Course Description Form

1. Course Name:	
Immunology	
2. Course Code:	
BTM31-Im	
3. Semester / Year:	
first semester/third class	
4. Description Preparation Date:	
1-9-2024	
5. Available Attendance Forms:	
Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 hours 3 units	
7. Course administrator's name (mention all, if more than one name)	
Dr. Shahlaa M. Salih Shahlaa.mahdi@nahrainuniv.edu.iq	Dr. & Rawaa Nazar Rawaa.alchalabi@ nahrainuniv.edu.iq
8. Course Objectives	
Course Objectives	• Describe how the immune system is able to discriminate self vs. non-self. • Explain how the innate and adaptive immune systems work together to generate an effective • immune response against a specific pathogen. • Explain how the immune system is able to respond to so many diverse antigens. • Distinguish between humoral and cell-mediated (cellular) immunity and the location of the • pathogens they target (extracellular, intracellular). • Explain what happens when there are defects in the immune system (i.e., autoimmune diseases, allergy, organ/tissue rejection.
9. Teaching and Learning Strategies	
Strategy	

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 theory +2 Practical		**Introduction of immunolog**	Presentation &white board	Quiz, Attendance seminar and written examination
2	2 theory +2 Practical		**Fundamental of blood ce biology**	Presentation &white board	
3	2 theory +2 Practical		**Lymphoid and lymphoic tissue**	Presentation &white board	
4	2 theory +2 Practical		**Inflammatory response**	Presentation &white board	
5	2 theory +2 Practical		**Complement system**	Presentation &white board	
6	2 theory +2 Practical		**Innate immunity**	Presentation &white board	

7			**Mid-term Exam**		
8	2 theory +2 Practical		**Antigen and immunogens**	Presentation &white board	
9	2 theory +2 Practical		**Antigen presentation an MHC complex**	Presentation &white board	
10	2 theory +2 Practical		**Antibodies**	Presentation &white board	
11	2 theory +2 Practical		**Immune response**	Presentation &white boa	
12	2 theory +2 Practical		**Cytokines**	Presentation &white boa	
13	2 theory +2 Practical		**Autoimmune diseases**	Presentation &white boa	
14	2 theory +2 Practical		**Hypersensitivity**	Presentation &white boa	
15	2 theory +2 Practical		**Immunological toleranc**	Presentation &white boa	
16			Final exam		

11. 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

12. 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, Website	https://www.livescience.com/26579-immune-system.html

Description Form

13.Course Name:	
Molecular Biology-I	
14.Course Code:	
BTM31-MoBI	
15.Semester / Year:	
First semester/third class	
16.Description Preparation Date:	
1-9-2024	
17.Available Attendance Forms:	
Attendance	
18.Number of Credit Hours (Total) / Number of Units (Total)	
60 hours 3 units	
19.Course administrator's name (mention all, if more than one name)	
Dr. Hameed M. Jasim Dr. Risala R. Allami	Hameed.jasim@nahrainuniv.edu.iq risala.allami@nahrainuniv.edu.iq ririallami@yahoo.com
20.Course Objectives	
Course Objectives	• The outcomes of this course provide students with knowledge and information as well as practical experience about Molecular Biology • Molecular Biology is the field of biology that studies the composition, structure and interactions of cellular molecules – such as nucleic acids and proteins – that carry out the biological processes essential for the cell's functions and maintenance. The course covers the following subjects: Introduction to DNA basics, Properties of Nucleic acids • Nucleic acid structure, The flow of genetic information, Replication of DNA, Gene Expression, PCR techniques, Gel electrophoresis, and other application in molecular biology..
21.Teaching and Learning Strategies	
Strategy	4. **Lectures** – Traditional classroom lectures delivered by the instructor to explain core concepts and theories.

	5. **PowerPoint Presentations** – Use of multimedia presentations to enhance visualization, provide diagrams, animations, and summary tables for complex topics. 6. **Assignments and Tutorials** – Weekly homework assignments and small-group discussion sessions to reinforce understanding and problem-solving skills. The main strategy that will be adopted in delivering this module is encouraging students to interact positively with others, think critically,.

22.Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 theory +2 Practical		Macromolecules Large macromolecular assemblies	Presentation &white board	Quiz, Attendance seminar and written examination
2	2 theory +2 Practical		Properties of nucleic acids Nucleic acid structure Chemical and physical properties of nucleic acids	Presentation &white board	
3	2 theory +2 Practical		Spectroscopic and thermal properties of nucleic acids	Presentation &white board	

			DNA supercoiling		
4	2 theory +2 Practical		Prokaryotic and eukaryotic chromosome structure Prokaryotic chromosome structure Chromatin structure	Presentation &white board	
5	2 theory +2 Practical		Eukaryotic chromosome structure Genome complexity The flow of genetic information	Presentation &white board	
6	2 theory +2 Practical		DNA replication: an overview Bacterial DNA replication The cell cycle Eukaryotic DNA replication	Presentation &white board	
7			Gene anatomy Promoters, Terminators, Enhancers, sense strand		
8	2 theory +2 Practical		Mid Term Exam 1	Presentation &white board	
9	2 theory +2 Practical		Split Genes	Presentation &white board	
10	2 theory +2 Practical		Transcription in prokaryotes Basic principles of transcription *Escherichia coli* RNA	Presentation &white board	

			polymerase The *E. coli* _70 promoter Transcription, initiation, elongation and termination		
11	2 theory +2 Practical		Transcription in eukaryotes The three RNA polymerases: characterization and function RNA Pol I genes: the ribosomal repeat RNA Pol III genes: 5S and tRNA transcription RNA Pol II genes: promoters and enhancers General transcription factors and RNA Pol II initiation	Presentation &white board	
12	2 theory +2 Practical		RNA processing rRNA processing and ribosomes tRNA processing and other small RNAs mRNA processing, hnRNAs and snRNAs Alternative mRNA processing	Presentation &white board	
13	2 theory +2 Practical		Gene Expression Translation of prokaryotic	Presentation &white board	

14	2 theory +2 Practical		eukaryotic genes	Presentation &white board	
15	2 theory +2 Practical		The genetic code tRNA structure and function	Presentation &white board	
16			Mid Term Exam 2		

