

وصف مقرر المواد الدراسية للمرحلة الرابعة للفصلين الاول والثاني للعام الدراسي 2024-2025

Course Description Form

Course Name:	
Enzymology	
Course Code:	
BMT41-Ez	
Semester / Year:	
Semester 1, Year 4	
Description Preparation	
Date: 1\9\2024	
Available Attendance Forms:	
Attendance	
Number of Credit Hours (Total) / Number of Units (Total): unit	
60 hrs 3 units	
Course administrator's name (mention all, if more than one name)	
Name: Dr. Asmaa Ali Hussein Email: asmaa.ali@nahrainuniv.edu.iq	
1. Course Objectives	
Course Objectives	• This course deals with the basic concept of enzymology. • The outcomes of this course provide students with knowledge and information as well as practical experience about enzymes / definition • To understand differences between enzymatic and non enzymatic reactions • To understand structure and function of enzymes. 5- Students learn about the importance of enzymatic reactions in clinical and industrial fields

Teaching and Learning Strategies					
Strategy	Effective teaching and learning strategies involve pre-lab preparation, demonstrations, guided inquiry, collaborative learning, feedback, reflection, theory-application integration, and a strong emphasis on safety. These strategies aim to engage students actively, reinforce theoretical concepts, develop critical thinking skills, and ensure a safe learning environment.				
2. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introduction, History & Course purpose	Introduction on biochemical reactions	PowerPoint, white board	Daily exams and homework
2	2	Explaining the Enzyme nomenclature for the students	Enzyme nomenclature and classifications	Whiteboard Presentation	Daily exams and homework
3	2	Explaining the differences between Enzymatic and non enzymatic reactions	Enzymatic and non enzymatic reactions	Whiteboard Presentation	Daily exams and homework
4	2	Explaining the importance of Enzyme structure	Enzyme structure and active site	Whiteboard	Daily exams and homework
5	2	Mid Exam	Mid exam		
6	2	Definition of an isoenzymes	Isoenzymes and their	Presentation	Daily exams and homework

			importance in disease diagnosis		
7	2	Explaining optimum conditions for enzyme production	Optimum conditions for enzyme production	Whiteboard Power Point	Daily exams and homework
8	2	Discussing the outline for purification techniques	Purification of enzymes using chromatographic techniques	Whiteboard	Daily exams and homework
9	2	Studying the importance of one step purification technique	Affinity chromatography purification	Whiteboard Power point	Daily exams and homework
10	2	Mid Exam	Mid exam	Whiteboard	Daily exams and homework
11	2	Studying the factors affecting Enzyme activity	Characterization of purified enzyme	Whiteboard Power point	Daily exams and homework
12	2	Studying enzyme kinetics	Enzyme kinetics	Whiteboard	Daily exams and homework
13	2	Studying the importance for Medical applications of enzymes	Medical applications of enzymes	Whiteboard	Daily exams and homework
14	2	Studying the industrial applications of enzymes	Industrial applications of enzymes	Whiteboard	Daily exams and homework

15	2	Revision	revision		Daily exams and homework
3. Course Evaluation					
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc					
4. Learning and Teaching Resources					
Required textbooks (curricular books, if any)					
Main references (sources)			-A Guide to Enzyme Catalysis and Protein Folding, 2nd edition (1999), Alan Fersht, W.H. Freeman and Co. New York, NY 1999. - https://www.sciencedirect.com/bookseries/methods-in-enzymology -Webb E.C., NC-IUBMB. (1992) Enzyme Nomenclature: Recommendations of the Nomenclature Committee of the International Union of Biochemistry and Molecular Biology on the Nomenclature and Classification of Enzymes. Academic Press, New York, NY.		
Recommended books and references (scientific journals, reports...)			Enzyme Technology , Published by N.K. Muraleedharan for Asiatech Publishers Inc.,2006 By Robert A. Copeland · 2023		
Electronic References, Websites			https://www.brenda-enzymes.org/		

Course Description Form

Course Name:	
Toxicology	
Course Code	
BTM41-To	
Semester/Year	
Semester 1, Year 4	
Description Preparation Date:	
1-9-2024	
Available Attendance Form	
Attendance	
number of Credit Hours (Total) number of Units (Total)	
60h 3 units	
Course administrator's name (mention all, if more than one name)	
Dr. Ruqaia mohammed, dr. Ali Zaid	
Course Objectives	
The outcomes of this course provide students with knowledge and information as well as practical experience about how toxic compounds and mechanism of disease progression in human body, where they act?, what they do?. Students learn how toxic materials affected our body	
Teaching and Learning Strategies	
The number of teaching units are three units which consists of approximately 14-15 week timetabled study over a two hours lecturing with a three-hour practical laboratory every week. The teaching methods involve interactive/active learning lectures, videos, tutorial sessions, laboratory classes and homework assignment 15 hours will be independent or self-directed study.	
1. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2		Introduction, History & Course objective	PowerPoint, white board	Daily exams and homework
2	2		Principles of toxicology	Whiteboard Presentation	Daily exams and homework
3	2		Chemical toxin part 1	Whiteboard Presentation	Daily exams and homework
4	2		Chemical toxin part 2	Whiteboard	Daily exams and homework
5	2		Bacterial toxin part 1		
6	2		Bacterial toxin part 1	Presentation	Daily exams and homework
7	2		Fungal toxin part 1	Whiteboard Power Point	Daily exams and homework
8	2		Fungal toxin part 1	Whiteboard	Daily exams and homework
9	2		Exam	Whiteboard Power point	Daily exams and homework
10	2		Food toxin	PowerPoint, white board	Daily exams and homework

