to as shiga toxins.^[8] Within the STEC strains, a subgroup classified as enterohemorrhagic *E. coli* (EHEC) represent a class of pathogens with more severe virulence factors in addition to the ability to produce Stxs. EHEC infections result in more severe diseases of hemorrhagic colitis and [hemolytic uremic syndrome](#).^[7] There are around 200 strains of STEC, and the wide range of diversity and virulence between them can be partly attributed to phage-mediated horizontal transfer of genetic material.

Anthrax toxin

[Anthrax](#) disease in humans results from infection with toxin producing [Bacillus anthracis](#) strains that can be inhaled, ingested in contaminated food or drink, or obtained through breaks in the skin like cuts or scrapes.^[10] Domestic and wild animals can also be infected via inhalation or ingestion. Depending on the route of entry, disease can present initially as inhalation anthrax, cutaneous anthrax, or gastrointestinal anthrax, but eventually will spread throughout the body, resulting in death, if not treated with antibiotics.^[10] [Anthrax toxin](#) is composed of three

domains: protective antigen (PA), edema factor (EF), and lethal factor (LF). EF is an adenylate cyclase that targets ATP. LF enzyme is a metalloprotease that confers the lethal phenotype associated with anthrax disease.^[7] As LF is the agent responsible for the death of infected hosts, it is classified in the group of lethal toxins.

Diphtheria toxin

[Diphtheria toxin](#) is produced by virulent [Corynebacterium diphtheriae](#) that infect the mucosal membranes of the throat and nasal cavity causing a gray, thickened lining of the throat, sore throat, weakness, mild fever, swollen glands of the neck, and difficulty breathing.^[11] Diphtheria toxin is an ADP-ribosyltransferase that inhibits protein synthesis which causes the symptoms associated with the disease.^[7] [Diphtheria](#) used to be a leading cause of childhood death until the creation of a vaccine.^[11] The [diphtheria vaccine](#) contains a diphtheria toxoid, antigenically identical yet inactivated and non-toxic. When the toxoid is introduced to the body in a vaccine, an immune response is mounted without sequelae associated with the toxigenicity.

Pertussis toxin

[Pertussis toxin](#) is produced by virulent [Bordetella pertussis](#) and is responsible for the disease of whooping cough, a respiratory disease that can be fatal for infants. The severe, uncontrollable coughing makes it difficult to breathe causing the “whooping” sound that occurs with inhalation. *Bordetella pertussis* targets cilia of the upper respiratory tract which are damaged by the Pertussis toxin, an ADP-ribosyltransferase that targets G-proteins.

Cholera toxin

[Cholera](#), characterized by copious watery diarrhea, is a potentially life-threatening illness transmitted through the fecal-oral route via food or water contaminated with toxigenic [Vibrio cholerae](#).^[13] *V. cholerae* targets the intestines and secretes [cholera toxin](#), an exotoxin and potent enterotoxin that acts as an ADP-ribosyltransferase targeting G-proteins. This causes an increase in intracellular cAMP and forces intestinal cells to expel significant amounts of water and electrolytes into the lumen

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies

The main strategy that will be adopted in delivering this unit is to encourage students to participate in exercises as well as a series of lectures and practical classes designed to introduce you to bacterial toxins. At the same time refine and broaden critical thinking skills through topics covered in the lectures including what bacterial toxins are, their prevalence and quantification. An interactive educational program through looking at the types of simple experiments (practical classes) provides training in basic techniques including isolation of pathogenic bacteria, their dissemination and extraction of their different toxins. These activities are fun for the students.

Student Workload (SWL)			
الحمل الدراسي للطلاب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	79	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	71	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب 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	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	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 bacterial toxins
Week 2	Classification of bacterial toxins
Week 3	ADP-ribosylation toxins
Week 4	Cholera toxins
Week 5	Other <i>V. cholerae</i> O1/O139 toxins

Week 6	<i>E. coli</i> heat-labile enterotoxin
Week 7	Exam
Week 8	<i>E. coli</i> heat-stable enterotoxin
Week 9	<i>Bordetella pertussis</i>
Week 10	Tetanus toxin
Week 11	Toxins that act on 28S rRNA
Week 12	Exam
Week 13	Pore-forming toxins1
Week 14	Pore-forming toxins2
Week 15	Endotoxins
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Disinfection and sterilization in laboratories
Week 2	Lab 2: General introduction to bacterial toxins
Week 3	Lab 3: Endotoxins and Exotoxins
Week 4	Lab 4: Bacterial food poisonings
Week 5	Lab 5: Virulence factors produced by bacteria as toxins1
Week 6	Lab 6: Virulence factors produced by bacteria as toxins2
Week 7	Lab 7: Enteric toxins
Week8	Lab 8: Estimation of toxic doses

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	علم السموم البكتريا ، الاستاذ الدكتور رحاب العزاوي ٢٠١٠ - السموم الميكروبية رشا حمد الميهي وجمهورية مصر العربية ٢٠١٤	Yes

Recommended Texts	Microbial toxins : current research and future trends. Proft, Thomas. Norfolk: Caister Academic .Press. 2014 Lectures by Prof. Dr. Mai Talib Falih - - University of Baghdad / college of Science .2016	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	Biotechnology and Genetic Engineering		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MEBio-406		
ECTS Credits	3		
SWL (hr/sem)	---		
Module Level	4	Semester of Delivery	
Administering Department	Bio	College	Meddle east
Module Leader	Farqad AbdIraheem AbdIftaah	e-mail	Farqad .A.A@meuc.edu.iq
Module Leader's Acad. Title	Prof.	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	None	e-mail	None
Scientific Committee Approval Date	01/10/2025	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 Objectives أهداف المادة الدراسية	<ol style="list-style-type: none">5. This class discusses the fundamental aspects of Biotechnology and Genetic Engineering.6. its importance to mankind in a brief and articulate explanation of this newly originated science.7. Underlie the principles and application of Recombinant phage DNA technology in pharmaceutical, and biomedical fields.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none">8. Familiarity with the basics of biotechnology and genetic engineering.9. Understanding the fermentation process and how to develop it.10. Benefiting from theoretical information in the production and development of products.11. An attempt to design a production line, starting from isolating the microorganism to obtaining the product.12. Using different technologies to develop and improve production
Indicative Contents المحتويات الإرشادية	<ol style="list-style-type: none">1.1. Introduction and Definition1.2 Historical Perspectives1.3 Scope and Importance of Biotechnology1.4 Commercial Potential1.5 An Interdisciplinary Challenge1.6 A Quantitative Approach1.7 Classical vs Modern Concepts1.8 Quality Control in Manufacturing1.9 Product Safety1.10 Good Manufacturing Practices (GMP)1.11 Good Laboratory Practices (GLP) <p>Fine Structure of a Gene</p> <ol style="list-style-type: none">12.2 From Gene to Protein12.3 Gene Expression12.4 Transcription

12.5 Genetic Code

12.6 Translation

12.7 Regulation of Gene Expression

12.8 Genetic Basis of Differentiation and Development

12.9 Housekeeping Genes

12.10 Genetics of Cancer

12.11 Immunogenetics

Tools of Recombinant DNA Technology

15.3 Making Recombinant DNA

15.4 DNA Library

15.5 Transgenics—Introduction of Recombinant DNA into Host Cells

15.6 Identification of Recombinants

15.7 Polymerase Chain Reaction (PCR)

15.8 DNA Probes

15.9 Hybridization Techniques

15.10 DNA Sequencing

15.11 Site-directed Mutagenesis

Cell- and Tissue-Culture Techniques

19.3 Applications of Cell and Tissue Cultures

Animal Cell Culture Techniques

Biological Fuel Generation

21.2 Single-cell Protein

21.3 Sewage Treatment

21.4 Environmental Biotechnology

21.5 Medical Biotechnology

	21.6 Agriculture and Forest Biotechnology
	21.7 Food and Beverage Biotechnology
	21.8 Safety in Biotechnology

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 as well as a series of lectures and practical classes designed to introduce you to Biotechnology and Genetic Engineering. At the same time refining and expanding their critical thinking skills through topics covered in lectures include what Biotechnology and Genetic Engineering, its basic characteristics, structure, classification, propagation, and quantification. An interactive tutorial and by considering types of simple experiments (Practical classes) offer training in basic Biotechnology and Genetic Engineering techniques including the isolation, extraction of plasmid DNA, and running agarose gel electrophoresis. These activities are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	21	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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	6	12% (5)	5 and 10	LO #1, #2 and #10, #11
	Assignments	6	12% (5)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	8% (20)	Continuous	All
	Report	4	8% (5)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	1hr	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 course
Week 2	The concept of biotechnology - a brief history and techniques of plant tissue cultures
Week 3	Animal tissue culture techniques
Week 4	Enzymatic techniques: production and extraction
Week 5	Biosensors, Types and Applications of biosensors
Week 6	Biotechnology applications in the food and industrial fields
Week 7	Mid-term Exam
Week 8	Introduction to genetic engineering

Week 9	Endonucleases, Application of restriction enzymes
Week 10	Molecular cloning & Cloning vectors
Week 11	Gene expression in cloned cells
Week 12	Types of gene expression profiling
Week 13	DNA sequencing and hybridization
Week 14	Techniques used in the field of genetic engineering
Week 15	Preparatory week before the final Exam
Week 16	final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Lab safety, Important of genetic engineering
Week 2	Lab 2: Devices and equipment required in genetic engineering laboratories
Week 3	Lab3: Cultures and Tissue Culture for Nucleic Acids Extraction.
Week 4	Lab 4: DNA Extraction
Week 5	Lab 5: Enzymes Used in Cloning
Week 6	Lab 6: PCR (Polymerase Chain Reaction) technique
Week 7	Lab 7: get your lab reports up to date, Revision for Module test (Mid-term Exam)
Week 8	Lab 8: Primer design
Week 9	Lab 9: Gel electrophoresis
Week 10	Lab 10: DNA transfer to filters
Week 11	Lab 11: Probes labelling preparation
Week 12	Lab 12: DNA hybridization
Week 13	Lab 13: Synthesis of Complementary DNA (cDNA) from mRNA molecules
Week 14	Lab 14: DNA Sequencing