23.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

24.Learning and Teaching Resources	
Required textbooks (curricular books, if any)	**Molecular Biology: Principles of Genome Function.** Nancy L Craig ,Orna Cohen-Fix, Rachel Green, Carol W Greider, Gisela Storz, Cynthia Wolberger. Oxford University Press 2018.
Main references (sources)	- 2-**Molecular Biology of the Cell. 8th edition.** Alberts B, Johnson A, Lewis J, et al. New York: Garland Science; 2020.
Recommended books and references (scientific journals, reports...)	
Electronic-References, Websites	

Course Description Form

25.Course Name:		
Industrial Microbiology		
26.Course Code:		
BTM31-InM		
27.Semester / Year:		
First semester/third class		
28.Description Preparation Date:		
1-9-2024		
29.Available Attendance Forms:		
Attendance		
30.Number of Credit Hours (Total) / Number of Units (Total)		
60 hours 3 units		
31.Course administrator's name (mention all, if more than one name)		
Dr.Nedhaal Suhail Zbar	Nedhaal.suhail@nahrainuniv.edu.iq	Nedhaal.suhail

32. Course Objectives	
Course Objectives	• Industrial Microbiology is aimed to bring to your understanding of industrial microbiology as the study of large scale profit motivated production of microorganisms or their products for direct use or as inputs in the manufacture of other goods.

33. Teaching and Learning Strategies	
Strategy	7. **Lectures** – Traditional classroom lectures delivered by the instructor to explain core concepts and theories. 8. **PowerPoint Presentations** – Use of multimedia presentations to enhance visualization, provide diagrams, animations, and summary tables for complex topics. 9. **Assignments and Tutorials** – Weekly homework assignments and small-group discussion sessions to reinforce understanding and problem-solving skills.

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

34. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 theory +2 Practical		Definition and use of the term 'fermentation'	Presentation &white board	Quiz, Attendance seminar and written examination
2	2 theory +2 Practical		Industrial Microbiology Vs Biotechnology	Presentation &white board	
3	2 theory +2 Practical		History(An Art from the Past, a Skill for the Future)	Presentation &white board	
4	2 theory +2 Practical		Multidisciplinary nature	Presentation &white board	
5	2 theory +2 Practical		A Typical Bioprocess: introduction, advantages and limitations.	Presentation &white board	
6	2 theory +2 Practical		Types of fermentations: Aseptic and non-aseptic fermentations	Presentation &white board	
7			Mid-term Exam		
8	2 theory +2 Practical		Fermentation types according to the	Presentation &white board	

			organization of the biological system :Suspended and support culture		
9	2 theory +2 Practical		Upstream processing (USP) and downstream processing (DSP), unit downstream processing	Presentation &white board	
10	2 theory +2 Practical		Industrial fermentation products and their producer microorganisms(List)	Presentation &white board	
11	2 theory +2 Practical		Obsolescence of procedures and methods	Presentation &white boa	
12	2 theory +2 Practical		Patents and Intellectual Property Rights	Presentation &white boa	
13	2 theory +2 Practical		Use of mutants / Genetically Modified Microorganisms (GMM) as against Wild type isolates for production.	Presentation &white boa	
14	2 theory +2 Practical		Culture Collections of industrially important microorganism	Presentation &white boa	
15	2 theory +2 Practical		Isolation of suitable producer microorganisms from the environment (Discuss approach for	Presentation &white boa	

			isolation)		
16			Final exam		

35. 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

1. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education
Main references (sources)	1. Modern Industrial Microbiology and Biotechnology (2007) by Nduka Okafor. Published by Science Publishers, Enfield, NH, USA 2. Practical Fermentation Technology Edited by Brian McNeil and Linda M. Harvey 2008 John Wiley & Sons, Ltd. ISBN: 978-0-470-01434-9 3. Industrial Microbiology: An Introduction (2001); Michael J. Waites, Neil L. Morgan, John S. Rockey& Gary Higton
Recommended books and references (scientific journals, reports...)	
Electronic-References, Website	

Course Description Form

2. Course Name:		
Genetic Engineering –I		
3. Course Code:		
BTM31-GeEnI		
4. Semester / Year:		
First semester/third class		
5. Description Preparation Date:		
1-9-2024		
6. Available Attendance Forms:		
Attendance		
7. Number of Credit Hours (Total) / Number of Units (Total)		
30 hours 2 units		
8. Course administrator's name (mention all, if more than one name)		
Yaseen Ismael Omran	**yaseen.ismael@nahrainuniv.edu.iq**	nuniv.edu.iq

9. Course Objectives	
Course Objectives	• This module will provide students with aspects of genetic engineering. • This module incorporates fundamental knowledge of DNA and protein structure and function • The learner will acquire the basic knowledge to construct and use cloning and expression vectors containing recombinant DNA in prokaryotic and eukaryotic systems

10. Teaching and Learning Strategies	
Strategy	10. **Lectures** – Traditional classroom lectures delivered by the instructor to explain core concepts and theories. 11. **PowerPoint Presentations** – Use of multimedia presentations to enhance visualization, provide diagrams, animations, and summary tables for complex topics. 12. **Assignments and Tutorials** – Weekly homework assignments and small-group discussion sessions to reinforce understanding and problem-solving skills.

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

11. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 theory		The basic principle of gene cloning.	The basic principle of gene cloning.	The basic principle of gene cloning.
2	2 theory		Cutting of DNA molecules.	Cutting of DNA molecules.	Cutting of DNA molecules.
3	2 theory		Restriction Modification System, Restriction Endonucleases.	Restriction Modification System, Restriction Endonucleases.	Restriction Modification System, Restriction Endonucleases.
4	2 theory		Joining of DNA molecules: Sticky end, Flash end	Joining of DNA molecules: Sticky end, Flash end	Joining of DNA molecules: Sticky end, Flash end
5	2 theory		Cloning Vectors. Plasmids: pBR322 and Its derivatives	Cloning Vectors. Plasmids: pBR322 and Its derivatives	Cloning Vectors. Plasmids: pBR322 and Its

					derivatives
6	2 theory		Phages (bacteriophages), Vectors derived from Lambda. Cosmids and Phasmids	Presentation &white board	
7	2 theory		Mid Exam		
8	2 theory		Single Stranded phages Vectors	Presentation &white board	
9	2 theory		*In vitro*- Mutagenesis	Presentation &white board	
10	2 theory		Cloning vectors for bacteria other than *E. coli*. Shuttle Vectors.	Presentation &white board	
11	2 theory		Introducing of hybrid DNA Mol. hybrid plasmid DNA, phage vectors and cosmids, In vitro-packaging.	Presentation &white boa	
12	2 theory		Selection of Recombinants	Presentation &white boa	
13	2 theory		Cloning Strategies: Via genetic complementation	Presentation &white boa	
14	2 theory		Construction of gene banks, cDNA cloning, Cloning of chemically synthesized genes.	Presentation &white boa	
15	2 theory		Restriction Mapping, DNA sequencing	Presentation &white boa	