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

2. Course Evaluation

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

3. Learning and Teaching Resources

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

نموذج وصف المقرر

اسم المقرر:	
المعلوماتية الحيوية	
رمز المقرر:	
BTM41-Binfo	
الفصل / السنة:	
الفصل الدراسي الثاني/ المرحلة الرابعة	
تاريخ إعداد هذا الوصف:	
1/10/2024	
أشكال الحضور المتاحة:	
حضوري	
عدد الساعات الدراسية (الكلي)/ عدد الوحدات (الكلي):	
وحدة,3 ساعة / 60	
اسم مسؤول المقرر الدراسي (إذا أكثر من اسم يذكر)	
م.د. زيد نصيف عباس zaid.altameemi@nahrainuniv.edu.iq الأيمل: الاسم:	
اهداف المقرر 4.	
المادة اهداف الدراسية	تهدف هذه المادة إلى تزويد الطلبة بالمعرفة النظرية والمهارات العملية الأساسية في علم المعلوماتية الحيوية، وهو العلم الذي يجمع بين البيولوجيا، علوم الحاسوب، والرياضيات لتحليل وفهم البيانات الحيوية الجزيئية. بنهاية هذا المقرر، يُتوقع من الطالب أن يكون قادراً على: - فهم المفاهيم الأساسية في المعلوماتية الحيوية، بما في ذلك بنية الجينوم، التسلسل الجيني، والبروتينات، وأنواع البيانات البيولوجية المختلفة. ، والقدرة على استخراج Ensembl، UniProt، وNCBI التعامل مع قواعد البيانات الحيوية العالمية مثل وتحليل المعلومات الجينية منها. - المحلية (Alignment) تطبيق أدوات وخوارزميات المعلوماتية الحيوية مثل خوارزميات المحاذاة (BLAST) والعالمية، وخوارزميات البحث السريع. - باستخدام البرمجيات والمنصات الحاسوبية المناسبة (DNA، RNA، Protein)تحليل البيانات الجزيئية.

5. تفسير نتائج التحليل البيولوجي الحاسوبي وربطها بالمفاهيم البيولوجية والوظيفية. 6. المستخدمة في تحليل البيانات الجينومية (R أو Python مثل) اكتساب مهارات البرمجة الأساسية والبروتينية. 7. تعزيز التفكير النقدي والتحليلي في تفسير البيانات المعقدة والتعامل مع مشكلات البحث العلمي في مجالات الجينوميات والبروتيوميات. 8. تطبيق المعرفة المكتسبة في مجالات تطبيقية مثل الطب الجزيئي، تصميم الأدوية، تحليل الطفرات، ودراسة التعبير الجيني. 9. العمل الجماعي والبحث الذاتي من خلال المشاريع الصغيرة، لربط الجانب النظري بالتطبيقي في بيئة بحثية واقعية.	
5. استراتيجيات التعليم والتعلم	
على مجموعة من الاستراتيجيات التعليمية المتنوعة (Bioinformatics) يُعتمد في تدريس مادة المعلوماتية الحيوية التي تهدف إلى تنمية الفهم العميق، والمهارات العملية، والتفكير التحليلي لدى الطلبة، وتشمل ما يأتي: 1. المحاضرات النظرية (Lectures): لتقديم المفاهيم الأساسية في المعلوماتية الحيوية، مثل بنية الجينوم، قواعد البيانات الحيوية، والخوارزميات المستخدمة في تحليل التسلسلات. 2. التطبيقات العملية (Practical Sessions / Hands-on Training): من خلال جلسات تدريبية في المختبر أو عبر الحاسوب، يتعلم الطلبة استخدام أدوات التحليل الحيوي، مثل NCBI BLAST، Clustal Omega، MEGA، وExpASy. 3. التعلم القائم على المشاريع (Project-Based Learning): ، مما يعزز قدرتهم على (Protein أو DNA) يُكلف الطلبة بمشاريع فردية أو جماعية لتحليل بيانات حقيقية البحث الذاتي وتطبيق المفاهيم النظرية عملياً. 4. التعلم المدمج (Blended Learning): الجمع بين المحاضرات الحضورية والمنصات الإلكترونية لتوفير مصادر تعليمية متعددة (فيديوهات، محاضرات رقمية، قواعد بيانات تفاعلية). 5. المناقشات الصفية ودراسة الحالات (Class Discussions & Case Studies): تحليل مشكلات بحثية واقعية في الجينوميات أو البروتيوميات، مما يشجع التفكير النقدي والنقاش العلمي البناء. 6. التعلم الذاتي (Self-Directed Learning): لتوسيع (MOOCs) تشجيع الطلبة على استكشاف مصادر إضافية مثل الأبحاث العلمية والمقررات الإلكترونية معارفهم واستقلاليتهم العلمية. 7. العروض التقديمية والمناقشات الطلابية (Student Presentations): لتنقية مهارات العرض العلمي والتواصل الأكاديمي، من خلال تقديم تقارير أو نتائج مشاريع تحليل بيانات.	الاستراتيجية

بنية المقرر 6.

الأسبوع	الساعات	مخرجات التعلم المطلوبة	اسم الوحدة او الموضوع	طريقة التعلم	طريقة التقييم
1	2	التعرف على مفهوم المعلوماتية الحيوية وتاريخها وأهم تطبيقاتها	مقدمة في المعلوماتية الحيوية	محاضرة تفاعلية + مناقشة صفية	أسئلة شفوية واختبار تمهيدي
2	2	(DNA ، RNA ، Protein) فهم أنواع البيانات الحيوية وطرق تمثيلها رقمياً	البيانات الحيوية وأنواعها	محاضرة + أمثلة تطبيقية	واجب قصير
3	2	التعرف على قواعد البيانات الحيوية العالمية وكيفية استخدامها	قواعد البيانات الحيوية (NCBI, UniProt, Ensembl)	تدريب عملي باستخدام الإنترنت	اختبار عملي قصير
4	2	القدرة على البحث في قواعد البيانات الجينية واستخراج التسلسلات	البحث البيولوجي Bio-Search	تدريب عملي + نقاش	تقييم أداء عملي
5	2	(Sequence Alignment) فهم مبدأ المحاذاة التسلسلية	المحاذاة التسلسلية (Global vs Local)	محاضرة + شرح خوارزميات	اختبار نظري قصير
6	2	تطبيق أدوات المحاذاة الحاسوبية	تطبيقات BLAST وClustal وOmega	تدريب عملي	تقييم عملي
7	2	تحليل النتائج وتفسير العلاقات الجينية بين التسلسلات	تفسير نتائج المحاذاة	نقاش جماعي + عرض تطبيقي	تقرير عملي
8	2	التعرف على مبادئ شجرة التطور وكيفية بنائها	تحليل التطور Evolutionary Analysis	محاضرة + تطبيق MEGA باستخدام	اختبار نظري + عملي