Week 15	Lab 15: Establishment of genes Libraries
Week 16	Lab 16 : get your lab reports up to date, Revision for Module test (Final exam)

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Biotechnology and genetic engineering / Kathy Wilson Peacock, 2010 ISBN 978-0-8160-7784-7	No
Recommended Texts	A.J. Nair. Introduction to Biotechnology and Genetic Engineering. ISBN: 978-1-934015-16-2 , 2008	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	Genetic Microbiology		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MEBio-403		
ECTS Credits	3		
SWL (hr/sem)	----		
Module Level	4	Semester of Delivery	
Administering Department	Bio	College	Meddle east
Module Leader	Farqad AbdIraheem AbdIftaah	e-mail	Farqad .A.A@meuc.edu.iq
Module Leader's Acad. Title	Prof.	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	None	e-mail	None
Scientific Committee Approval Date	01/10/2025	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

<p>Module Objectives</p> <p>أهداف المادة الدراسية</p>	<p>8. This class discusses the fundamental aspects of Genetic Microbiology.</p> <p>9. its importance to mankind in a brief and articulate explanation of this newly originated science.</p> <p>10. Highlights the general morphology, genetic structure, function of Genetic Microbiology</p> <p>11. Underlie the principles and application of Recombinant phage DNA technology in pharmaceutical, and biomedical fields.</p>
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>13. Discuss reasons for studying Genetic Microbiology</p> <p>14. Outline methods for cultivation of Genetic Microbiology; purification of gene; detection of gene and their components; investigation of Molecular Biology gene function; assess the value of Genetic Microbiology genome sequencing.</p> <p>15. Explain the role of primers in gene nucleic acid synthesis; the roles of host proteins in Genetic Microbiology genome replication</p>
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Microbial Genetics Genetics is the study of heredity which is concerned with how</p> <p>information in nucleic acids is expressed nucleic acids are duplicated and transmitted to progeny these processes account for the characteristics of progeny</p> <p>2. DNA Replication in Bacteria</p> <p>During replication, enzymes known as polymerases transport nucleotides from the cytoplasm that are complimentary to the template and fit them into place, resulting in two strands, one parental and one new one. The replication is said to be semi-conservative because the parental strand is conserved (remains the same).</p> <p>Steps of DNA Replication</p> <p>Copied in 5' to 3' direction Polymerase can only add nucleotides to 3' end In Prokaryotes, replication begins at specific site in chromosome called the origin of replication Replication of DNA begins a specific site on the DNA template termed the origin and proceeds in both directions from the origin until nuclear division and cytokinesis take place. Replication speed = 1000 nucleotides/sec</p> <p>RNA Synthesis in Bacteria</p> <p>Transcription is the synthesis of RNA and involves the assembly of nucleotides by an enzyme, RNA polymerase.</p> <p>1. RNA polymerase binds to DNA at a promoter site near the gene to be</p>

- transcribed.
2. RNA polymerase travels the length of the DNA using it as a template to duplicate.
 3. The RNA polymerase continues until it reaches a termination site at which time the transcription is complete.

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 as well as a series of lectures and practical classes designed to introduce you to Microbial Genetics. At the same time refining and expanding their critical thinking skills through topics covered in lectures include what are Microbial Genetics, their basic characteristics, structure, classification, propagation, and quantification. An interactive tutorial and by considering types of simple experiments (Practical classes) offer training in basic Microbial Genetics.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	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 course
Week 2	Bacterial Conjugation- Definition, Principle, Process, Examples
Week 3	Other conjugative elements
Week 4	Bacterial Transformation
Week 5	Types of Bacterial Transformation
Week 6	What is a plasmid
Week 7	Mid-term Exa
Week 8	How do scientists use plasmids
Week 9	BACTERIAL MUTATION
Week 10	Types of Mutations
Week 11	Mechanisms of mutation
Week 12	Results of mutation
Week 13	DNA damage and repair summary

Week 14	Bacterial Transduction- Definition, Principle, Steps, Examples
Week 15	Gene Transfer
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Lab safety, Important of Genetic Microbiologydiagnoses
Week 2	Lab 2: Introduction to Transformation
Week 3	Lab 3: Isolation of DNA Bacterial
Week 4	Lab 4: Isolation of RNA Bacterial
Week 5	Lab 5: Genetic Modification: Bacteria Producing Human Insulin
Week 6	Lab 6: Isolating gene and vector
Week 7	Lab 7: get your lab reports up to date, Revision for Module test

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Fundamental Molecular Biology . Lizabeth A. Allison 2007	No
Recommended Texts	Molecular Genetics of Bacteria Jeremy W. Dale Simon F. Park University of Surrey, UK	No
Websites	www.blackwellpublishing.com www.wiley.com	

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	Mycology I		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MEBio-409		
ECTS Credits	3		
SWL (hr/sem)	---		
Module Level	4	Semester of Delivery	
Administering Department	Bio	College	Meddle east
Module Leader	Alhan Hashim Sheat	e-mail	Alhan.H.S.@meuc.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	None	e-mail	None
Scientific Committee Approval Date	01/10/2025	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

<p>Module Objectives</p> <p>أهداف المادة الدراسية</p>	<p>12. This class discusses the fundamental aspects of mycology.</p> <p>13. its importance to mankind in a brief and articulate explanation of this newly originated science.</p> <p>14. Highlights the general morphology, genetic structure, function of fungi as a vital starting point for knowledge of fungus diseases and gene transfer technology.</p> <p>15. Underlie the principles and application of fungal technology in pharmaceutical, and biomedical fields.</p>
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>16. Discuss reasons for studying fungi; explain how fungi differ from other organisms; define the term 'fungi'.</p> <p>17. Outline methods for cultivation of fungi; purification of fungi; detection of fungi and their components</p> <p>18. Describe the mechanisms of fungal growth .</p> <p>19. Explain the basis of the shapes, sizes and colors of the reproductive units, especially the spores, vary and conidia with a variety of fungal species .</p> <p>20. Describe the fungi that cause disease for human ,animal, inscta and plant..</p>
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p><u>Part A – fungal structure, classification, and nomenclature replication:</u></p> <p>Introduction to fungal structure. History of fungal. Fungi (singular Fungus) are known as thallic organisms(Eukaryotic) Fungi are of great importance due to their close association with all aspects of life, which made it of great importance to study these</p> <p>The group of organisms, identifying them and studying their characteristics, highlighting the importance of studying fungi for the role they play in fungi</p> <p>human life positively or negatively. Complex organic compounds as energy and carbon sources. Fungi share some other features with fungi. Their cell walls are made of chitin, which is found in the exoskeletons of arthropods.Fungi produce a number of pigments, including melanin, which is also found in the hair and skin of animals. Like In animals, fungi also store carbohydrates as glycogen. [8 hrs]</p> <p>Most fungi grow on agar dextros potato medium (PDA) This medium is nutritionally rich and encourages the growth of mycelium at the expense of sporulation.It is replaced with weak media such as (CMA) medium (agar meal corn) because it contains more accessible carbohydrates. Cellulose-decomposing and food-destroying fungi retain their ability to produce cellulose enzyme cellulase When using weak media and to encourage the formation of blackboards, pieces of paper or dung are added to it .Animals or pieces of filter papers or seeds, depending on the type of mushroom.It is difficult to isolate fungi from infected tissues or soil infested soils or from decaying materials due to the rapid spread of fungi, bacteria and actinomycetes</p>

which includes antagonism . [4 hrs]

Part B – fungal groups

fungi reproduce sexually. However, Imperfecti Fungi or Deuteromycetes lack sexual reproduction. There are usually two phases in the life cycle of fungi.

The two metaphases are the haploid, which has an odd number of chromosomes chromosomes (n1) and diploid, which has a diploid number of Chromosomes in the nucleus (n2) and gametes are usually haploid (n1) produced after the process of diploid nuclear fusion from the chromosomal set (n2) as in Sexual spores such as oospores, zygosporangia, and so on. and produces Monophase (1n) again in the life cycle of the fungus through the process of meiosis (meiosis) The number of chromosomes in the nucleus will be bisected . [2 hrs]

Symbiosis interactions or symbioses between fungi and other organisms fall within a range wide range of categories. In some cases, coexistence is obligatory (symbiosis obligate). Necessary for life (but it affects its host negatively, which leads to death.