16			Southern Blotting, Northern, Western.		

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	
Main references (sources)	• Brown, T.A. – Gene Cloning and DNA Analysis: An Introduction • 8th Edition, Wiley Blackwell, 2016. Glick, B.R., & Pasternak, J.J. – Molecular Biotechnology: Principles and Applications of Recombinant DNA 5th Edition, ASM Press, 2017
Recommended books and references (scientific journals, reports...)	
Electronic-References, Website	

Course Description Form

36.Course Name:	
Animal Tissue culture	
37.Course Code:	
BTM31-ATC	
38.Semester / Year:	
first semester/third class	
39.Description Preparation Date:	
1-9-2024	
40.Available Attendance Forms:	
Attendance	
41.Number of Credit Hours (Total) / Number of Units (Total)	
60 hours 3 units	
42.Course administrator's name (mention all, if more than one name)	
Pro. Zahraa K. Zedan **Dr. Moyassar Basil Hadi**	**Dr.zahraa.zedan@gmail.com** **Moyassar.basil@nahrainuniv.edu.iq**
43. Course Objectives	
Course Objectives	• The course aims that students acquire the practical skills needed to isolate mammalian cells for in vitro studies, perpetuate animal cells in the laboratory, manipulate animal cells in the laboratory, and apply molecular techniques in laboratory situations..
44. Teaching and Learning Strategies	
Strategy	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

45. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 theory +2 Practical		**Introduction to animal tissue culture**	Presentation &white board	Quiz, Attendance seminar and written examination
2	2 theory +2 Practical		**Primary cell culture**	Presentation &white board	
3	2 theory +2 Practical		**Cell Lines**	Presentation &white board	
4	2 theory +2 Practical		**Animal cell culture media**	Presentation &white board	
5	2 theory +2 Practical		**Types of cell culture**	Presentation &white board	
6	2 theory +2 Practical		**Applications of animal tissue culture**	Presentation &white board	
7			**Midterm Exam**		
8	2 theory +2 Practical		**Biology of Cells in Culture**	Presentation &white board	
9	2 theory +2 Practical		**Factors affecting cell behavior in vitro**	Presentation &white board	
10	2 theory +2 Practical		**The difference between two-dimensional and three-dimensional cultivation environment**	Presentation &white board	

11	2 theory +2 Practical		**Applications of 3D tissue culture**	Presentation &white boa	
12	2 theory +2 Practical		**Scaffolds of 3D tissue culture**	Presentation &white boa	
13	2 theory +2 Practical		**Use of microfluidic system as a tissue culture system**	Presentation &white boa	
14	2 theory +2 Practical		**Review and answer students' questions**	Presentation &white boa	
15	2 theory +2 Practical		**Review and answer students' questions**	Presentation &white boa	
16			**Preparatory week before the final Exam**		

46. Course Evaluation

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

47. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications, Sixth Edition. 2. Basics of animal cell culture: Foundation for modern science
Main references (sources)	1. Animal Cell Culture and Technology
Recommended books and references (scientific journals, reports...)	1. An Introductory Undergraduate Course Covering Animal Cell Culture Techniques. https://iubmb.onlinelibrary.wiley.com/doi/epdf/10.1002/bmb.2004.494032050381
Electronic-References, Website	3. Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications, Sixth Edition. 4. Basics of animal cell culture: Foundation for modern science

Course Description Form

14.Course Name:		
Experimental Design &Academic Writing		
15.Course Code:		
BTM31-ExDe		
16.Semester / Year:		
firstsemester/third class		
17.Description Preparation Date:		
1-9-2024		
18.Available Attendance Forms:		
Attendance		
19.Number of Credit Hours (Total) / Number of Units (Total)		
30 hours 2 units		
20.Course administrator's name (mention all, if more than one name)		
Yaseen Ismael Omran	**yaseen.ismael@nahrainuniv.edu.iq**	nuniv.edu.iq

21. Course Objectives	
Course Objectives	• To understand the experimental design for different types of sciences • To understand how to write academically •

22. Teaching and Learning Strategies	
Strategy	13. **Lectures** – Traditional classroom lectures delivered by the instructor to explain core concepts and theories. 14. **PowerPoint Presentations** – Use of multimedia presentations to enhance visualization, provide diagrams, animations, and summary tables for complex topics. 15. **Assignments and Tutorials** – Weekly homework assignments and small-group discussion sessions to reinforce understanding and problem-solving skills. The main strategy that will be adopted in delivering this module is encouraging students to interact positively with others, think critically, solve immunology-related problems and to solve problems related to

	Immunology and think independently and access relevant literature and review information.

23. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 theory		Why we take experimental design course?	Presentation &white board	Quiz, Attendance seminar and written examination
2	2 theory		Methods of acquiring knowledge	Presentation &white board	Quiz, Attendance seminar and written examination
3	2 theory		The Scientific Method	Presentation &white board	Quiz, Attendance seminar and written examination
4	2 theory		Scientific Research	Presentation &white board	Quiz, Attendance seminar and written examination
5	2 theory		Deductive reasoning, Inductive reasoning, Theories and hypothesis	Presentation &white board	Quiz, Attendance seminar and written examination
6	2 theory		Types of research	Presentation &white	Quiz,

			studies	board	Attendance seminar and written examination
7	2 theory		Research proposal	Presentation &white board	Quiz, Attendance seminar and written examination
8	2 theory		Midterm Exam	Presentation &white board	Quiz, Attendance seminar and written examination
9	2 theory		What is academic writing	Presentation &white board	Quiz, Attendance seminar and written examination
10	2 theory		Types of academic writing	Presentation &white board	Quiz, Attendance seminar and written examination
11	2 theory		How to write a reference	Presentation &white board	Quiz, Attendance seminar and written examination
12	2 theory		How to write concisely with examples	Presentation &white boa	

13	2 theory		The writing process	Presentation &white boa	
14	2 theory		How to write presentation	Presentation &white boa	
15	2 theory		Final Exam	Presentation &white boa	
16			Predatory to final exam .		