تطبيق	تدريب عملي	Phylogenetic Tree Construction	تطبيق مهارات بناء الأشجار التطورية وتفسيرها	2	9
اختبار قصير	محاضرة تفاعلية	مقدمة في Proteomics	التعرف على المفاهيم الأساسية في علم البروتيوميات	2	10
تقييم عملي	تدريب عملي على EXPASy	Protein Structure Analysis	استخدام أدوات تحليل البروتين والبنى الثانوية والثالثية	2	11
واجب برمجي	محاضرة + تطبيقات حاسوبية	Bioinformatics Programming Basics	فهم الأساسيات البرمجية في المعلوماتية (Python أو R) الحيوية	2	12
تقرير وعرض تقديمي	تعلم قائم على المشروع	Mini Project (Data Analysis)	تنفيذ مشروع بسيط لتحليل بيانات جينية حقيقية	2	13
الاختبار النهائي (Final Exam)	مناقشة + اختبار شامل	مراجعة وتطبيقات ختامية	مراجعة شاملة للمقرر وتقييم التعلم	2	14

7. تقييم المقرر

التحضير اليومي والامتحانات اليومية والشفوية والشهرية والتحريرية والتقارير الخ

8. مصادر التعلم والتدريس

	الكتب المقررة المطلوبة (المنهجية أن وجدت)
Genomics, Proteomics & Bioinformatics Journal https://academic.oup.com/gpb	المراجع الرئيسة (المصادر)
Introduction to Proteomics: Principles and Applications Nawin C. Mishra, Günter Blobel (Foreword by) ISBN: 978-0-471-75402-2 May 2010 Lesk Arthur M. 2017. Introduction to	الكتب والمراجع الساندة التي يوصى بها (المجلات العلمية، التقارير....)

Genomics Third ed. Oxford United Kingdom: Oxford University Press.	
https://pubmed.ncbi.nlm.nih.gov/	المراجع الإلكترونية، مواقع الانترنت

Course Description Form

Course Name:	
Molecular Genetics	
Course Code:	
BTM42-MoGe	
SemsterYear:	
2 nd Semester / 4 th year	
Description Preparation Date:	
1 / 10 / 2024	
Available Attendance Forms:	
Attendance	
Number of Credit Hours (Total) / Number of Units (Total)	
60 Hours / 3 Units	
Course administrator's name (mention all, if more than one name)	
Name	Sahar M. Hussein, Sahar.hussain@nahrainuniv.edu.iq ,
9. Course Objectives	
Course Objectives	• Covering the basics of molecular biology genetics. • Understanding and appreciating the potential of using modern applications of molecular biology. • Learning outcomes, teaching, learning, and assessment methods..
10. Teaching and Learning Strategies	
Strategy	Teaching and Learning Methods 1- Lecture Method 2- PowerPoint System

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

Week	Hou rs	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2T+ 2L	Understanding the theoretical and practical principles and foundations related to the subject	Introduction of molecular genetics, Genomestructure and function	Lectures and Seminars	1- Oral and written exams 2- Seminars
2	2T+ 2L	"	Eukaryotic gene regulation	"	"
3	2T+ 2L	"	Differences between Prokaryotes and Eukaryotes mechanisms of regulation.	"	"
4	2T+ 2L	"	Transcription factors	"	"
5	2T+ 2L	"	Structure and Function of RNA	"	"

6	2T+ 2L	"	Mid exam	"	"
7	2T+ 2L	"	Micro RNA	"	"
8	2T+ 2L	"	Oncogenes and Tumor Suppressor Genes	"	"
9	2T+ 2L	"	Mutation and SNPs	"	"
10	2T+ 2L	"	Personality medicine	"	"
11	2T+ 2L	"	Protein folding & Stability	"	"
12	2T+ 2L	"	Protein folding and stability	"	"
13	2T+ 2L	"	Genes and environment	"	"
14	2T+ 2L	"	Human genetic projects	"	"
15	2T+ 2L	"	Final exam	"	"

12. Course Evaluation

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

13. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Text books Book of Molecular biology of gene Biology 304 –Spring 2016 Section 1001
Main references (sources)	

Recommended books and references (scientific journals, reports...)	
Electronic-References, Websites	

Course Description Form

Course Name:	
Pharmaceutical biotechnology	
Course Code: PTM, PP	
PhBt42-BTM	
Semester / Year	
: 2 nd semester/ 4 th year	
Description Preparation Date:	
1-10-2024	
Available Attendance Forms:	
Attendance	
Number of Credit Hours (Total) / Number of Units (Total)	
30 h/2 units	
Course administrator's name (mention all, if more than one name)	
Prof.Dr.Zahraa K. ZedanMA	zahraa.kamel@nahrainuni.edu.iq
Course Objectives	
Course Objectives	• Training specialized personnel in pharmaceutical biotechnology fields, such as biopharmaceutical manufacturing, gene therapy, and treatment. • • Understanding the mechanisms of drug production and development using technologies such as genetic engineering, nanotechnology, and code replication techniques. • • Developing innovative treatments and understanding the mechanisms of biopharmaceutical production using modern

	biotechnology tools. • • Designing innovative drug delivery systems that contribute to improving treatment efficacy and reducing side effects. • • Contributing to the production of vaccines and serums using advanced biotechnology, thus enhancing global health security. • • Developing sustainable biological solutions to address environmental and health challenges, such as reducing pollution and improving production quality..
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14. Teaching and Learning Strategies

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

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introducing the student to the fundamentals and history of pharmaceutical biotechnology.	An introduction to pharmaceutical biotechnology and a brief overview of the history of this field.	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly exams
2	2	Introducing the student to the most important pharmaceutical materials produced using rDNA technology	A detailed explanation of how to use the rDNA method and the necessary steps for doing so.	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly exams
3	2	Introducing the student to the most important applications of pharmaceutical biotechnology.	Applications of pharmaceutical biotechnology in medicine	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly exams
4	2	Introducing the student to the method of producing insulin and growth hormone using bacterial cells through gene cloning.	Key applications of insulin and growth hormone production using biotechnology; detailed explanation.	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly exams
5	2	First monthly exam	First monthly exam	The whiteboard	Daily quizzes and homework