The pathogens and parasites get the ingredients for their life from the host It affects her family negatively, which leads to her death. The difference between parasites and pathogens is that the pathogens. They cause disease, while parasites do so only in rare cases. Commensal relationships benefit one partner, but do not harm the other. And there are fungi ,It enters into mutualistic relationships that benefit from it and benefit the other (the breadwinner). Therefore, besides the intrusive and restorative fungi, there are species that live with other plants living Symbiotic, they either live with some algae to form lichens, or with plant roots. The fungus (Micorrhiza) is in symbiotic relationships . [4 hrs]

The term metabolites secondary covers a wide range of processes Metabolites that have no relationship except that they are all activated when the growth of the fungus stops in one way or another In other words, when fungi grow on suitable environments, they carry out food metabolism and produce compounds Metabolism is described as secondary, when growth stops, using glucose in a small amount cases. The primary metabolites are those intermediate compounds produced as a result of food metabolism during the growth process. The secondary metabolites of fungi are bioactive compounds, most of which are toxic to humans ,Animal, plant, and microorganisms are therefore called Mycotoxins when they are present Toxic to humans and animals, while those that are toxic to plants are called Phytotoxins and a group of compounds Toxic to microorganisms, it is called Antibiotic. So far, nearly 1000 compounds have been known Metabolic compounds, which are the result of more than 1000 secondary metabolic reactions that differ in their structure in a way Large in chemical composition, and each reaction is specific to each species or type of fungus . [4 hrs]

Types of Spores and their shapes: The shapes, sizes and colors of the reproductive units,

especially the spores, vary, The conidia differ in the diversity of fungal taxa, and such diversity is noted in Deuteromycetes imperfect fungi in particular which may be Their spores are single-celled, or yeast-like, and multiply By donating. The majority of fungi reproduce by mycelia, which may be A type of mycelium, a cystic fungus containing a septum with a simple hole or

Basidiomycosis of the type of mycelia, in which the hole is of the type dolipore and mycelium with canine connections. despite the existence of Multiple ways for fungi to multiply, but the formation of blackboards is one of the most important Chlamydo spores are formed by the transformation of one of the cells The vegetative layer of the fungal hyphae or a group of these cells is round and thickened The wall, and this type of blackboard does not spread, but is liberated when the thread is dissolved Fungal form chlamydial spores, which may form peripheral As for the conidia, they are formed on specialized cells that are not part of the site or its middle Vegetative mycelium. [2 hrs]

Fungal growth mechanisms is approximately 50-100 microns in length of the hypha. The elongation is in the mycelium By the top of the Haifa, that is, the growth is apical. The more mature parts of the fungal hyphae are unable to Rather, it plays an important role in supporting growth by forming new protoplasm and transporting it by flow cytoplasm to the developing apex. So Gow & Goody stated in 1990 that life in fungi is At their tops, this means that the intercalary growth that occurs in plants does not occur in fungi

In fungi, growth occurs in a space that does not exceed half a micron in length and is called a zone dilation. zone extension, which is full of vesicles and devoid of existing organelles in other regions of the fungus. Vesicles are of two types: Micro vesicles

Their size is less than 100 microns, and other large macro vesicles are more than 100 microns. The follicles are clustered in Spitzenkorper clusters, which are observed for the first time Once by researcher Brunswik in 1924 and the large vesicle Macro vesicles are

Vesicles secretory contains enzymes to build and break down the wall in the process of growth. [4 hrs]

Types of mycotoxins: Mycotoxins are classified on the basis of their sources of synthesis into five main groups:A group of amino acids. such as Pcsilocybin and Ergotamine and the rest of the alkaloids, Fusaric acid and Penicillin. It is a heterogeneous group.It is a mycotoxin, due to its origin from different organic acids , A group of phenolic and aromatic toxins, which are synthesized in a manner.Polyketides They are part of a large group of mycotoxins that create one such methodThe second will be mentioned later in Paragraph (3), and among these types of toxins are Aflatoxins Zearalenones and Griseofulvin. And Shikmic acid method for the synthesis of aromatic amino acids.It is the second way to synthesize a group of aromatic and phenolic toxins.This route contains xanthocillin and cumarins. [2 hrs]

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 as well as a series of lectures and practical classes designed to introduce you to mycology. At the same time refining and expanding their critical thinking skills through topics covered in lectures include what are fungi, their basic characteristics, structure, classification, propagation, and quantification. An interactive tutorial and by considering types of simple experiments (Practical classes) offer training in basic fungal techniques including the isolation, diagnosis and classification of a pathogenic fungi. These activities are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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	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.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	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 course
Week 2	Introduction taxonomy of fungi
Week 3	Myxomycetes
Week 4	Mastigomycotina
Week 5	Diplomastigomycotina
Week 6	Amastigomycotina
Week 7	Mid-term Exam
Week 8	Zygomycotina
Week 9	Ascomycotina
Week 10	Hemiascomycotina
Week 11	Basidiomycotina
Week 12	Oomycotina
Week 13	Types of disease caused by fungi
Week 14	Dermatophytes
Week 15	Cutaneous mycoses
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Lab safety, Important of fungal diagnoses
Week 2	Lab 2: Methods of sterilization and culture media for growing fungi
Week 3	Lab 3: Slide preparation
Week 4	Lab 4: Isolation and cultivation of fungi
Week 5	Lab 5: Chemical factors , Factors affecting fungal growth
Week 6	Lab 6: Preservation of fungi
Week 7	Lab 7: get your lab reports up to date, Revision for Module test

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Alexopoulos . G . J . 1962 . Introductory mycology . John Wiley & sons Inc . N . Y . Bonnie H. Ownley Robert N. Trigiano . 2017. Plant Pathology Concepts and Laboratory Exercises .3ed . ed . CRC Press Taylor & Francis Group . Boca Raton London New York.	No
Recommended Texts	Volk . J . Thomas .1994 . The fungi . Academic press. - M. Peraica, B. RadicÂ , A. LucicÂ , & M. PavlovicÂ . 1999. Toxic effects of mycotoxins in humans . Bulletin of the World Health Organization.	No
Websites	https://www.youtube.com/watch?v= 6oLUAnSoOE	

<https://www.youtube.com/watch?v=6kT7vLbuX9U>

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A – Excellent	امتياز	90 - 100	Outstanding Performance
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	C – Good	جيد	70 - 79	Sound work with notable errors
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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	Mycology II		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MEBio-410		
ECTS Credits	3		
SWL (hr/sem)	----		
Module Level	4	Semester of Delivery	
Administering Department	Bio	College	Meddle east
Module Leader	Alhan Hashim Sheat	e-mail	Alhan.H.S.@meuc.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	None	e-mail	None
Scientific Committee Approval Date	01/10/2025	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

<p>Module Objectives</p> <p>أهداف المادة الدراسية</p>	<p>16. This class discusses the fundamental aspects of mycology.</p> <p>17. its importance to mankind in a brief and articulate explanation of this newly originated science.</p> <p>18. Highlights the general morphology, genetic structure, function of fungi as a vital starting point for knowledge of fungus diseases and gene transfer technology.</p> <p>19. Underlie the principles and application of fungial technology in pharmaceutical, and biomedical fields.</p>
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>21. Discuss reasons for studying fungi; explain how fungi differ from other organisms; define the term 'fungi'.</p> <p>22. Outline methods for cultivation of fungi; purification of fungi; detection of fungi and their components</p> <p>23. Describe the mechanisms of fungal growth .</p> <p>24. Explain the basis of the shapes, sizes and colors of the reproductive units, especially the spores, vary and conidia with a variety of fungal species .</p> <p>25. Describe the fungi that cause disease for human ,animal, inscta and plant..</p>
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p><u>Part A – fungal structure, classification, and nomenclature replication:</u></p> <p>Introduction to fungal structure. History of fungal. Fungi (singular Fungus) are known as thallic organisms(Eukaryotic) Fungi are of great importance due to their close association with all aspects of life, which made it of great importance to study these</p> <p>The group of organisms, identifying them and studying their characteristics, highlighting the importance of studying fungi for the role they play in fungi</p> <p>human life positively or negatively. Complex organic compounds as energy and carbon sources. Fungi share some other features with fungi. Their cell walls are made of chitin, which is found in the exoskeletons of arthropods.Fungi produce a number of pigments, including melanin, which is also found in the hair and skin of animals. Like In animals, fungi also store carbohydrates as glycogen. [8 hrs]</p> <p>Most fungi grow on agar dextros potato medium (PDA) This medium is nutritionally rich and encourages the growth of mycelium at the expense of sporulation.It is replaced with weak media such as (CMA) medium (agar meal corn) because it contains more accessible carbohydrates. Cellulose-decomposing and food-destroying fungi retain their ability to produce cellulose enzyme cellulase When using weak media and to encourage the formation of blackboards, pieces of paper or dung are added to it .Animals or pieces of filter papers or seeds, depending on the type of mushroom.It is difficult to isolate fungi from infected tissues or soil infested soils or from decaying materials due to the rapid spread of fungi, bacteria and actinomycetes</p>

which includes antagonism . [4 hrs]

Part B – fungal groups

fungi reproduce sexually. However, Imperfecti Fungi or Deuteromycetes lack sexual reproduction. There are usually two phases in the life cycle of fungi.

The two metaphases are the haploid, which has an odd number of chromosomes chromosomes (n_1) and diploid, which has a diploid number of Chromosomes in the nucleus (n_2) and gametes are usually haploid (n_1) produced after the process of diploid nuclear fusion from the chromosomal set (n_2) as in Sexual spores such as oospores, zygosporangia, and so on. and produces Monophase ($1n$) again in the life cycle of the fungus through the process of meiosis (meiosis) The number of chromosomes in the nucleus will be bisected . [2 hrs]

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The pathogens and parasites get the ingredients for their life from the host It affects her family negatively, which leads to her death. The difference between parasites and pathogens is that the pathogens. They cause disease, while parasites do so only in rare cases. Commensal relationships benefit one partner, but do not harm the other. And there are fungi ,It enters into mutualistic relationships that benefit from it and benefit the other (the breadwinner). Therefore, besides the intrusive and restorative fungi, there are species that live with other plants living Symbiotic, they either live with some algae to form lichens, or with plant roots. The fungus (Micorrhiza) is in symbiotic relationships . [4 hrs]

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Types of Spores and their shapes: The shapes, sizes and colors of the reproductive units,

especially the spores, vary, The conidia differ in the diversity of fungal taxa, and such diversity is noted in Deuteromycetes imperfect fungi in particular which may be Their spores are single-celled, or yeast-like, and multiply By donating. The majority of fungi reproduce by mycelia, which may be A type of mycelium, a cystic fungus containing a septum with a simple hole or Basidiomycosis of the type of mycelia, in which the hole is of the type dolipore and mycelium with canine connections. despite the existence of Multiple ways for fungi to multiply, but the formation of blackboards is one of the most important Chlamydo spores are formed by the transformation of one of the cells The vegetative layer of the fungal hyphae or a group of these cells is round and thickened The wall, and this type of blackboard does not spread, but is liberated when the thread is dissolved Fungal form chlamydial spores, which may form peripheral As for the conidia, they are formed on specialized cells that are not part of the site or its middle Vegetative mycelium. [2 hrs]