24. 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

25. Learning and Teaching Resources

Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic-References, Website	

Course Description Form

26.Course Name:
Viruses and Vaccines
27.Course Code:
BTM32-vi
28.Semester / Year:
second semester/third class
29.Description Preparation Date:
1-9-2024
30.Available Attendance Forms:
Attendance
31.Number of Credit Hours (Total) / Number of Units (Total)
60 hours 3 units
32.Course administrator's name (mention all, if more than one name)

Dr. Lamiaa Fingan Nashi Al-Maliki Dr. Rawaa Nazar Alchalabi	lamiaafingan@yahoo.com rawaaalchalabi-1984@yahoo.com

33. Course Objectives	
Course Objectives	• --- Learn about Medical Virology and the history of Virology. • --- Learn about the virus shapes and types. • --- Study the genetic material of different types of viruses • --- Study on viral replication and effect of virus on the cells. • ---Study the methods for virus culturing and types of cell cultures. • --- Study about viral replication and host rang determination. • •

34. Teaching and Learning Strategies	
Strategy	16. **Lectures** – Traditional classroom lectures delivered by the instructor to explain core concepts and theories.

	17. **PowerPoint Presentations** – Use of multimedia presentations to enhance visualization, provide diagrams, animations, and summary tables for complex topics. 18. **Assignments and Tutorials** – Weekly homework assignments and small-group discussion sessions to reinforce understanding and problem-solving skills. The main strategy that will be adopted in delivering this module is encouraging students to interact positively with others, think critically, solve immunology-related problems and to solve problems related to Immunology and think independently and access relevant literature and review information.

35. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 theory +2 Practical		Definition of Virology, viruses and general characteristics of virus	Presentation &white board	Quiz, Attendance seminar and written examination
2	2 theory +2 Practical		Virus replication	Presentation &white board	
3	2 theory +2 Practical		Classification and GENETICAS OF VIRUSES	Presentation &white board	
4	2 theory +2 Practical		Viruses pathogencity	Presentation &white board	
5	2 theory +2 Practical		Functions of Envelope and Consequences of Properties for Enveloped viruses	Presentation &white board	
6	2 theory +2 Practical		Host defense mechanism	Presentation &white board	
7			DNA Viruses families		

8	2 theory +2 Practical		RNA Viruses families	Presentation &white board	
9	2 theory +2 Practical		Mid term exam	Presentation &white board	
10	2 theory +2 Practical		Vaccines and types of Vaccines	Presentation &white board	
11	2 theory +2 Practical		Steps of Vaccines production	Presentation &white boa	
12	2 theory +2 Practical		Attenuated, Killed Vaccines and mechanisms of actions	Presentation &white boa	
13	2 theory +2 Practical		Corona virus ,whole virus, protein subunit, viral vector and nucleic acid of the virus	Presentation &white boa	
14	2 theory +2 Practical		Second mid exam	Presentation &white boa	
15	2 theory +2 Practical		Second mid exam	Presentation &white boa	
16			Final exam		

36. 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

37. Learning and Teaching Resources

Required textbooks (curricular books, if any)	- Medical Virology by David o white and Frank J Finner 2 - Viruses of Microorganisms. By Paul Hyman and Stephen T. Abedon Published: 2018. 3 - Viruses and interferon: Current Research. Edited by: Karen Mossman Published: 2011
Main references (sources)	

Recommended books and references (scientific journals, reports...)	

Course Description Form

38.Course Name:	
Molecular Biology II	
39.Course Code:	
BTM31-Im	
40.Semester / Year:	
Third semester/third class	
41.Description Preparation Date:	
1-9-2024	
42.Available Attendance Forms:	
Attendance	
43.Number of Credit Hours (Total) / Number of Units (Total)	
60 hours 3 units	
44.Course administrator's name (mention all, if more than one name)	
Dr. Hameed M. Jasim Dr. Risala R. Allami	Hameed.jasim@nahrainuniv.edu.iq risala.allami@nahrainuniv.edu.iq ririallami@yahoo.com
45. Course Objectives	
Course Objectives	• To provide students with knowledge and information as well as practical experience about Molecular Biology. • Studying the composition, structure and interactions of cellular molecules – such as nucleic acids and proteins • Carrying out the biological processes essential for the cell's functions and maintenance. • system (i.e., autoimmune diseases, allergy, organ/tissue rejection.
46. Teaching and Learning Strategies	
Strategy	

	19. **Lectures** – Traditional classroom lectures delivered by the instructor to explain core concepts and theories. 20. **PowerPoint Presentations** – Use of multimedia presentations to enhance visualization, provide diagrams, animations, and summary tables for complex topics. 21. **Assignments and Tutorials** – Weekly homework assignments and small-group discussion sessions to reinforce understanding and problem-solving skills. The main strategy that will be adopted in delivering this module is encouraging students to interact positively with others, think critically, solve immunology-related problems and to solve problems related to Immunology and think independently and access relevant literature and review information.

47. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 theory +2 Practical		Regulation of transcription in prokaryotes General features of genes that are regulated, molecules involved in regulation	Presentation &white board	Quiz, Attendance seminar and written examination
2	2 theory +2 Practical		Regulation of gene expression in prokaryotes • Operon • lac Operon • Activation of the lac operon by cyclic AMP and the CAP protein	Presentation &white board	
3	2 theory +2 Practical		Eukaryotic transcription	Presentation &white board	

			• The Structure of Eukaryotic mRNAs • Production of Mature mRNA in Eukaryotes • Regulation of gene expression in eukaryotes • Control of Transcription by Activators and Repressors		
4	2 theory +2 Practical		Controls of Gene Expression in Eukaryotes • Methylation of DNA • RNA Interference (RNAi) Micro RNA (miRNA	Presentation &white board	
5	2 theory +2 Practical		Mutations • Missense mutation • Nonsense mutation • Silent mutation • Frameshift mutation	Presentation &white board	
6	2 theory +2 Practical		• Transposon • Types and structure of transposons • The transposition machinery	Presentation &white board	
7			• Recombination: homologous recombination,		