				The screen	assignments in addition to monthly exams
6	2	Introducing the student to the trade and scientific names of drugs produced using biotechnology	The most important methods used in naming and commercially marketing pharmaceutical materials produced using biotechnology.	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly exams
7	2	Pharmaceutical Biotechnology: Legal & Ethical Issues.	The most important ethical protocols for pharmaceutical drug industry	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly exams
8	2	Introducing the student to methods of producing medical enzymes using biotechnology, with examples.	Medical enzymes, their cloning, and their applications in detail	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly exams
9	2	Introducing the student to vaccine production using biotechnology methods	Manufactured vaccines and their production methods in detail	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly exams
10	2	Definition and explanation of the most important cases of treatment using biotechnology-manufactured drugs	Applications of treatment with bio produced drugs	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly

					exams
11	2	Introducing the student to the most important sources of cells used in drug manufacturing	Sources of cells used in drug manufacturing, their types, and reasons for their use.	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly exams
12	2	Identifying the main obstacles that accompany gene therapy	A detailed explanation of the types of gene therapy	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly exams
13	2	Introducing the student to the most important cases of treatment with genetically engineered pharmaceutical materials.	Types of cases in which treatment with gene-based drugs has been successful, and the most important companies specializing in this line of production.	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly exams
14	2	The student is required to define the vectors used to transfer the genes responsible for drug manufacturing.	Types of vectors used to transfer genes used in pharmaceutical manufacturing and methods of modifying them	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly exams
15	2	2 nd monthly exam	2 nd monthly exam	The whiteboard The screen	Daily quizzes and homework assignments in addition to monthly exams

16. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as : Attendance, preparedness, contribution to discussions, engagement in seminars., oral quizzes, and interactive questioning	
17. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Introduction to biotechnology Book,2020 Pharmaceutical Biotechnology, Basics 2023
Main references (sources)	Introduction: Trends and Developments in the Pharmaceutical and Life Sciences Industry • Chapter • Open Access • First Online: 20 February 2020 • pp 1–5 Application of Biotechnology in Pharmaceutical Manufacturing Control • Chapter • First Online: 21 May 2024 • pp 31–42
Recommended books and references (scientific journals, reports...)	Harnessing synthetic biology for advancing RNA therapeutics and vaccine design ○ Review Article ○ Open access ○ Published: 30 November 2023 ○ Volume 9, article number 60, (2023)
Electronic-References, Websites	https://link.springer.com/10.1007/978-3-030-35918-8_1?fromPaywallRec=true

Course Description Form

18. Course Name:	
Stem cells and gene therapy	
19. Course Code:	
E41-IBTM	
20. Semester /	
Year: 1 st /4 th	
21. Description Preparation Date:	
1-9-2024	
22. Available Attendance Forms:	
Attendance	
23. Number of Credit Hours (Total) / Number of Units (Total) 2	
30 h/2 units	
24. Course administrator's name (mention all, if more than one name) P	
Prof. Dr. Zahraa k. Zedan & Asst. Prof. Moyasser B. Hadi	
25. Course Objectives	
Course Objectives	• Enabling students to acquire the practical skills necessary to isolate and grow stem cells in the laboratory for therapeutic applications and laboratory studies, maintain stem cells in the laboratory, manipulate stem cells in the laboratory, and differentiate them into different cell types as needed. The main objectives can be listed below: • 1. Developing students' skills in isolating stem cells from various tissues, such as bone marrow, and growing them in culture dishes. • 2. Developing students' skills in understanding and identifying ideal applications of stem cells in therapeutic and medical applications. • 3. Developing skills in successfully growing stem cells in the laboratory.

	4. Developing skills in preserving stem cells under laboratory conditions. 5. Developing students' skills in modifying stem cells in the laboratory according to experimental conditions..
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26. Teaching and Learning Strategies

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

Week	Hours		Unit or subject name	Learning method	Evaluation method
Week	Hrs		Lecture Objective (English)	White board smart screen	Lecture Topics (English)
1	2		Introduce students to the fundamentals and history of stem cells and gene therapy	White board Smart screen	Introduction and historical background of stem cells and gene therapy
2	2		Identify the main types and classifications of stem cells and gene therapy	White board Smart screen	Detailed types and classifications of stem cells and gene therapy
3	2		Explain main medical applications of stem cells	White board Smart screen	Applications of stem cells in medicine
4	2		Explain induced pluripotent stem cell (iPSC) generation	White board Smart	iPSC generation methods and

				screen	laboratory procedures
5	2		First Monthly Exam	White board Smart screen	First monthly exam
6	2		Introduce methods of stem cell isolation and cultivation	White board Smart screen	Stem cell isolation and culture techniques and applications
7	2		Explain methods of stem cell preservation and biobanking	White board Smart screen	Stem cell preservation methods and stem cell banks
8	2		Introduce embryonic stem cells and their significance	White board Smart screen	Detailed study of embryonic stem cells and applications
9	2		Explain adult stem cells and their applications	White board Smart screen	Adult stem cells and medical uses
10	2		Discuss key clinical cases treated with stem cell therapy	White board Smart screen	Applications of stem cell therapy
11	2		Identify stem cell sources and their specific applications	White board Smart screen	Sources and applications of various stem cell types
12	2		Explain challenges and limitations in gene therapy	White board Smart screen	Detailed explanation of gene therapy types and challenges

13	2		Present successful cases of targeted gene therapy	White board Smart screen	Successful cases and reasons for gene therapy success
14	2		Medical application of gene therapy	White board Smart screen	Viral vectors used in gene therapy
15	2		2 nd exam	White board Smart screen	Second monthly exam

28. Course Evaluation

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

29. Learning and Teaching Resources

[Advances in Stem Cells and their Niches](#)

Book series

Menu

[Volume 7](#) pp. 1 - 90 • 2023

[Volume 6](#) pp. 1 - 207 • 2022

Recapitulating the Stem Cell Niche Ex Vivo

[Volume 5](#) pp. 1 - 236 • 2021

Stem Cell

Therapy Research (Hardback) volume 6 : 2023

Advances in gene therapy tools volume 5: 2022

Course Description Form

Course Name:	
Medical biotechnology	
Course Code:	
MeBt42-BTM	
Semester / Year	
Semester 2, Year 4	
Description Preparation Date:	
1\10\2024	
Available Attendance Forms:	
Attendance	
Number of Credit Hours (Total) / Number of Units (Total): 2\2 unit	
30h/2 units	
30. Course administrator's name (mention all, if more than one name)	
Name: Dr. Mayaada S Mahdi Email: mayyadah.mahdi@nahrainuniv.edu.iq	
Name: Dr:	
31. Course Objectives	
Course Objectives	The outcomes of this course provide students with knowledge and information as well as practical experience about how to use of living cells and cell materials to research and produce pharmaceutical and diagnostic products that help treat and prevent human diseases. Also knowledge to use a multidisciplinary approach to solving complex problems in the biotechnological field.
32. Teaching and Learning Strategies	
Strategy	The number of teaching units are three units which consists of approximately 14-15 week timetabled study over a two hours lecturing with a three-hour practical laboratory every week. The teaching