Fungal growth mechanisms is approximately 50-100 microns in length of the hypha. The elongation is in the mycelium By the top of the Haifa, that is, the growth is apical. The more mature parts of the fungal hyphae are unable to Rather, it plays an important role in supporting growth by forming new protoplasm and transporting it by flow cytoplasm to the developing apex. So Gow & Goody stated in 1990 that life in fungi is At their tops, this means that the intercalary growth that occurs in plants does not occur in fungi

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Their size is less than 100 microns, and other large macro vesicles are more than 100 microns. The follicles are clustered in Spitzenkorper clusters, which are observed for the first time Once by researcher Brunswik in 1924 and the large vesicle Macro vesicles are

Vesicles secretory contains enzymes to build and break down the wall in the process of growth. [4 hrs]

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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 as well as a series of lectures and practical classes designed to introduce you to mycology. At the same time refining and expanding their critical thinking skills through topics covered in lectures include what are fungi, their basic characteristics, structure, classification, propagation, and quantification. An interactive tutorial and by considering types of simple experiments (Practical classes) offer training in basic fungal techniques including the isolation, diagnosis and classification of a pathogenic fungi. These activities are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem)	79	Structured SWL (h/w)	7
الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem)	46	Unstructured SWL (h/w)	6
الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem)	125		
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.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	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 course
Week 2	Introduction of fungi
Week 3	Natural habitat of fungi
Week 4	Reproduction in fungi
Week 5	Fungal growth mechanisms
Week 6	Shapes and types of spores
Week 7	Mid-term Exam
Week 8	Sexual Reproduction in fungi
Week 9	Secondary Metabolism
Week 10	Toxines of fungi
Week 11	Relationships between fungi and other microorganism
Week 12	Medical mycology
Week 13	Types of disease caused by fungi
Week 14	Dermatophytes
Week 15	Cutaneous mycoses
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Lab safety, Important of fungal diagnoses
Week 2	Lab 2: Methods of sterilization and culture media for growing fungi
Week 3	Lab 3: Slide preparation
Week 4	Lab 4: Isolation and cultivation of fungi
Week 5	Lab 5: Chemical factors , Factors affecting fungal growth
Week 6	Lab 6: Preservation of fungi
Week 7	Lab 7: get your lab reports up to date, Revision for Module test

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Alexopoulos . G . J . 1962 . Introductory mycology . John Wiley & sons Inc . N . Y . Bonnie H. Ownley Robert N. Trigiano . 2017. Plant Pathology Concepts and Laboratory Exercises .3ed . ed . CRC Press Taylor & Francis Group . Boca Raton London New York.	No
Recommended Texts	Volk . J . Thomas .1994 . The fungi . Academic press. - M. Peraica, B. RadicÂ , A. LucicÂ , & M. PavlovicÂ . 1999. Toxic effects of mycotoxins in humans . Bulletin of the World Health Organization.	No
Websites	https://www.youtube.com/watch?v= 6oLUAnSoOE	

<https://www.youtube.com/watch?v=6kT7vLbuX9U>

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	Virology		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MEBio-407		
ECTS Credits	3		
SWL (hr/sem)	---		
Module Level	4	Semester of Delivery	
Administering Department	Bio	College	Meddle east
Module Leader	Farqad AbdIraheem AbdIftaah	e-mail	Farqad .A.A@meuc.edu.iq
Module Leader's Acad. Title	Prof.	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	None	e-mail	None
Scientific Committee Approval Date	01/10/2025	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

<p>Module Objectives</p> <p>أهداف المادة الدراسية</p>	<p>20. This class discusses the fundamental aspects of virology.</p> <p>21. its importance to mankind in a brief and articulate explanation of this newly originated science.</p> <p>22. Highlights the general morphology, genetic structure, function of viruses as a vital starting point for knowledge of virus diseases and gene transfer technology.</p> <p>23. Underlie the principles and application of Recombinant phage DNA technology in pharmaceutical, and biomedical fields.</p>
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>26. Discuss reasons for studying viruses; explain how viruses differ from other organisms; define the term 'virus'.</p> <p>27. Outline methods for cultivation of viruses; purification of viruses; detection of viruses and their components; investigation of virus gene function; assess the value of virus genome sequencing.</p> <p>28. Describe the modes of transmission of plant viruses and animal viruses; evaluate the roles of vectors in virus transmission; discuss the immune mechanisms encountered by an animal virus when it enters the body of a new host.</p> <p>29. Explain the role of primers in virus nucleic acid synthesis; the roles of virus and host proteins in virus genome replication; outline the replication mechanisms of virus DNAs and RNAs; the term 'reverse transcription'.</p> <p>30. Explain the basis of the Baltimore classification of viruses.</p> <p>31. Describe the HSV-1 virion; outline the main features of the HSV-1 genome; the replication cycle of HSV-1; describe the replication cycle of parvoviruses; the difference between autonomous and defective parvoviruses.</p> <p>32. Discuss the main events of the rotavirus replication cycle; how rotaviruses cause disease etc..</p>
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p><u>Part A – Viral structure, classification, and nomenclature replication:</u></p> <p>Introduction to virus structure, Virus genomes, proteins, capsids, virion membranes, occlusion bodies. History of virus classification and nomenclature, Modern virus classification and nomenclature and Baltimore classification. Transmission of plant viruses, vertebrate viruses, invertebrate viruses. [8 hrs]</p> <p>Overview of virus replication. Introduction to transcription, translation and transport. Transcription of virus genomes in eukaryotes, Translation in eukaryotes. Transport in eukaryotic cells, transcription and translation of viruses in bacteria. Overview of virus genome replication. Locations of virus genome replication in eukaryotic cells: Initiation of genome replication, Polymerases, DNA replication, Double-stranded RNA replication, Single-stranded RNA replication and reverse transcription. Introduction to assembly and exit of virions from cells, nucleocapsid assembly, formation of virion membranes and virion exit from the infected cell. [4 hrs]</p>

Part B – Viral groups

Introduction to herpesviruses: human herpesviruses (virion), HSV-1 genome organization, replication, latent herpesvirus infection and other dsDNA viruses. Introduction to parvoviruses; examples of parvoviruses (virion); replication and other ssDNA viruses. [2 hrs]

Introduction to reoviruses; Rotavirus virion; Rotavirus replication; Other dsRNA viruses. Introduction to picornaviruses; some important picornaviruses; Picornavirus Virion; replication; recombination; experimental systems and Other plus-strand RNA viruses. Introduction to rhabdoviruses; some important rhabdoviruses (virion and genome organization); replication, other minus-strand RNA viruses, viruses with ambisense genomes and reverse genetics. [4 hrs]

Introduction to retroviruses (virion); replication; examples of retroviruses; as gene vectors; endogenous retroviruses. Introduction to HIV (virion); genome; HIV-1 replication; variability; Progression of HIV infection; Prevention of HIV transmission. Importance of HBV (virion); Non-infectious particles, Soluble virus protein; HBV genome; HBV genetic groups; HBV replication; Prevention and treatment of HBV infection and other reverse-transcribing DNA viruses. [4 hrs]

Introduction to bacterial viruses (bacteriophages): Single-stranded RNA phages; Double-stranded RNA phages; Single-stranded DNA phages; and Double-stranded DNA phages. Introduction to viruses and cancer; Papillomavirus-linked cancers; Polyomavirus-linked cancers; Epstein-Barr virus-linked cancers; Kaposi's sarcoma; Adult T cell leukemia; Hepatocellular carcinoma; Virus-associated cancers in animals; Cell lines derived from virus-associated cancers; How do viruses cause cancer?; Prevention of virus-induced cancers Introduction to prions; transmissible spongiform encephalopathies; The nature of prions; Prion diseases; Prion strains; Prion transmission; he protein-only hypothesis [2 hrs]

Introduction to virus vaccines; Live attenuated virus vaccines; Inactivated virus vaccines; Virion subunit vaccines; Live recombinant virus vaccines and Mass production of viruses for vaccines. Virus-like particles; Synthetic peptide vaccines; DNA vaccines; Storage and transport of vaccines. [4 hrs]

Introduction to anti-viral drugs; development of anti-viral drugs; examples of anti-viral drugs; drug resistance; anti-viral drug research. Introduction to emerging viruses; Viruses in new host species; Viruses in new areas; Viruses in new host species and in new areas; New viruses; Recently discovered viruses; Re-emerging viruses; Virus surveillance; Dealing with outbreaks. [2 hrs]

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 as well as a series of lectures and practical classes designed to introduce you to virology. At the same time refining and expanding their critical thinking skills through topics covered in lectures include what are viruses, their basic characteristics, structure, classification, propagation, and quantification. An interactive tutorial and by considering types of simple experiments (Practical classes) offer training in basic virological techniques including the isolation, propagation and plaque-purification of bacteriophage and bioassay of a pathogenic insect virus. These activities are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All

	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	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 course
Week 2	Virus structure
Week 3	Classification and nomenclature of viruses
Week 4	Virus transmission
Week 5	Attachment and entry of viruses into cells, Transcription, translation, and transport
Week 6	Virus genome replication, Assembly and exit of virions from cells
Week 7	Mid-term Exam
Week 8	Herpesviruses (and other dsDNA viruses), Parvoviruses (and other ssDNA viruses)
Week 9	Reoviruses (and other dsRNA viruses), Picornaviruses (and other plus-strand RNA viruses)
Week 10	Retroviruses, Rhabdoviruses (and other minus-strand RNA viruses)
Week 11	Human immunodeficiency viruses, Hepadnaviruses (and other reverse-transcribing DNA viruses)
Week 12	Bacterial viruses, Prions
Week 13	Viruses and cancer, Virus vaccines
Week 14	Anti-viral drugs