			Site specific recombination, Illegitimate recombination		
8	2 theory +2 Practical		**Mid Term Exam**	Presentation &white board	
9	2 theory +2 Practical		• Genomics and Proteomics	Presentation &white board	
10	2 theory +2 Practical		• Epigenetics	Presentation &white board	
11	2 theory +2 Practical		• Metagenomics	Presentation &white boa	
12	2 theory +2 Practical		• Bacteriophages and eukaryotic viruses: Introduction to viruses, Bacteriophages	Presentation &white boa	
13	2 theory +2 Practical		• Bioinformatics Algorithms: Introduction to bioinformatics	Presentation &white boa	
14	2 theory +2 Practical		• Cancer Molecular basis of cancer	Presentation &white boa	
15	2 theory +2 Practical		**Mid Term Exam**	Presentation &white boa	
16			**Preparatory week before the final Exam**		

48. 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

49. Learning and Teaching Resources

Required textbooks (curricular books, if any)	David Clark (2005). Molecular Peter J. Russell (2010). Genetics A Molecular Approach Third Edition Brown, T.A. (2010). Gene cloning and DNA

	analysis: An Introduction. Sixth Edition , John Wiley & Sons, Ltd., Publication
Main references (sources)	

Course Description Form

48.Course Name:	
Nanobiotechnology	
49.Course Code:	
BTM32-NaBt	
50.Semester / Year:	
second semester/third class	
51.Description Preparation Date:	
1-9-2024	
52.Available Attendance Forms:	
Attendance	
53.Number of Credit Hours (Total) / Number of Units (Total)	
30 hours 45 units	
54.Course administrator's name (mention all, if more than one name)	
Dr. Widad Jassim Atia	Widad.atia@nahrainuniv.edu.iq
55. Course Objectives	
Course Objectives	• This course covers the basics of nanobiotechnology, focusing on nanoparticles, their properties, classification and different methods of their syntheis, such as chemica , physical and green(bio)methods. Last one characterized as eco-friendly biofabrication methods. Students perform practical experiments includes the biosynthesis and their effects on microbes and plants, and explore applications in medicine, pharmaceuticals, and agriculture. Biofabrication is highlighted for its safety, simplicity, low cost, and high productivity
56. Teaching and Learning Strategies	
Strategy	22. **Lectures** – Traditional classroom lectures delivered by the instructor to explain core concepts and theories.

	23. **PowerPoint Presentations** – Use of multimedia presentations to enhance visualization, provide diagrams, animations, and summary tables for complex topics. 24. **Assignments and Tutorials** – Weekly homework assignments and small-group discussion sessions to reinforce understanding and problem-solving skills. The main strategy that will be adopted in delivering this module is encouraging students to interact positively with others, think critically, solve immunology-related problems and to solve problems related to Immunology and think independently and access relevant literature and review information.

57. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 theory		Introduction to Nanotechnology,	Presentation &white board	Quiz, Attendance seminar and written examination
2	2 theory		Nanoparticle and Nanomaterials: Definitions. And Classification them depended on different bases	Presentation &white board	
3	2 theory		Studying the properities of Nanomaterials: - Physical and Chemical properities.	Presentation &white board	
4	2 theory		Synthesis methods	Presentation &white	

			of Nanomaterials	board	
5	2 theory		Chemical and Physical Synthesis methods of Nanomaterials	Presentation &white board	
6	2 theory		Advantages and Disadvantages properities	Presentation &white board	
7			Mid term exam		
8	2 theory		Green synthesis of Nanomaterials	Presentation &white board	
9	2 theory		Biosynthsis methods of Nanomaterials by using microorganisms : Bacteria, Fugi, Yeasts, Algae	Presentation &white board	
10	2 theory		Detection and Charactrrization Techniques of nanomaterials.	Presentation &white board	
11	2 theory		Antibacterial activity effect of nanomaterials.	Presentation &white boa	
12	2 theory		Antifungal activity effect of nanomaterials.	Presentation &white boa	

13	2 theory		Application of Nanomaterials in different fields of life: Medical(therapeutic and diagnostic), Pharmalogical ,Agricultural and other applications	Presentation &white boa	
14	2 theory		Bio–Nano Interactions	Presentation &white boa	
15			Second Midterm	Presentation &white boa	
16			Final exam		

58. Course Evaluation

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

59. Learning and Teaching Resources

Required textbooks (curricular books, if any)	■ Nanotechnology-and-plant-sciences-Nanoparticles-and-their-impact- plants Manzer H. Siddiqui · Mohamed H. Al-Whaibi Firoz Mohammad ■ Intodction to Nanotechnology. Charles P. Poole, Jr. Frank J. Owens ■ Nanobiotechnology. Amultidisplinary field of science. Ram Prasad (Department of Botany) Mahatma Gandhi Central University Motihari, Bihar, India .
Main references (sources)	

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

COURSE Description

60.Course Name:	
Human Cytogenetics	
61.Course Code:	
BTM32-HuCy	
62.Semester / Year:	
Second semster/third class	
63.Description Preparation Date:	
1-9-2024	
64.Available Attendance Forms:	
Attendance	
65.Number of Credit Hours (Total) / Number of Units (Total)	
60 hours 3 units	
66.Course administrator's name (mention all, if more than one name)	
Prof. Dr. Ali Zaid Al-Saffar	ali.saffar@nahrainuniv.edu.iq
67. Course Objectives	
Course Objectives	• Understand the fundamental principles and techniques of human cytogenetics. • Gain knowledge of the structure and organization of the human genome. • Explore the various types of chromosomal aberrations and their impact on human health. • Learn about the different methods used in the cytogenetic analysis, including karyotyping and FISH (Fluorescence in situ Hybridization). • Understand the role of cytogenetics in the diagnosis and classification of genetic disorders. • Study the principles of prenatal and postnatal cytogenetic testing and their applications. • Explore the use of cytogenetics in cancer research and its implications for diagnosis and treatment. • Develop critical thinking and analytical skills in the interpretation of cytogenetic data. • Understand the ethical, legal, and social implications of cytogenetic testing. • Gain practical laboratory skills for conducting cytogenetic experiments and data analysis.
68. Teaching and Learning Strategies	

Strategy	25. **Lectures** – Traditional classroom lectures delivered by the instructor to explain core concepts and theories. 26. **PowerPoint Presentations** – Use of multimedia presentations to enhance visualization, provide diagrams, animations, and summary tables for complex topics. 27. **Assignments and Tutorials** – Weekly homework assignments and small-group discussion sessions to reinforce understanding and problem-solving skills. The main strategy that will be adopted in delivering this module is encouraging students to interact positively with others, think critically, solve immunology-related problems and to solve problems related to Immunology and think independently and access relevant literature and review information.

69. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 theory		Introduction: What are Chromosomes	Presentation &white board	Quiz, Attendance seminar and written examination
2	2 theory		Chromosomes and Cell Cycle	Presentation &white board	
3	2 theory		Variation in Chromosomal Structure Part I	Presentation &white board	
4	2 theory		Variation in Chromosomal Structure Part II	Presentation &white board	

5	2 theory		Variation in Chromosome Number Part I	Presentation &white board	
6	2 theory		Variation in Chromosome Number Part II	Presentation &white board	
7			Mid–Course Exam		
8	2 theory		Y and X Chromosomes, X-Inactivation	Presentation &white board	
9	2 theory		Sex Related Disorders	Presentation &white board	
10	2 theory		Nomenclature and formulation of chromosomal disorders	Presentation &white board	
11	2 theory		The biology of cancer cells	Presentation &white boa	
12	2 theory		Introduction to Cancer Cytogenetics	Presentation &white boa	
13	2 theory		Epigenetics and Cancer	Presentation &white boa	
14	2 theory		Modern Techniques Used in Human Cytogenetic Analysis (Part 1)	Presentation &white boa	
15			Modern Techniques Used in Human Cytogenetic	Presentation &white boa	

			Analysis (Part 2)		
16			**Preparatory week before the final Exam**		

70. 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

71. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Cancer Cytogenetics Chromosomal and Molecular Genetic Aberrations of Tumor Cells, Sverre Heim
Main references (sources)	The Principles of Clinical Cytogenetics, Steven L. Gersen Martha B. Keagle Editors
Recommended books and references (scientific journals, reports...)	
Electronic-References, Website	

Course Description Form

50.Course Name:

Genetic Engineering –II	
51.Course Code:	
BTM32-GeEnII	
52.Semester / Year:	
Second semester/third class	
53.Description Preparation Date:	
1-9-2024	
54.Available Attendance Forms:	
Attendance	
55.Number of Credit Hours (Total) / Number of Units (Total)	
30 hours 2 units	
56.Course administrator's name (mention all, if more than one name)	
Yaseen Ismael Omran	yaseen.ismael@nahrainuniv.edu.iq
57. Course Objectives	
Course Objectives	• This module will provide students with aspects of genetic engineering. • This module incorporates fundamental knowledge of DNA and protein structure and function • The learner will acquire the basic knowledge to construct and use cloning and expression vectors containing recombinant DNA in prokaryotic and eukaryotic systems.
58. Teaching and Learning Strategies	
Strategy	28. **Lectures** – Traditional classroom lectures delivered by the instructor to explain core concepts and theories. 29. **PowerPoint Presentations** – Use of multimedia presentations to enhance visualization, provide diagrams, animations, and summary tables for complex topics. 30. **Assignments and Tutorials** – Weekly homework assignments and small-group discussion sessions to reinforce understanding and problem-solving skills. The main strategy that will be adopted in delivering this module is encouraging students to interact positively with others, think critically, solve

	immunology-related problems and to solve problems related to Immunology and think independently and access relevant literature and review information.

59. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 theor		Introduction and common properties for cloning experiments of eukaryotes. Cloning in yeast, Transformation of yeast, Cloning vectors for yeast	The basic principle of gene cloning.	The basic principle of gene cloning.
2	2 theory		Artificial Chromosomes: BAC & YAC. The structure & use of YAC	Cutting of DNA molecules.	Cutting of DNA molecules.
3	2 theory		Cloning in molds and other yeast	Restriction Modification System, Restriction Endonucleases.	Restriction Modification System, Restriction Endonucleases.
4	2 theory		Cloning in plants Cloning vector derived from (Ti) plasmid & development.	Joining of DNA molecules: Sticky end, Flash end	Joining of DNA molecules: Sticky end, Flash end
5	2 theory		The Ri plasmid Cloning genes in plant by direct gene transfer, transfer into organelles.	Cloning Vectors. Plasmids: pBR322 and Its derivatives	Cloning Vectors. Plasmids: pBR322 and Its derivatives

6	2 theory		Plant viruses as Cloning vectors. Introduction of foreign DNA into plant cells,	Presentation &white board	
7	2 theory		Expression of foreign DNA in the plant cells		
8	2 theory		Cloning in animals Introducing of DNA into mammalian cells.	Presentation &white board	
9	2 theory		Cloning vector for mammalian cells Direct gene transfer	Presentation &white board	
10	2 theory		Expression of genes cloned in *E. coli.* and mammalian cell	Presentation &white board	
11	2 theor		Probes: Labeling, problem, cDNA probes.	Presentation &whi board	
12	2 theor		Application of genetic engineering Medical Application: Diagnosis of genetic diseases, Gene therapy.	Presentation &whi board	
13	2 theor		Industrial Application: Production of Insulin, Somatotropin, Interferons	Presentation &whi board	
14	2 theor		Vaccins, Single Cell protein, Degradation	Presentation &wh board	

			of toxic compounds		
15	2 theor		Agriculture Application: Resistance to Viruses, Resistance to pesticide, Resistance to Fungi.	Presentation &wl board	
16			Preparatory week before the final Exam		

60. 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

61. Learning and Teaching Resources	
Main referer (sources)	• Brown, T.A. – Gene Cloning and DNA Analysis: An Introduction • 8th Edition, Wiley Blackwell, 2016. Glick, B.R., & Pasternak, J.J. – Molecular Biotechnology: Principles and Applications of Recombinant DNA 5th Edition, ASM Press, 2017
Recommended books and references (scientific journals, reports...)	
Electronic-Referenc Websites	

Course Description Form

72.Course Name:
Molecular Techniques
73.Course Code:
BTM31-MoTech
74.Semester / Year:
first semester/third class
75.Description Preparation Date:
1-9-2024
76.Available Attendance Forms:
Attendance
77.Number of Credit Hours (Total) / Number of Units (Total)
30 hours 2 units

78.Course administrator's name (mention all, if more than one name)	
Dr. Hameed M. Jasim Dr. Risala R. Allami	Hameed.jasim@nahrainuniv.edu.iq risala.allami@nahrainuniv.edu.iq ririallami@yahoo.com

79. Course Objectives	
Course Objectives	• The outcomes of this course provide students with knowledge and information as well as practical experience about Molecular Techniques. • Molecular Techniquesis the field of biology that studies the composition, structure and interactions of cellular molecules – such as nucleic acids and proteins – that carry out the biological processes essential for the cell's functions and maintenance. The course covers the following subjects: Introduction to DNA basics, Properties of Nucleic acids • Nucleic acid structure, The flow of genetic information, Replication of DNA, Gene Expression, PCR techniques, Gel electrophoresis, and other application in molecular techniques.