	methods involve interactive/active learning lectures, videos, tutorial sessions, laboratory classes and homework assignment 15 hours will be independent or self-directed study.				
33. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introducing to medical biotechnology	Study biotechnology and medicine	White board and power points	Quizzes and homework Seminar or written exams
2	2	Introducing to biotechnology and Healthcare	Study how biotechnology has made a huge impact onto healthcare such as diagnostics and biopharmaceuticals	White board and power points	Quizzes and homework Seminar or written exams
3	2	Introducing to Detecting and Diagnosing Human Disease Conditions	Study the identification of disease and test therapies before clinical trial in human	White board and power points	Quizzes and homework Seminar or written exams
4	2	Introducing to Medical Products and Applications of Biotechnology	Study the use of uses living cells and cell materials to research and then	White board and power points	Quizzes and homework Seminar or written exams

			produce pharmaceutical and diagnosing products		
5	2	Mid Exam	Mid exam		
6	2	Introducing to Gene therapy	Study treating disease by inserting functional genes to replace defective ones.	White board and power points	Quizzes and homework Seminar or written exams
7	2	Introducing to The Application of Antisense Technology to Medicine	Study the Antisense technology as a formidable tool for investigating physiologic and pathologic processes	White board and power points	Quizzes and homework Seminar or written exams
8	2	Introducing to The importance of Triplex Technology to Medicine	Study the Triplex technology	White board and power points	Quizzes and homework Seminar or written exams
9	2	Introducing to Applications of Nanotechnology in Medicine	Study the applications of nanoparticles	White board and power points	Quizzes and homework Seminar or written exams

10	2	Mid Exam	Mid exam		
11	2	Introducing to Regenerative medical biotechnologies	Study the applications of regenerative medicine	White board and power points	Quizzes and homework Seminar or written exams
12	2	Introducing to Functional biomaterials in medicine	Study the applications of biomaterials in medicine	White board and power points	Quizzes and homework Seminar or written exams
13	2	Introducing to The genetic basis of Disease	Study the basis of genetic disease	White board and power points	Quizzes and homework Seminar or written exams
14	2	Introducing to RNA-based therapeutics	Study the applications of RNA-based therapeutics	White board and power points	Quizzes and homework Seminar or written exams
15	2	Revision	revision	White board and power points	Quizzes and homework Seminar or written exams

34. Course Evaluation

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

35. Learning and Teaching Resources

Required textbooks (curricular books, if any)

1. Medical biotechnology Bernard R.

	Glick, 2014
Main references (sources)	2. Medical biotechnology, book, Oxford , university press. 3. Prescott's Microbiology 10th. Joanne Willey
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

Course Name:	
Forensic and DNA typing	
Course Code:	
DnaTy41-BTM	
Semester / Year:	
First Semeste4 th class	
Description Preparation Date:	
1-9-2024	
Available Attendance Forms:	
Attendance	
Number of Credit Hours (Total) / Number of Units (Total)	
60 h/3 units	
Course administrator's name (mention all, if more than one name)	
Dr sahar m. huseein + dr. mays T. abdallah	
36. Course Objectives	
Course Objectives	• • Understand the scientific fundamentals of forensic science. • • Identify the molecular structure of DNA and the importance of mutations and genetic variations. • • Use PCR, STR, and SNP techniques for DNA fingerprinting. • • Apply methods for collecting and preserving biological samples for investigative purposes. • • Analyze results using specialized software such as BioEdit, MEGA, and GeneMapper. • • Discuss the ethical and legal issues associated with forensic genetic

		testing..			
37. Teaching and Learning Strategies					
Strategy		- Lecture Method 2- PowerPoint System 3- Homework and Seminar System Learning Methods 1- Weekly Quick Exams 2- Discussion, Questions, and Instant Answers 3- International Network for Information on the Subject of Specialization			
38. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2+2	Understanding the theoretical and practical principles and foundations related to the subject	Introduction of Forensic Science	Lecture style	- Oral and written exams 2- Seminars
2	2+2	"	Collection and Preservation of Biological Evidence	"	"
3	2+2	"		"	"
4	2+2	"	Forensic Serology	"	"
5	2+2	"		"	"
6	2+2	"	Mid exam	"	"
7	2+2	"	Crime Scene	"	"
8	2+2	"		"	"
9	2+2	"	'Short Tandem Repeats (STR)	"	"

10	2+2	"		"	"
11	2+2	"	Mitochondrial DNA in Forensics	"	"
12	2+2	"	Y-Chromosome Analysis	"	"
13	2+2	"		"	"
14	2+2	"	Statistical Analysis in DNA Typing	"	"
15	2+2	"	Bioinformatics in Forensic DNA Analysis	"	"
16	2+2	"	Final exam	"	"

39. Course Evaluation

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

40. Learning and Teaching Resources

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

Course Description Form

Course Name:	
Immunochemistry	
Course Code:	
BTM42E-II	
Semester / Year:	
Second /Fourth class/Elective	
Description Preparation Date:	
1-9-2024	
41. Available Attendance Forms:	
Attendance	
42. Number of Credit Hours (Total) / Number of Units (Total)	
30 hours /2 units	
Course administrator's name (mention all, if more than one name)	
Dr. Shahlaa M. Salih Shahlaa.mahdi@nahrainuniv.edu.iq	
Course Objectives	
Course Objectives	• Provide students with fundamental knowledge of immunochemical reactions and mechanisms. • Understand the relationship between the molecular structure of antigens and antibodies and their immunological functions. • Train students in laboratory immunochemistry techniques and their applications in medical diagnosis and scientific research. • Develop critical thinking skills and the ability to analyze and interpret data. • Enhance students' ability to integrate theoretical concepts with practical

	applications in medical and research field
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43. Teaching and Learning Strategies

Strategy	• Deliver core concepts through structured lectures. • Use interactive presentations and classroom discussions to reinforce understanding. • Assign reports and short research projects to integrate theory with practice. • Encourage active participation and teamwork in solving immunochemistry-related problem
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44. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 Theory		Introduction to Immunochemistry	Presentation & white board	Quiz, Attendance seminar and written examination
	2 Theory		Antigens and Antibodies		
	2 Theory		Antigen–Antibody Interactions		
	2 Theory		Precipitation reaction		
	2 Theory		Agglutination		
	2 Theory		ELISA technique		