Week 15	Emerging viruses
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Lab safety, Important of viral diagnoses
Week 2	Lab 2: Laboratory diagnosis methods for viral infections: specimen collection
Week 3	Lab 3: Isolation and cultivation of viruses
Week 4	Lab 4: Isolation and cultivation of Bacteriophage culture
Week 5	Lab 5: One-step multiplication curve (Run and Read Results)
Week 6	Lab 6: Detection of viral nucleic acid, Serological tests
Week 7	Lab 7: get your lab reports up to date, Revision for Module test

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	VIROLOGY PRINCIPLES AND APPLICATIONS by John B. Carter and Venetia A. Saunders, 2007.	No
Recommended Texts	Viruses: Biology, Application and Control by David Harper. ISBN: 9780815341505 Garland Science. An alternative is Basic Virology, 3rd Edition by Wagner, Hewlett, Bloom & Camerini. Wiley Blackwell ISBN-10: 1405147156 ISBN-13: 978-1405147156.	No
Websites	https://www.youtube.com/watch?v=Eq9JIq9HvMg , https://www.youtube.com/watch?v=WGKoJRNKADY , www.wiley.com/go/carter	

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	Industrial microbiology		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MEBio-402		
ECTS Credits	3		
SWL (hr/sem)	----		
Module Level	4	Semester of Delivery	
Administering Department	Bio	College	Meddle east
Module Leader	Aeshah Muhnah Mohammed	e-mail	Aeshah M.M.@meuc.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	01/10/2025	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
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Co-requisites module	None	Semester	
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Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<p>Study of Microorganisms: Learn about the structure, classification, and biological interactions of bacteria, fungi, yeasts, and other microorganisms used in industry.</p> <p>Understanding Biological Processes: Study the biological interactions and processes that occur within microorganisms and apply this knowledge to industrial processes.</p> <p>Developing Fermentation Technologies: Study and improve fermentation processes that use microorganisms to produce biological products, such as pharmaceuticals, enzymes, and food.</p> <p>Gene Engineering and Biotechnology: Study advanced technologies such as gene mutation and genetic engineering to improve microorganisms and enhance their production of industrial products.</p> <p>Improving the Efficiency of Industrial Processes: Develop and improve industrial processes used in the production of biological products, such as optimizing fermentation conditions...</p>
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>Understanding Industrial Fermentation Processes: Students gain an understanding of the concept of fermentation and its associated microscopic processes. They acquire knowledge about the procedures required to produce biological products using microorganisms.</p> <p>Identifying Microorganisms Used in Industry: Students learn about bacteria, fungi, yeasts, and other microorganisms used in industrial processes. They understand the classification and distinctive characteristics of each type and how they are used in industrial production.</p> <p>Using Modern Biotechnology: Students learn about modern biotechnology and its application in industrial microbiology. They can understand genetic engineering and the improvement of microorganisms to increase productivity and enhance desirable traits.</p>
Indicative Contents المحتويات الإرشادية	<p>Introduction to Industrial Microbiology: This course introduces the concept of industrial microbiology and its importance in industry and practical applications.</p> <p>Classification and Identification of Microorganisms: This course covers the classification and identification of bacteria, fungi, yeasts, viruses, and other microorganisms used in industry.</p> <p>Industrial Fermentation Techniques: This course explores the fundamental concepts of fermentation processes and their applications in industrial production, including bacterial and fungal fermentation and the use of yeasts.</p> <p>Gene Engineering and Genetic Engineering: This course examines advanced</p>

	<p>techniques in gene engineering and genetic manipulation for improving microorganisms and their industrial applications.</p> <p>Analysis and Optimization of Industrial Processes: Students learn how to analyze and optimize industrial processes used in the production of biological products, such as pH control.</p>
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy to be adopted in delivering this material is to encourage student participation in exercises, while simultaneously developing and expanding their critical thinking skills. This will be achieved through interactive lessons and tutorials, and by incorporating simple experiments that involve engaging, hands-on activities.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	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	Introduction to Industrial Microbiology
Week 2	Microbial Species Used in Industry
Week 3	Bio-Mechanisms and Microbial Product Control
Week 4	Requirements for Microbial Industries
Week 5	Microbial Isolation
Week 6	Cultivation Media
Week 7	Fermenters
Week 8	Acetic Acid Production
Week 9	Amino Acid Production
Week 10	Vitamin production
Week 11	Mushroom production
Week 12	Single-cell protein production
Week 13	Organic solvent production
Week 14	Antibiotic production
Week 15	Probiotics

Week 16	Final exam
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Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: General instructions within the Industrial microorganisms laboratory
Week 2	Lab 2: Isolation of industrial microorganisms and methods of preserving isolates
Week 3	Lab 3: methods of preserving isolates
Week 4	Lab 4: Isolation of antibiotic-producing from bacteria
Week 5	Lab 5: Microbial production of antibiotics
Week 6	Lab 6: Isolation of amylase-producing microorganisms
Week 7	Lab 7: Isolation of protease-producing microorganisms
Week 8	Lab 8: Production of citric acid from microorganisms
Week 9	Lab9: Some applications of lactic fermentation
Week 10	Lab10: The use of microorganisms in the production of matured cheese and yoghurt

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Industrial Microbiology: Principles and Applications" Michael J. Waites: Wiley)	Yes
Recommended Texts	Copyright © 2000-2023 by John Wiley & Sons, Inc. or related companies. All rights reserved.	No
Websites	https://4lfonsina.files.wordpress.com/2012/11/industrial-microbiology-an-introduction-0632053070-wiley.pdf	

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	Food Microbiology		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MEBio-401		
ECTS Credits	3		
SWL (hr/sem)	----		
Module Level	4	Semester of Delivery	
Administering Department	Bio	College	Meddle east
Module Leader	Raneem Mohammed Abdjljeel	e-mail	Raneem.mohammed@meuc.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	Module Leader's Qualification	Ms.c.
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	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	a) Identifying the microorganisms that cause food spoilage b) How to handle these microorganisms c) Teaching the student how to distinguish between different genera and species of contaminating microorganisms d) Identifying the microorganisms present in food e) Teaching the student how to handle these microorganisms to improve a particular
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	This course aims to familiarize students with the scientific terminology of industrial and food microbiology and how to write their scientific names. It also aims to teach students how to manage food spoilage caused by microorganisms and how to use microorganisms in the food industry.
Indicative Contents المحتويات الإرشادية	<p>This course covers a variety of topics and concepts related to microorganisms in a food context. Some of the introductory content may include:</p> <p>Definition of Food Microorganisms:</p> <p>The concept of food microorganisms and their importance in nutrition science.</p> <p>Identification of important microorganisms in food, such as bacteria and fungi.</p> <p>The Effect of Microorganisms on Food:</p> <p>Examining the role of microorganisms in food preparation and spoilage.</p> <p>Understanding the effect of microorganisms on flavor, spoilage, and chemical transformations in food.</p> <p>Microorganisms and the Digestive System:</p> <p>Examining beneficial microorganisms in the digestive system, such as beneficial gut bacteria.</p> <p>Understanding the effect of microorganisms on the digestion and absorption of nutrients.</p> <p>Microorganisms and Food Preservation:</p> <p>Examining the use of microorganisms in various technologies.</p>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy to be adopted in delivering this material is to encourage student participation in exercises, while simultaneously developing and expanding their critical thinking skills. This will be achieved through interactive lessons and tutorials, and by incorporating simple experiments that involve engaging, hands-on activities.
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Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	79	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	71	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب 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	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	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	History and development of food microbiology.
Week 2	Characteristics of predominant microorganisms in food.
Week 3	Sources of microorganisms in food
Week 4	Normal microbiological quality of foods and its significance
Week 5	Microbial growth characteristics
Week 6	Factors influencing microbial growth in food
Week 7	Microbiological standard of food
Week 8	Microbial food spoilage
Week 9	Important factors in microbial food spoilage
Week 10	Spoilage of Specific Food Groups
Week 11	Food Spoilage by Microbial Enzymes
Week 12	Microbial foodborn diseases
Week 13	Parasites
Week 14	Indicators of Bacterial Pathogens
Week 15	Control of microorganisms in food
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: General instructions within the food microbiology laboratory
Week 2	Lab 2: Methods for Microbiological Examination of Foods
Week 3	Lab 3: Study of the microbiology of milk
Week 4	Lab 4: Study of the microbiology of cheese
Week 5	Lab 5: study of the microbiology of red meat and chicken
Week 6	Lab 6: Study of the microbiology of fish

Week 7	Lab 7: Study of the microbiology of fruits and vegetables
Week 8	Lab 8: Study of microbiology in eggs
Week 9	Lab 9: Study of microorganisms in pickles and sugary foods
Week 10	Lab 10: Study of microorganisms in canned food
Week 11	Lab 11: Study of the microbiology of bread and cereals

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Food Microbiology: Fundamentals and Frontiers" بواسطة Michael P. Doyle وRobert L. Buchanan.	Yes
Recommended Texts	Copyright © 2000-2023 by John Wiley & Sons, Inc. or related companies. All rights reserved.	No
Websites	https://www.wiley.com/en-us/Food+Microbiology%3A+Fundamentals+and+Frontiers%2C+5th+Edition-p-9781555816261	