80. Teaching and Learning Strategies	
Strategy	31. **Lectures** – Traditional classroom lectures delivered by the instructor to explain core concepts and theories.

	32. **PowerPoint Presentations** – Use of multimedia presentations to enhance visualization, provide diagrams, animations, and summary tables for complex topics. 33. **Assignments and Tutorials** – Weekly homework assignments and small-group discussion sessions to reinforce understanding and problem-solving skills

81. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 theory +		Measurement of DNA concentration Separation of molecules by gel electrophoresis	Presentation &white board	Quiz, Attendance seminar and written examination
2	2 theory		Estimation of the sizes of DNA molecules Special gel electrophoresis methods for separating larger molecules	Presentation &white board	
3	2 theory		Protein gel electrophoresis	Presentation &white board	
4	2 theory		The Polymerase Chain Reaction Correct temperatures to use Melting temperature	Presentation &white board	
5	2 theory		Real-time PCR enables the amount of starting material to be quantified Carrying out a	Presentation &white board	

			quantitative PCR experiment		
6	2 theory +		Real-time PCR for quantifying RNA Southern transfer	Presentation &white board	
7			Genetic maps Single nucleotide polymorphisms (SNPs)		
8	2 theory		Mid Term Exam 1	Presentation &white board	
9	2 theory		Restriction fragment length polymorphisms (RFLPs) Random Amplified Polymorphic DNA (RAPD)	Presentation &white board	
10	2 theory		Amplified Fragment Length Polymorphism (AFLP) Short tandem repeats (STRs)	Presentation &white board	
11	2 theory		Sequencing Genes and Genomes DNA sequencing	Presentation &white boa	
12	2 theory		Chain termination DNA sequencingAlternative mRNA processing	Presentation &white boa	
13	2 theory		Fluorescence in situ hybridization (FISH)	Presentation &white boa	
14	2 theory		DNA Microarrays	Presentation &white boa	
15	2 theory		Mid Term Exam 2	Presentation &white boa	
16			Final exam		
82. 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

83. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	
Main references (sources)	-
Recommended books and references (scientific journals, reports...)	
Electronic-References, Website	

Course Description Form

84.Course Name:
Antibiotics
85.Course Code:
BTM32- An
86.Semester / Year:

Second semester/third class
87.Description Preparation Date:
1-9-2024
88.Available Attendance Forms:
Attendance
89.Number of Credit Hours (Total) / Number of Units (Total)
60 hours 3 units
90.Course administrator's name (mention all, if more than one name)

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

91. Course Objectives

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

92. Teaching and Learning Strategies

Strategy	34. **Lectures** – Traditional classroom lectures delivered by the instructor to explain core concepts and theories. 35. **PowerPoint Presentations** – Use of multimedia presentations to enhance visualization, provide diagrams, animations, and summary tables for complex topics. 36. **Assignments and Tutorials** – Weekly homework assignments and small-group discussion sessions to reinforce understanding and problem-solving skills.

93. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 theory +2 Practical		• Chemotherapeutic agents and antimicrobials. • Antibiotics Discovery and Development. • Sources of antimicrobials.	Presentation &white board	Quiz, Attendance seminar and written examination

2	2 theory +2 Practical		The biosynthesis and regulation of the production of antibiotics in microorganisms. The production of synthetic and semi-synthetic antibiotics.	Presentation &white board	
3	2 theory +2 Practical		**Mechanisms of Action of Antibiotics** Inhibition of Cell Wall Synthesis Inhibition of Protein Synthesis Inhibition of Nucleic Acid Synthesis	Presentation &white board	
4	2 theory +2 Practical		• Antimetabolites and Other Mechanisms. • Factors Affecting Choice of Antimicrobial Agent	Presentation &white board	
5	2 theory +2 Practical		Pharmacokinetics and Pharmacodynamics of Antibiotics	Presentation &white board	
6	2 theory +2 Practical		Superbugs origin and dissemination	Presentation &white board	
7			Midterm exam		
8	2 theory +2 Practical		Common Infections and Antibiotic Treatment. Antibiotics for Gram positive bacteria	Presentation &white board	
9	2 theory +2 Practical		Antibiotics for Gram negative bacteria	Presentation &white board	
10	2 theory +2 Practical		Antibiotics for an aerobic infections	Presentation &white board	

11	2 theory +2 Practical		Classes of antibiotics and some potential side effects.	Presentation &white boa	
12	2 theory +2 Practical		Herbal antibiotics	Presentation &white boa	
13	2 theory +2 Practical		Final Topics antibiotics (general concepts)	Presentation &white boa	
14	2 theory +2 Practical		2nd Midterm exam	Presentation &white boa	
15	2 theory +2 Practical		Seminar presentation	Presentation &white boa	
16			Final exam		

94. 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

95. Learning and Teaching Resources

Required textbooks (curricular books, if any)	CLSI AST News Update. Volume 7, Issue 1, June 2022. Mechanisms of Antibiotic Resistance (20216). Microbiol Spectr. April ; 4(2) .
Main references (sources)	Ahmad, M. and Khan, A.U. (2019) 'Global economic impact of antibiotic resistance: A review.' Journal of Global Antimicrobial Resistance, 19 pp. 313-316Molecular Genetics of Bacteria, Snyder, L. and Champness, W. 2007. 3rd edition, American Society for Microbiology, Washington, D. C
Recommended books and references (scientific journals, reports...)	Centers for Disease Control and Prevention. (2019) US antibiotic use rates by state. NHS. (2019) Antibiotic resistance
Electronic-References, Website	https://www.cdc.gov/antibiotic-use/community/images/materials/Antibiotic-Prescriptions-Map https://www.nhs.uk/conditions/antibiotics/antibiotic-antimicrobial-resistance/