	2 Theory		Mid term exam		
	2 Theory		Complement fixation		
	2 Theory		Monoclonal antibodies productio		
	2 Theory		Antibody purification		
	2 Theory		Radioimmunoassay		
	2 Theory		Molecular diagnostics		
	2 Theory		Immunofluorescence		
	2 Theory		Flow cytometry		
	2 Theory		Immunohistochemistry		
			Final exam		

45. Course Evaluation

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

46. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Immunology by Ivan M .Roitt (Editor), J. Brostoff and D. Male Paperback.
Main references (sources)	Molecular Immunology by Abul K. Abbas, Andrew H. Lichtman, Jordan S. Pober Paperback -
Recommended books and references (scientific journals, reports...)	Kuby Immunology by Richard A.Goldsby,Thomas J. Kindt and Barbara A. Osborne Paperback
Electronic-References, Websites	https://www.livescience.com/26579-immune-system.html

Course Description Form

Course Name:	
Genomics and proteomics	
Course Code:	
PrGe42-BTM	
Semester / Year:	
Second /Fourth class	
Description Preparation Date:	
1-9-2024	
47. Available Attendance Forms:	
Attendance	
48. Number of Credit Hours (Total) / Number of Units (Total)	
30 hours /2 units	
Course administrator's name (mention all, if more than one name)	
Dr. Asmaa Ali Hussein	Asmaa.ali@nahrainuniv.edu.iq
Dr. Zaid Nsaif Abbas	zaid.altameemi@nahrainuniv.edu.iq
Course Objectives	
Course Objectives	The aim of the Genomics and Proteomics module is to provide students with a comprehensive understanding of the principles, techniques, and applications of genomics and proteomics in modern biological research. This module will delve into the study of genomes and proteomes, exploring their structures, functions, and interactions. Through a combination of theoretical knowledge and practical exercises, students will gain insights into the vast amount of genetic and protein information encoded within living organisms and how this knowledge can be harnessed to advance various areas of biological science, including medicine,

		biotechnology, and personalized healthcare..			
49. Teaching and Learning Strategies					
Strategy		• Lectures: Engage students through interactive lectures that provide theoretical knowledge, foundational concepts, and recent research advancements in genomics and proteomics. Use multimedia aids such as visuals, videos, and case studies to enhance understanding and promote critical thinking. • Group Discussions: Organize group discussions to facilitate active learning and exchange of ideas. Assign topics or case studies related to genomics and proteomics for students to analyze, discuss, and present their findings. • Case Studies: Introduce real-life case studies and scenarios that highlight the application of genomics and proteomics in different fields. Challenge students to apply their knowledge and problem-solving skills to analyze complex genomic and proteomic data and propose solutions.			
50. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 Theory		Introduction to Genomics	Presentation &white board	Quiz, Attendance seminar and written examination
	2 Theory		DNA Sequencing Techniques		
	2 Theory		Genome annotation and gene prediction		

	2 Theory		Genomic variation and SNP analysis		
	2 Theory		Metagenomics		
	2 Theory		Epigenetics		
	2 Theory		Functional genomics and transcriptomics		
	2 Theory		Mid Exam		
	2 Theory		Introduction and scope of Proteomics		
	2 Theory		Steps in Proteomic Analysis		
	2 Theory		Protein Purification		
	2 Theory		Strategies for protein identification		
	2 Theory		Protein Modifications and Proteomics		
	2 Theory		Protein Engineering		
	2 Theory		Irrational design of protein engineering		
			Exam		

51. Course Evaluation

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

52. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Introduction to Proteomics: Principles and Applications Nawin C. Mishra, Günter Blobel (Foreword by) ISBN: 978-0-471-75402-2 May 2010 Lesk Arthur M. 2017. <i>Introduction to Genomics</i> Third ed. Oxford United Kingdom: Oxford University Press
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Course Description Form

53. Course Name:	
Biomarkers in Medical Diseases	
54. Course Code:	
BTM42E-II	
55. Semester / Year:	
2 nd Semester - 4 th Year	
56. Description Preparation Date:	
28/1/2024	
57. Available Attendance Forms:	
Attendance	
58. Number of Credit Hours (Total) / Number of Units (Total):	
30 h/2 Units	
59. Course administrator's name (mention all, if more than one name)	
Name: Moyassar Basil Hadi	
Email: moyassar.basil@nahrainuniv.edu.iq	
60. Course Objectives	
Cour Obje ves	The aims of studying clinical biomarkers include improving disease diagnosis and prognosis, developing new treatments, and personalizing medicine through risk assessment and monitoring. They allow for a better understanding of disease mechanisms, aid in patient stratification for clinical trials, and provide objective measures of a patient's response to therapy or risk of future events. Aims of studying clinical biomarkers Diagnosis: Confirm the presence of a disease or condition. Prognosis: Predict the likely course of a disease, such as the probability of progression or recurrence. Risk assessment: Identify individuals who have a heightened susceptibility to a specific disease or condition. Treatment monitoring: Assess a patient's response to therapy and monitor the

	disease's status over time. Therapeutic development: Provide a basis for developing new drugs. Predict whether a patient will respond favorably or unfavorably to a specific treatment. Help design more efficient clinical trials by identifying patient populations most likely to benefit from a treatment. Understanding disease: Provide deeper insight into the underlying pathomechanisms of a disease. Safety monitoring: Detect the likelihood and extent of adverse effects from a treatment or exposure. skills to modify stem cells in the laboratory according to the conditions of the experiment.
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61. Teaching and Learning Strategies