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	Chordates		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MEBio-405		
ECTS Credits	3		
SWL (hr/sem)	----		
Module Level	4	Semester of Delivery	
Administering Department	Bio	College	Meddle east
Module Leader	Raneem Mohammed AbdJaleel	e-mail	Raneem Mohammed@meuc.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	Module Leader's Qualification	Ms.c.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	None	e-mail	None
Scientific Committee Approval Date	01/10/2025	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 Objectives أهداف المادة الدراسية	<ul style="list-style-type: none">• Identifying and classifying different animal groups• Anatomical comparison of different body organs and systems• Comparing animals to each other to observe differences in the complexity of their bodies
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>A. Knowledge and Understanding:</p> <ol style="list-style-type: none">1. The student will be able to identify organisms belonging to the phylum Chordata.2. The student will be able to classify these organisms.3. The student will be able to compare them structurally and behaviorally.4. The student will be able to dissect laboratory animals.5. The student will be able to create skeletons of some animals and preserve others. <p>B. Subject-Specific Skills:</p> <ol style="list-style-type: none">1. The student will understand the basis for classifying these organisms.2. The student will be able to explain these differences and relate them to environmental variables.3. The student will be able to connect ancestors and current generations evolutionarily.4. The student will be able to envision the future of these organisms.5. The student will understand and explain the role of materials used in preservation.
Indicative Contents المحتويات الإرشادية	<p>Teaching and Learning Methods:</p> <ol style="list-style-type: none">A. Theoretical LecturesB. Practical LaboratoriesC. Films and SlidesD. Field Trips for Application <p>Assessment Methods:</p> <ol style="list-style-type: none">1. Daily and Monthly Exams2. Practical Tests3. Oral Exams4. Attendance <p>C. Thinking Skills -</p> <ol style="list-style-type: none">1. Ability to identify these organisms2. Raising laboratory animals3. Dissecting animals

	<p>4. Creating skeletons and taxidermied models</p> <p>5. Working in museums or animal breeding facilities</p> <p>D. General and Transferable Skills (Other skills related to employability and personal development) -</p> <p>1. Visual aids and models</p> <p>2. PowerPoint projector</p> <p>3. Analytical equipment</p> <p>4. Field visits to laboratories</p> <p>16. A. Learner Outcomes and Teaching and Learning Methods</p>
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<p>The main strategy that will be adopted in delivering this unit is to encourage students to participate in exercises as well as a series of lectures and practical classes designed to introduce you to it. At the same time refine and broaden critical thinking skills through topics covered in the lectures including what bacterial toxins are, their prevalence and quantification. An interactive educational program through looking at the types of simple experiments (practical classes) provides training in basic techniques including isolation of pathogenic bacteria, their dissemination and extraction of their different it. These activities are fun for the students.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem)	63	Structured SWL (h/w)	7
الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem)	37	Unstructured SWL (h/w)	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
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Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	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	Characteristics of the Phylum Chordata
Week 2	Classification of the Chordata

Week 3	Class Fish
Week 4	Class Amphibians and Reptiles
Week 5	Class Aves
Week 6	Class Mammals
Week 7	Midterm Exam
Week 8	Comparative Study of the Skeletal System
Week 9	Comparative Study of the Muscular System
Week 10	Comparative Study of the Respiratory System
Week 11	Comparative Study of the Urinary System
Week 12	Comparative Study of the Integumentary System
Week 13	Comparative Study of the Digestive System
Week 14	Study of Chordata Behaviors
Week 15	Final Exam Review
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Characteristics of the Phylum Chordata
Week 2	Classification of the Chordata
Week 3	Class Fish
Week 4	Class Amphibians and Reptiles

Week 5	Class Aves
Week 6	Class Mammals
Week 7	Comparative Study of types of Chordata
Week8	Comparative Study of types of Chordata

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	حبيب شكري.د للحبليات المقارن التشريح أساسيات	Yes
Recommended Texts	None	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	pathogenic bacteria		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MEBio-411		
ECTS Credits	3		
SWL (hr/sem)	---		
Module Level	4	Semester of Delivery	
Administering Department	Bio	College	Meddle east
Module Leader	Hamza Kadum Alzubaidi	e-mail	Hamza.Kadum@meuc.edu.iq
Module Leader's Acad. Title	Assistant Prof.	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	None	e-mail	None
Scientific Committee Approval Date	01/10/2025	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

<p>Module Objectives</p> <p>أهداف المادة الدراسية</p>	<p>This course aims to clarify and define the key concepts of pathogenic bacteria, providing a comprehensive introduction to important terminology, methods of infection and epidemiology, methods for measuring bacterial virulence, and bacterial genetic evolution. It then delves into the important groups of pathogenic bacteria based on their scientific classification, studying the specific characteristics and pathogenicity of each bacterial genus. The course covers laboratory diagnostic methods for these genus, including microscopic examination, culture on various bacterial media, serological and phage typing, and modern microbiological diagnostic techniques to enhance accurate diagnosis. Emphasis is placed on the epidemiology of each bacterial genus, infection prevention methods, and developing students' ability to accurately diagnose pathogenic bacteria. Students will work in research groups to learn about sterilization methods, media preparation, and microbiological culture. They will then accurately diagnose clinically important genus species through biochemical tests and culture characteristics, developing their ability to accurately identify bacteria isolated from various pathogenic samples.</p>
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>A. Knowledge and Understanding:</p> <p>Focus on pathogenically important bacterial groups in bacteriology, accurate diagnosis of pathogenic species, their epidemiology, and methods of prevention.</p> <p>B. Subject-Specific Skills:</p> <p>Focus on how to prepare and stain samples for microscopic examination, in addition to using different culture media to isolate pathogenic bacterial species.</p>
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Teaching and Learning Methods:</p> <p>Using scientific references and direct interaction with students through lectures... and developing students' practical skills and laboratory work through hands-on experiments in the lab.</p> <p>Assessment Methods:</p> <p>Exchanging information with students, students presenting summaries of the previous lecture, quizzes, midterm exams, and reports.</p> <p>C- Thinking Skills:</p> <p>Training and preparing students to work in research groups in the lab and developing their presentation and discussion skills, including different methods for diagnosing bacteria.</p>

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 as well as a series of lectures and pathogenic bacteria classes designed to introduce you to it. At the same time refining and expanding their critical thinking skills through topics covered in lectures include what are pathogenic bacteria, their basic characteristics, structure, classification, propagation, and quantification. An interactive tutorial and by considering types of simple experiments (Practical classes) offer training in basic . pathogenic bacteria
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7

	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	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	Comprehensive Introduction to Pathogenic Bacteriology
Week 2	Staphylococcus and its genera
Week 3	Streptococcus and its genera
Week 4	Enterobacteriaceae
Week 5	E. coli, Proteus, Klebsiella
Week 6	Enterobacteriaceae
Week 7	Salmonella, Shigella, Yersinia
Week 8	Mid exam
Week 9	Brucella, Haemophilus, Bordetella
Week 10	Neisseria and its genera
Week 11	Aerobic spore-forming bacteria
Week 12	Bacillus, Clostridium
Week 13	Pseudomonas and its genera
Week 14	Spirochaetes
Week 15	Bacteroides
Week 16	Corynebacteria

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Streptococcus and its genera
Week 2	Enterobacteriaceae
Week 3	E. coli, Proteus, Klebsiella
Week 4	Bacillus, Clostridium
Week 5	Pseudomonas and its genera
Week 6	Spirochaetes
Week 7	Bacteroides

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	الجبوري . محييمد مدالله . علم البكتريا الطبية . جامعة الموصل . الطبعة الأولى.	No
Recommended Texts	Jawetz, Melnick & Adelberg's Medical Microbiology twenty fourth edition Geo.F.Books. et al . – Alex3-Shris Medical Microbiology An Introduction to Infectious Disease editors .Kenneth J, Ryan M, et al 4 th edition.	No
Websites	www.blackwellpublishing.com www.wiley.com	

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	Endocrinology		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MEBio-414		
ECTS Credits	3		
SWL (hr/sem)	---		
Module Level	4	Semester of Delivery	
Administering Department	Bio	College	Meddle east
Module Leader	Farqad AbdIraheem AbdIftaah	e-mail	Farqad .A.A@meuc.edu.iq
Module Leader's Acad. Title	Prof.	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	None	e-mail	None
Scientific Committee Approval Date	01/10/2025	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

<p>Module Objectives</p> <p>أهداف المادة الدراسية</p>	<p>The module objectives of an endocrinology module may include:</p> <ol style="list-style-type: none">1. Understanding the principles of endocrinology, including hormone synthesis, secretion, and regulation.2. Describing the structure and function of different endocrine glands, including the pituitary, thyroid, parathyroid, adrenal, pancreas, and gonads.3. Understanding the role of hormones in maintaining homeostasis, including the regulation of metabolism, growth, and development.4. Analyzing the pathophysiology of endocrine disorders, including diabetes, thyroid disorders, adrenal disorders, and reproductive disorders.5. Understanding the principles of endocrine diagnostic testing, including laboratory assessments and imaging techniques.6. Describing the use of pharmacological agents in the treatment of endocrine disorders.7. Understanding the principles of endocrine research, including molecular and genetic approaches to studying hormone function and regulation. <p>Overall, an endocrinology module aims to provide students with a comprehensive understanding of the principles and applications of endocrinology, as well as the practical skills required for diagnosis and treatment of endocrine disorders. The module also aims to emphasize the importance of endocrine research in advancing our understanding of human health and disease.</p>
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>The module learning outcomes of an endocrinology module may include:</p> <ol style="list-style-type: none">1. Knowledge and understanding: Students should be able to demonstrate a deep understanding of the principles and applications of endocrinology, including hormone synthesis, secretion, and regulation, as well as the structure and function of different endocrine glands.2. Critical thinking: Students should be able to analyze the pathophysiology of endocrine disorders, including diabetes, thyroid disorders, adrenal disorders, and reproductive disorders, and evaluate the role of hormones in maintaining homeostasis.3. Practical skills: Students should be able to apply their knowledge of endocrine diagnostic testing, including laboratory assessments and imaging techniques, to diagnose endocrine disorders and evaluate treatment efficacy.4. Communication: Students should be able to communicate effectively and clearly about endocrinology concepts, both orally and in writing, using appropriate