Course Description Form

96.Course Name:
Molecular diagnostics
97.Course Code:

BTM32- An
98.Semester / Year:
Second semester/third class
99.Description Preparation Date:
1-9-2024
100. Available Attendance Forms:
Attendance
101. Number of Credit Hours (Total) / Number of Units (Total)
30 hours /2 units
102. Course administrator's name (mention all, if more than one name)

Sahar M. Hussein + mays T.Abdallah	Saharhadad84@gmail.come Mays.talip@nahrainuniv.edu.iq

103. Course Objectives	
Course Objectives	• This course provides an introduction of theory, interpretation of result with • biosafety and a risk assessment and use of molecular techniques in the • diagnostics lab, explain direct type and source of specimen as well as how to • handling with it. Pointing on main important molecular markers that used for • diagnosis with an importance of nucleic acids types, isolation, handling, and • storage. • 2. Additionally, understanding some of analytical techniques common used in • molecular lab such as real time PCR (RT-PCR),sequencing with alignment and • detect polymorphism on codon level, direct SNP typing with restriction • enzyme, understanding MLST system for microorganism diagnosis, plotting • for DNA and RNA , finally with Flow Cytometry techniq. • 3. Molecular lab tests offer a high level of reliability and accuracy and are used • to detect microorganisms, look for genetic mutations associated with certain • infectious diseases and cancers, perform paternity tests, and much

	more.

104. Teaching and Learning Strategies

Strategy	37. **Lectures** – Traditional classroom lectures delivered by the instructor to explain core concepts and theories. 38. **PowerPoint Presentations** – Use of multimedia presentations to enhance visualization, provide diagrams, animations, and summary tables for complex topics. 39. **Assignments and Tutorials** – Weekly homework assignments and small-group discussion sessions to reinforce understanding and problem-solving skills.

105. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 theory +2 Practical		Introduction of molecular diagnosis	Presentation &white board	Quiz, Attendance seminar and written examination
2	2 theory +2 Practical		DNA extraction from different samples	Presentation &white board	
3	2 theory +2 Practical		Gel electrophoreses	Presentation &white board	
4	2 theory +2 Practical		Sample handling and preservation	Presentation &white board	
5	2 theory +2 Practical		Process of PCR	Presentation &white board	
6	2 theory +2 Practical		primer design	Presentation &white board	
7			Mid exam		
8	2 theory +2 Practical		RT-PCR	Presentation &white board	

9	2 theory +2 Practical		Nucleic acid diagnosis	Presentation &white board	
10	2 theory +2 Practical		Sequencing	Presentation &white board	
11	2 theory +2 Practical		Sequence aliment	Presentation &white boa	
12	2 theory +2 Practical		Seminar	Presentation &white boa	
13	2 theory +2 Practical		Seminar	Presentation &white boa	
14	2 theory +2 Practical		Revision	Presentation &white boa	
15	2 theory +2 Practical		Final exam	Presentation &white boa	
16					

106. 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

107. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**Molecular Diagnostics (3rd Edition, 2017)** **Editors: George P. Patrinos, Wilhelm Ansorge, Phillip B. Danielson** **Publisher: Academic Press (Elsevier)**
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic-References, Website	

المحاضرات الالكترونية للمرحلة الثالثة لقسم التقميات الحيوية الجزيئية والطبية للعام الدراسي

2025-2024

المرحلة الثالثة-الفصل الدراسي الاول		
ت	المادة الدراسية	الرابط
1	**Immunology**	https://drive.google.com/file/d/1q3PH0AXi6gNQfG6ntWAXXEOMWoFadsGI/view?usp=sharing
2	**Molecular Biology -I**	https://drive.google.com/file/d/1CnXe7AUEdnYAUGK2ju6pbvjGb4tx3rjz/view?usp=sharing
3	**Experimental design and Academic Writing**	https://drive.google.com/file/d/1gYyb1u4IM1Sm3Y2ko6HKitrnXjekpvTz/view?usp=sharing
4	**Animal Tissue culture**	https://drive.google.com/file/d/1bHeGeuuE9mxWJOqaBJnvVAOqQwbNW-Qo/view?usp=sharing
5	**Genetic Engineering I**	https://drive.google.com/file/d/1ouR_yZbW-MFGq5rY3t3lMLA0JjHDbwvT/view?usp=sharing
6	**Industerial Microbiology**	https://drive.google.com/file/d/1zK1WmKW1QG0fM7DvylpWM-Zg3qX5RHSp/view?usp=sharing
7	**Molecular Techniques**	https://drive.google.com/file/d/1mVOFE12wFEBXeeSTWVpnE371uVT3sMiV/view?usp=sharing

المرحلة الثالثة-الفصل الدراسي الثاني		
الرابط	المادة الدراسية	ت
https://drive.google.com/file/d/1hQIhZyNKXMvwUHsH1ugmrAkDy5Y9dxFz/view?usp=sharing	**Antibiotcs**	1
https://drive.google.com/file/d/1mXckkARmca8YX9dKxcz0_BN-E9p6a--V/view?usp=sharing	**Cytogenetics**	2
https://drive.google.com/file/d/1tPQO9mISLQ4Q5WfecniLQGimlJcjZ2Ao/view?usp=sharing	**Genetic Engineering II**	3
https://drive.google.com/file/d/1EMNMgI0JfExlAqvThdXdy4WoNH3HEr1S/view?usp=sharing	**Molecular Biology II**	4
https://drive.google.com/file/d/1uMn3AYBIFuZfcWLUqgUzgYsMkPlCumGv/view?usp=sharing	**Molecular Diagnostic**	5
https://drive.google.com/file/d/1a5rcmF8RwdjebvyKTuS1CVugGw_x50W6/view?usp=sharing	**Nanobiotechnology**	6
https://drive.google.com/file/d/1jdUSz6rN12h4YfVxvfqNIR5hR1HoDugJ/view?usp=sharing	**Virology and Vaccines**	7