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

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 st	2	Define students with biomarkers, their origin, uses, and applications	Introduction to Biomarkers	Whiteboard and P	Quiz & Home Work
2 nd	2	Different types of biomarkers (e.g., diagnostic, prognostic, predictive) Various detection methods and their principles Sensitivity, specificity, and accuracy of	Types of biomarkers and detection tests	Whiteboard and P	Quiz & Home

		detection tests Clinical applications and limitations of biomarkers and detection tests			Work
3 rd	2	The role of biomarkers in disease pathogenesis and progression The relationship between biomarkers and disease severity or prognosis The potential applications of biomarkers in clinical practice The limitations and challenges of using biomarkers in disease diagnosis and management	Sources of biomarkers and their impact on diseases	Whiteboard and P	Quiz & Home Work
4 th	2	The application of biomarkers in various therapeutic areas (e.g., oncology, cardiology, neurology) The role of biomarkers in predicting treatment response and monitoring disease progression The potential benefits and limitations of biomarker-guided treatment The importance of integrating biomarkers into clinical decision-making	Benefits of using biomarkers in treatment	Whiteboard and P	Quiz & Home Work
5 th	2	Various treatment strategies that target biomarkers The mechanisms of action of these treatments The clinical applications and potential outcomes of biomarker-targeted treatments The challenges and limitations of these treatments	Treatments to control biomarker levels	Whiteboard and P	Quiz & Home Work
6 th	2	The role of biomarkers in breast cancer diagnosis, prognosis, and treatment The clinical significance of key breast cancer biomarkers Biomarker-based treatment options and their mechanisms of action Emerging trends and future directions in breast cancer biomarkers	Breast cancer biomarkers	Whiteboard and P	Quiz & Home Work
7 th	2	Written Exam	Midterm Exam	Whiteboard and P	Quiz & Home Work
8 th	2	The molecular biology of lung cancer and the role of biomarkers The clinical applications of biomarkers in lung cancer diagnosis, treatment, and prognosis The limitations and challenges of biomarker testing in lung cancer Emerging trends and future directions in lung cancer biomarkers	Lung cancer and tumor biomarkers	Whiteboard and P	Quiz & Home Work
9 th	2	The molecular biology of hematological malignancies and the role of biomarkers	Cancer and blood disease	Whiteboard and P	Quiz &

		The clinical applications of biomarkers in diagnosis, prognosis, and treatment of blood cancers The limitations and challenges of biomarker testing in hematological malignancies Emerging trends and future directions in cancer and blood disease biomarkers	biomarkers		Home Work
10	2	The pathophysiology of heart disease and the role of biomarkers The clinical applications of biomarkers in heart disease diagnosis, prognosis, and treatment The limitations and challenges of biomarker testing in heart disease Emerging trends and future directions in heart disease biomarkers	Heart disease biomarkers	Whiteboard and P	Quiz & Home Work
11	2	The biology of viral infections and the role of biomarkers The clinical applications of biomarkers in viral disease diagnosis, treatment, and prevention The limitations and challenges of biomarker testing in viral diseases Emerging trends and future directions in viral disease biomarkers	Viral disease biomarkers	Whiteboard and P	Quiz & Home Work
12	2	The immunopathogenesis of autoimmune diseases and the role of biomarkers The clinical applications of biomarkers in immune disease diagnosis, treatment, and monitoring The limitations and challenges of biomarker testing in immune diseases Emerging trends and future directions in immune disease biomarkers	Immune disease biomarkers	Whiteboard and P	Quiz & Home Work
13	2	The pathophysiology of Alzheimer's disease and the role of biomarkers The clinical applications of biomarkers in Alzheimer's disease diagnosis, treatment, and monitoring The limitations and challenges of biomarker testing in Alzheimer's disease Emerging trends and future directions in Alzheimer's disease biomarkers	Alzheimer's disease biomarkers	Whiteboard and P	Quiz & Home Work
14	2	The genetic basis of disease and the role of biomarkers The clinical applications of biomarkers in genetic disease diagnosis, treatment, and prevention The limitations and challenges of biomarker testing in genetic diseases Emerging trends and future directions in genetic disease biomarkers	Genetic diseases biomarkers	Whiteboard and P	Quiz & Home Work
15	2	Answering students questions	Review and answer students'	Whiteboard and P	Quiz &

			questions		Home Work
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63. Course Evaluation

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

- Midterm Written Exam (30%).
- Weekly Quizzes (5%).
- Home Works and Assignments (5%).
- Final Exam (60%)

64. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Biomarkers of Diseases: Their Role in Emergency Medicine https://www.intechopen.com/chapters/73938
Main references (source)	<u>Biomarkers and Disease Diagnosis</u> https://www.iomcworld.org/open-access/biomarkers-and-disease-diagnosis-70711.html
Recommended books and references (scientific journals, reports...)	<u>Biomarkers in clinical medicine</u> https://pubmed.ncbi.nlm.nih.gov/22997869/
Electronic References, Websites	What are Biomarkers? https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3078627/

Course Description Form

Course Name:	
Antibiotics Resistance and Infection Control	
Course Code:	
BTM42E-II	
Semester / Year:	
Second /Fourth class/Elective	
Description Preparation Date:	
1-9-2024	
65. Available Attendance Forms:	
Attendance	
66. Number of Credit Hours (Total) / Number of Units (Total)	
30 hours /2 units	
Course administrator's name (mention all, if more than one name)	
Dr. Dhafar N. Al-Ugaili	dhafar.alugaili@nahrainuniv.edu.iq
Course Objectives	
Course Objectives	. This course covers content related to antimicrobial resistance: the origins of antimicrobial resistance, dissemination, mechanisms, therapeutics, and impact on healthcare, agriculture, and the environment. This course mainly concentrates on resistance in bacteria.
67. Teaching and Learning Strategies	
Strategy	- Deliver core concepts through structured lectures. - Use interactive presentations and classroom discussions to reinforce understanding. - Assign reports and short research projects to integrate theory with practice.

- Encourage active participation and teamwork in solving immunochemistry-related problem

68. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 Theory		Introduction: -An overview of antimicrobial chemotherapy	Presentation & white board	Quiz, Attendance seminar and written examination
2	2 Theory		Antimicrobial drug resistance		
3	2 Theory		Strategies used to resist the effects of antibiotics I.		
4	2 Theory		- Strategies used to resist the effects of antibiotics II.		
5	2 Theory		Strategies used to resist the effects of antibiotics III. -Drug inactivation		
6	2 Theory		Strategies used to resist the effects of antibiotics..		
7	2 Theory		Strategies to overcome antibiotic resistance		
8	2 Theory		Mid term exam		
9	2 Theory		Resistance in clinical environments		

10	2 Theory		Multidrug resistant bacteria: MRSA/ VRSA		
11	2 Theory		Drug resistance in cancer		
12	2 Theory		Antimicrobial resistant in sexually transmitted pathogens		
13	2 Theory		Bacteriocins as alternative medicine		
14	2 Theory		Therapeutics: Host-targeted therapeutics		
15	2 Theory		Final exam		

69. Course Evaluation

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

70. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Ahmad, M. and Khan, A.U. (2019) 'Global economic impact of antibiotic resistance: A review.' Journal of Global Antimicrobial Resistance, 19 pp. 313-316 Molecular Genetics of Bacteria, Snyder, L. and Champness, W. 2007. 3rd edition, American
Main references (sources)	Society for Microbiology, Washington, D. C.
Recommended books and references (scientific journals, reports...)	
Electronic-References, Websites	Centers for Disease Control and Prevention. (2019) US antibiotic use rates by state. [Online image] [Accessed 30 May 2020] https://www.cdc.gov/antibiotic-use/community/images/materials/Antibiotic-Prescriptions-Map-2017.jpg .