	<p>terminology and referencing sources of information.</p> <p>5. Research skills: Students should be able to demonstrate an understanding of the principles of endocrine research, including molecular and genetic approaches to studying hormone function and regulation, and demonstrate the ability to critically evaluate and interpret scientific literature in endocrinology.</p> <p>6. Professional skills: Students should be able to demonstrate professional skills such as ethical conduct, teamwork, and time management, and understand the importance of lifelong learning and professional development in the field of endocrinology. In general, the module learning outcomes of an endocrinology module aim to equip students with the knowledge, skills, and attitudes required to understand the principles and applications of endocrinology, and to apply this knowledge in the diagnosis and treatment of endocrine disorders. The module also aims to emphasize the importance of research skills and professional development in the field of endocrinology.</p>
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>The indicative contents of an endocrinology module may include:</p> <ol style="list-style-type: none"> 1. Introduction to endocrinology: Basic concepts, principles, and terminology of endocrinology. The organization and function of different endocrine glands, and the roles of hormones and their regulation. 2. Pituitary gland and hypothalamic control: The structure and function of the pituitary gland, and its regulation by the hypothalamus. The role of growth hormone, prolactin, thyroid stimulating hormone, adrenocorticotrophic hormone, follicle stimulating hormone, and luteinizing hormone in the control of other endocrine glands. 3. Thyroid gland: The structure and function of the thyroid gland, and the synthesis and regulation of thyroid hormones. The role of thyroid hormones in metabolism, growth, and development, and the pathophysiology and treatment of thyroid disorders. 4. Parathyroid gland and calcium homeostasis: The structure and function of the parathyroid gland, and the regulation of calcium homeostasis. The role of parathyroid hormone and calcitonin in calcium metabolism, and the pathophysiology and treatment of calcium disorders. 5. Adrenal gland: The structure and function of the adrenal gland, and the synthesis and regulation of adrenal hormones. The role of glucocorticoids, mineralocorticoids, and adrenal androgens in metabolism, stress response, and sex differentiation, and the pathophysiology and treatment of adrenal disorders. 6. Pancreas and glucose homeostasis: The structure and function of the pancreas, and the synthesis and regulation of insulin and glucagon. The role of insulin and glucagon in glucose metabolism, and the pathophysiology and treatment of diabetes mellitus.

7. Reproductive endocrinology: The structure and function of the male and female reproductive systems, and the synthesis and regulation of reproductive hormones. The role of reproductive hormones in sexual differentiation, puberty, and fertility, and the pathophysiology and treatment of reproductive disorders.

8. Endocrine diagnostic testing: Laboratory assessments, imaging techniques, and clinical evaluation for the diagnosis of endocrine disorders.

9. Pharmacology of endocrine disorders: The use of pharmacological agents in the treatment of endocrine disorders, including hormone replacement therapy, antidiabetic drugs, and thyroid hormone therapy.

10. Endocrine research: Molecular and genetic approaches to studying hormone function and regulation, and the application of endocrine research in clinical practice. Overall, an endocrinology module should provide students with a comprehensive understanding of the principles and applications of endocrinology, including the organization and function of different endocrine glands, the roles of hormones and their regulation, and the pathophysiology and treatment of endocrine disorders. The module should also emphasize the importance of endocrine diagnostic testing, pharmacology, and research in advancing our understanding of human health and disease.

Effective learning and teaching strategies for an endocrinology module may include a combination of the following approaches:

1. Lectures: Lectures can be used to introduce students to key concepts and principles of endocrinology, including the structure and function of different endocrine glands, hormone synthesis and regulation, and the role of hormones in maintaining homeostasis.

2. Case based learning: Case studies can be used to illustrate the practical applications of endocrinology in real world scenarios. These cases can be drawn from fields such as diabetes, thyroid disorders, adrenal disorders, and reproductive disorders.

3. Small group discussions: Small group discussions can be used to encourage students to actively engage with the subject matter, share ideas and insights, and learn from each other. Discussions can focus on case studies, current research topics, and the practical applications of endocrinology in healthcare.

4. Laboratory sessions: Laboratory sessions can provide students with hands on experience in

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<p>Effective learning and teaching strategies for an endocrinology module may include a combination of the following approaches:</p> <ol style="list-style-type: none"> 1. Lectures: Lectures can be used to introduce students to key concepts and principles of endocrinology, including the structure and function of different endocrine glands, hormone synthesis and regulation, and the role of hormones in maintaining homeostasis. 2. Case based learning: Case studies can be used to illustrate the practical applications of endocrinology in real world scenarios. These cases can be drawn from fields such as diabetes, thyroid disorders, adrenal disorders, and reproductive disorders. 3. Small group discussions: Small group discussions can be used to encourage students to actively engage with the subject matter, share ideas and insights, and learn from each other. Discussions can focus on case studies, current research topics, and the practical applications of endocrinology in healthcare. 4. Laboratory sessions: Laboratory sessions can provide students with hands on experience in endocrine diagnostic testing, including laboratory assessments and imaging techniques.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	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 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	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 endocrine system
Week 2	Types of glands and its hormones
Week 3	Hypothalamic glands
Week 4	Pituitary gland type 1
Week 5	Pituitary gland type 2
Week 6	Thyroid gland
Week 7	Mid term Exam
Week 8	Parathyroid gland
Week 9	Endocrine pancreas part 1
Week 10	Endocrine pancreas part 2
Week 11	Adrenal gland part 1
Week 12	Adrenal gland part 2

Week 13	Male reproductive system part 1
Week 14	Male reproductive system part 2
Week 15	Female reproductive system
Week 16	Fainal exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction endocrine system
Week 2	Methods of plasma and serum keeping
Week 3	hypothalamus gland
Week 4	Anterior pituitary gland
Week 5	Posterior pituitary gland
Week 6	thyroid gland and parathyroid gland
Week 7	parathyroid gland
Week 8	Mid exam
Week 9	The pancreas
Week 10	Adrenal gland
Week 11	Male reproductive system
Week 12	female reproductive system
Week 13	ELISA technique
Week 14	Estimation some hormone levels
Week 15	Results analysis of estimated hormone levels by ELISA

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	TEXTBOOK OF MEDICAL PHYSIOLOGY, Guyton, Arthur C., 2006 , pdf	Yes
Recommended Texts	Endocrine system 2: hypothalamus and pituitary gland , Nursing Times *online] June 2021 / Vol 117 pdf	No
Websites	https://www.endocrinology.org/about-us/what-is-endocrinology/	

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
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	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	English Language		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MEBio-431		
ECTS Credits	2		
SWL (hr/sem)	-----		
Module Level	4	Semester of Delivery	
Administering Department	Bio	College	Meddle east
Module Leader	Ayaa Abdlrahmaan Shuker	e-mail	Ayaa. A.s@meuc.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	Module Leader's Qualification	Ms.c.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	None	e-mail	None
Scientific Committee Approval Date	01/10/2025	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

<p>Module Objectives</p> <p>أهداف المادة الدراسية</p>	<p>The aim is to strengthen students' learning to use English as a foreign language to help them enrich their knowledge and understanding of terms and phrases, and to strengthen their four skills (reading, writing, speaking, and listening). Learning English also helps them communicate with people around the world.</p> <p>The course teaches students how to use English grammar rules in conversation. It teaches students verbs (present, past, present continuous, and past continuous), the use of adjectives and adverbs, how to ask questions using verbs, and the use of question words. Students in the Department of Life Sciences are introduced to the rules, principles, concepts, vocabulary, and meanings of the English language, as detailed in the course description.</p>
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>A. Cognitive Objectives</p> <ol style="list-style-type: none">1. To be able to understand the material and use blended learning.2. To know and understand the course topics.3. To possess clarity in the cognitive aspect to reach a high level of sound scientific awareness.4. To acquire practical skills that qualify the student to perform the applied aspects of life sciences. <p>B. Course-Specific Skills Objectives</p> <ol style="list-style-type: none">1. To acquire the self-directed skills at the level of the required method.2. To acquire the required cognitive and intellectual skills.3. To acquire the required practical skills.4. To participate in discussions and dialogues using English vocabulary in the classroom.
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Traditional teaching methods (lecture, discussion, observation, etc.), as well as the use of blended learning.</p> <p>Modern teaching methods (brainstorming, extracurricular skills).</p> <p>Modern educational technology.</p> <p>Self-learning and e-learning programs using multimedia technology via the internet.</p> <p>Assessment methods:</p> <ol style="list-style-type: none">A. Daily quizzes, oral exams, monthly exams, and term reports for theoretical material.B. Distribution of grades: For English language (20% for the first semester), (20% for the second semester) / 60% for the final exam.C. Allocating additional marks for classroom and extracurricular activities <p>C. Affective and Value-Based Objectives</p> <ol style="list-style-type: none">C1. Developing the student's awareness of the importance of the English language in daily and academic life

	<p>C2. Developing the ability to analyze, deduce, evaluate, and make judgments</p> <p>C2. Contributing to the student's intellectual, personal, and professional development</p> <p>C3. Enhancing and developing the student's positive attitude towards learning the English language</p> <p>C4. Developing the student's awareness of foreign cultures</p> <p>Teaching Methods</p>
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

	<p>C. Affective and Value-Based Objectives</p> <p>C1. Developing the student's awareness of the importance of the English language in daily and academic life</p> <p>C2. Developing the ability to analyze, deduce, evaluate, and make judgments</p> <p>C2. Contributing to the student's intellectual, personal, and professional development</p> <p>C3. Enhancing and developing the student's positive attitude towards learning the English language</p> <p>C4. Developing the student's awareness of foreign cultures</p> <p>Teaching Methods</p>
Strategies	

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem)	33	Structured SWL (h/w)	5
الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem)	17	Unstructured SWL (h/w)	3
الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50
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Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	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	Unit 1 Home and away
Week 2	Unit 2 Been there, done that !
Week 3	Discussion
Week 4	Unit 3 What a story
Week 5	Unit 4 Nothing but the truth
Week 6	Unit 5 An eye to the future
Week 7	Unit 6 Making it big

Week 8	Mid exam
Week 9	Unit 7 Getting on together
Week 10	Unit 8 Going to extremes
Week 11	Discussion
Week 12	Unit 9 Things ain't what they used to be!
Week 13	Unit 10 Risking life and limb
Week 14	Discussion
Week 15	Preparatory week before the final Exam
Week 16	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	New-headway-plus-upper-intermediate-students-book. New-headway-plus-upperintermediate-students-workbook	No
Recommended Texts	المحاضرات المؤرشفة من قبل تدريسي الاختصاص لكل مادة ورقية كانت ام فديوية	No
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
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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	Antibiotics		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MEBio-413		
ECTS Credits	3		
SWL (hr/sem)	-----		
Module Level	4	Semester of Delivery	
Administering Department	Bio	College	Meddle east
Module Leader	Farqad Abdhraheem Abdlftaah	e-mail	Farqad A.A@meuc.edu.iq
Module Leader's Acad. Title	Prof.	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	None	e-mail	None
Scientific Committee Approval Date	01/10/2025	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 Objectives أهداف المادة الدراسية	<p>Understanding the importance of antibiotics, the microorganisms that produce them, how they are manufactured, and their mechanisms of action against pathogenic microorganisms, particularly pathogenic bacteria, fungi, and others, as well as identifying their harmful side effects on humans.</p> <p>Developing students' abilities to investigate the effects of these antibiotics on pathogenic bacteria in the laboratory to select the appropriate antibiotic, given that some antibiotics affect Gram-positive bacteria, others Gram-negative bacteria, and some are effective against both types.</p>
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>A. Knowledge and Understanding: Understanding how to select the appropriate antibiotic to kill or inhibit the growth of the pathogenic bacteria under test, along with understanding how to use the antibiotic correctly in various practical applications.</p> <p>B. Subject-Specific Skills: Knowing how to identify one or more antibiotics from a group of antibiotics to obtain the best laboratory results without resorting to the indiscriminate use of antibiotics.</p>
Indicative Contents المحتويات الإرشادية	<p>Teaching and Learning Methods:</p> <p>Using traditional lecture methods through in-person lectures and presentations, and utilizing alternative methods such as gathering information from scientific sources.</p> <p>Assessment Methods:</p> <p>Daily quizzes, midterm and final exams, and practical experiment reports.</p> <p>Thinking Skills:</p> <p>Assigning students survey tasks to investigate the most commonly used antibiotics in hospitals and private clinics and to study their effectiveness, taking into account their country of origin.</p>

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 as well as a series of lectures and Antibiotic classes designed to introduce you to it. At the same time refining and expanding their
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critical thinking skills through topics covered in lectures include what are Antibiotic, their basic characteristics, structure, classification, propagation, and quantification. An interactive tutorial and by considering types of simple experiments (Practical classes) offer training in basic . Antibiotic

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	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 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	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	History of Antibiotics: General Introduction
Week 2	Methods of Obtaining Antibiotics
Week 3	Sensitivity Testing Methods
Week 4	Classes of Antibiotics: Penicillins
Week 5	Classes of Antibiotics: Penicillins
Week 6	Cephalosporins
Week 7	Mid exam
Week 8	Aminoglycosides
Week 9	Cell Wall-Acting Antibiotics
Week 10	Plasma Membrane-Acting Antibiotics
Week 11	Second Midterm Exam
Week 12	Protein Synthesis Inhibiting Antibiotics
Week 13	Natural Resistance to Antibiotics
Week 14	Acquired Resistance to Antibiotics
Week 15	Antifungals
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Sensitivity Testing Methods
Week 2	Classes of Antibiotics: Penicillins
Week 3	Cephalosporins

Week 4	Aminoglycosides
Week 5	Cell Wall-Acting Antibiotics
Week 6	Plasma Membrane-Acting Antibiotics
Week 7	Second Midterm Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	الزبيدي، حامد مجيد. ١٩٨٨، علم الاحياء المجهرية النظري والعملي، جامعة بغداد	No
Recommended Texts	DR. Laurence, P. N. Bennett. 1992. clinical pharmacology. seventh edition. Claudio. O. Gualerzi. et. al., 2014. Antibiotics Targets, Mechanism and Resistance. Wiley-VCH co.	No
Websites	www.blackwellpublishing.com www.wiley.com	

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 Biology		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MEBio-412		
ECTS Credits	3		
SWL (hr/sem)	----		
Module Level	4	Semester of Delivery	
Administering Department	Bio	College	Meddle east
Module Leader	Farqad AbdIraheem AbdIftaah	e-mail	Farqad .A.A@meuc.edu.iq
Module Leader's Acad. Title	Prof.	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	None	e-mail	None
Scientific Committee Approval Date	01/10/2025	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 Objectives أهداف المادة الدراسية	24. This class discusses the fundamental aspects of Molecular Biology. 25. its importance to mankind in a brief and articulate explanation of this newly originated science. 26. Highlights the general morphology, genetic structure, function of Molecular Biology . 27. Underlie the principles and application of Recombinant phage DNA technology in pharmaceutical, and biomedical fields.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	33. Discuss reasons for studying Molecular Biology 34. Outline methods for cultivation of Molecular Biology; purification of gene; detection of gene and their components; investigation of Molecular Biology gene function; assess the value of Molecular Biology genome sequencing. 35. Describe the modes of transmission of plant viruses and animal viruses; evaluate the roles of vectors in virus transmission; discuss the immune mechanisms encountered by an animal virus when it enters the body of a new host. 36. Explain the role of primers in gene nucleic acid synthesis; the roles of host proteins in Molecular Biology genome replication
Indicative Contents المحتويات الإرشادية	<p>Molecular biology is the branch of biology that deals with the nature of biological phenomena at the molecular level through the study of the life molecules (DNA, RNA and proteins).</p> <p>DNA as a Genetic Material rather than Proteins: Classic Experiments</p> <p>I. Frederick Griffith: Bacterial Transformation</p> <p>In 1928, British bacteriologist Frederick Griffith conducted a series of experiments using <i>Streptococcus pneumoniae</i> bacteria and mice. Griffith wasn't trying to identify the genetic material, but rather, trying to develop a vaccine against pneumonia. In his experiments, Griffith used two related strains of bacteria, known as R and S.</p> <p>2. Avery, McCarty, and MacLeod: Identifying the transforming principle</p> <p>In 1944, three Canadian and American researchers; Avery, McCarty, and MacLeod, set out to identify Griffith's "transforming principle".</p> <p>To do so, they began with large cultures of heat-killed S cells and extracted the transforming principle by enzymatically destroying the other cellular components. By this method, they were able to obtain small amounts of highly purified transforming principle, which they could then analyse through other tests to determine its identity (Figure 2).</p> <p>Hershey-Chase experiments</p>

In their experiments, Hershey and Chase studied **bacteriophages**, viruses that attack bacteria and composed of outer structures made of proteins and an inner core consisting of DNA.

Discovering the Double Helix

By the early 1950s, considerable evidence had accumulated indicating that DNA was the genetic material of cells, and now the race was on to discover its three-dimensional structure. Around this time, Austrian biochemist Erwin **Chargaff** (1905–2002) examined the content of **DNA** in different species and discovered that adenine, thymine, guanine, and cytosine were not found in equal quantities, and that it varied from species to species, but not between individuals of the same species. He found that the amount of adenine was very close to equalling the amount of thymine, and the amount of cytosine was very close to equalling the amount of guanine, or $A = T$ and $G = C$. These relationships are also known as

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 as well as a series of lectures and practical classes designed to introduce you to Molecular Biology. At the same time refining and expanding their critical thinking skills through topics covered in lectures include what are Molecular Biology, their basic characteristics, structure, classification, propagation, and quantification. An interactive tutorial and by considering types of simple experiments (Practical classes) offer training in basic Molecular.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem)	71	Unstructured SWL (h/w)	6

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem)	150		
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 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	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 course
Week 2	DNA as a Genetic Material rather than Proteins: Classic Experiments
Week 3	The Molecular Composition of DNA

Week 4	DNA Molecular Structure
Week 5	DNA replication
Week 6	DNA Replication in Prokaryotes
Week 7	Mid-term Exam
Week 8	Chromosomes Structure: Chromatin
Week 9	Eukaryotic DNA Replication
Week 10	DNA Repair
Week 11	Other DNA damage repair mechanisms
Week 12	DNA proofreading and repair in human disease
Week 13	Transcription
Week 14	Transfer RNA
Week 15	Translation
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Lab safety, Important of Molecular Biology diagnoses
Week 2	Lab 2: Introduction to microscopic techniques
Week 3	Lab 3: Isolation of DNA
Week 4	Lab 4: Isolation of RNA
Week 5	Lab 5: Isolation and cultivation of DNA Bacteria

Week 6	Lab 6: Detection of human nucleic acid
Week 7	Lab 7: get your lab reports up to date, Revision for Module test

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Fundamental Molecular Biology . Lizabeth A. Allison 2007	No
Recommended Texts	Molecular Genetics of Bacteria Jeremy W. Dale Simon F. Park University of Surrey, UK	No
Websites	www.blackwellpublishing.com www.wiley.com	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A – Excellent	امتياز	90 - 100	Outstanding Performance
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