Course Description Form

Course Name:	
Biosperation	
Course Code:	
BTM42E-II	
Semester / Year:	
Second /Fourth class/Elective	
Description Preparation Date:	
1-9-2024	
71. Available Attendance Forms:	
Attendance	
72. Number of Credit Hours (Total) / Number of Units (Total)	
30 hours /2 units	
Course administrator's name (mention all, if more than one name)	
ا.د.مها حميد عبد الله	maha.albahrani@nahrainuniv.edu.iq
Course Objectives	
Course Objectives	• Understand the principles of bioseparation and downstream processing. • Explain the physical and chemical properties of biomolecules that influence separation. • Describe cell disruption, filtration, centrifugation, and sedimentation techniques. • Apply membrane-based separation methods such as microfiltration, ultrafiltration, nanofiltration, and reverse osmosis. Explain extraction and precipitation methods for protein purification..

73. Teaching and Learning Strategies

Strategy	• Deliver core concepts through structured lectures. • Use interactive presentations and classroom discussions to reinforce understanding. • Assign reports and short research projects to integrate theory with practice. • Encourage active participation and teamwork in solving immunochemistry-related problem
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74. Course Structure

W e e k	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 Theory		An Introduction to Bioseparation: definition, principle, Key Steps in Bioseparation	Presentation & white board	Quiz, Attendance seminar and written examination
2	2 Theory		Analytical Methods and Bench Scale Preparative Bioseparation;		
3	2 Theory		Extractions Methods and Biological Applications of Essential Oils		
4	2 Theory		Chemical method: Techniques of Separating Mixtures – practice technique		
5	2 Theory		Masking		

6	2 Theory		Mid Exam		
7	2 Theory		Crystallization		
8	2 Theory		Crystallization in the laboratory		
9	2 Theory		Fermenter and Fermentation		
10	2 Theory		Determination of protein concentration		
11	2 Theory		Separation by Chromatography Methods		
12	2 Theory		Analysis of Proteins		
13	2 Theory		Chemical method: Crystallization		
14	2 Theory		Seminar		
15	2 Theory		Preparation for final exam		

75. Course Evaluation

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

76. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Belter, P. A., Cussler, E. L., & Hu, W. S. (1988). Bioseparations: Downstream Processing for Biotechnology. Wiley-Interscience.
Main references (sources)	Harrison, R. G., Todd, P., Rudge, S. R., & Petrides, D. P. (2015). Bioseparations Science and Engineering (2nd ed.). Oxford University Press.
Recommended books and references (scientific	Janson, J. C., & Ryden, L. (Eds.). (1998). Protein Purification: Principles, High Resolution Methods, and Applications. Wiley-VCH.

journals, reports...)	
Electronic- References, Websites	

المحاضرات الالكترونية للمرحلة الرابعة لقسم التقنيات الحيوية الجزيئية والطبية للعام الدراسي 2024-2025

المرحلة الرابعة-الفصل الدراسي الاول		
المرحلة الرابعة-الفصل الدراسي الاول	المادة الدراسية	ت
الرابط		
https://drive.google.com/file/d/1UosebUVLIfCBjmZYzcNnpkeU4Y4t5Yhl/view?usp=sharing	Bioinformatics	1
https://drive.google.com/file/d/1Y-iy-J21laoQ2VRVOBGSWydsAl6B_El5/view?usp=sharing	Enzymology	2
https://drive.google.com/file/d/1YdssbNJSXHYHS0-fhh6l7KWhXkKq3PpD/view?usp=sharing	Toxicology	3
https://drive.google.com/file/d/1EWDD8eWaTZKZSq85zX6SOiinmHASoTo/view?usp=sharing	Forensic sciences and DNA typing	4
المرحلة الرابعة-الفصل الدراسي الثاني		
المرحلة الرابعة-الفصل الدراسي الثاني	المادة الدراسية	ت
الرابط		
https://drive.google.com/file/d/1mzcwwMVg5Lz3pQnbauzxHHRMQk6XNO1S/view?usp=sharing	Molecular genetics	1
https://drive.google.com/file/d/1B0c_WKE5C1Fd_Ck-vTVP4Q269KGpVNHl/view?usp=sharing	Medical biotechnology	2
https://drive.google.com/file/d/11C8HSUsQbii7qjEEwUHLTDVOnoeDJYKy/view?usp=sharing	Genomics and Proteomics	3
https://drive.google.com/file/d/1BJloxAp6g7wUijfakAwz-4ZY9-0xQ1_Y/view?usp=sharing	Pharmaceutical Biotechnology	4
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https://drive.google.com/file/d/1cQiHuwYBDO8heKy_MW7W1CLoRV2MpoE9/view?usp=sharing	Immunochemistry	1
https://drive.google.com/file/d/1BK619LW9Xw5_qlqPKq4QMkkpfrD5ghw_r/view?usp=sharing	Blood diseases	2
https://drive.google.com/file/d/1YhxWyuQ4ziaoLuhaaZLq_ujQeeFjp2Pg/view?usp=sharing	Biosperation	3
https://drive.google.com/file/d/1FcS01r4PtOJ_PRaStOf_uP7GrnqisrLF/view?usp=sharing	Antibiotics resistance and Infection control	4
https://drive.google.com/file/d/1htNuXuxUowt0y-tM4qrG18diGSvGN-IN/view?usp=sharing	Biomarkers in medical diseases	5
https://drive.google.com/file/d/1_gkt17tiU4A_ikdSOqaGb5VaOIVZUQIG/view?usp=sharing	Stem cells and gene therapy	6

