

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



Academic Program and Course Description Guide

2024

Introduction:

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

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

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

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

Concepts and terminology:

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

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

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

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

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

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

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

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

Academic Program Description Form
For undergraduate Bachelor's students

University Name: **University of Baghdad**

Faculty/Institute: **College of Science**

Scientific Department: **Biotechnology department.**

Academic or Professional Program: **Biotechnology**

Final Certificate Name: **Bachelor's degree in Biotechnology**

Academic System: **Seasonal**

Description Preparation Date: **1-10-2023**


File Completion Date: **1-10-2023**

Signature: 

Head of Department name:

Prof. Dr. Nadhim Hasan Hayder

Date:

Signature: 

Scientific Associate name:

Prof. Dr. Namir I. A. Haddad

Date:

The file is checked by: **Prof. Dr. Israa Ali Zaidan**

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date:

Signature: 



Approval of the Dean: Assis. Prof. Dr. Raed Falih Hassan

1. Program Vision

The Department of Biotechnology looks forward to using biological systems of various types, cellular or enzymatic, to obtain many of the vital materials that society needs in various agricultural, industrial, medical, or environmental fields. This comes by benefiting from research at the laboratory level and then applied by building strategies for projects. Scientific, and therefore the science of biotechnology depends on specialists in the sciences of biochemistry, microbiology, and engineering sciences, and cooperation among themselves to reach the applied aspects of microbiology and animal and plant cell cultures to benefit from them in the development of industry, agriculture, and the advancement of health and other service institutions.

2. Program Mission

Preparing specialized personnel in the fields of biotechnology and providing them with up-to-date information in various fields of contemporary life, genetically engineering living organisms, searching for sites of modification, medical biotechnologies, producing pharmaceutical compounds, environmental reclamation to get rid of air, soil and water pollutants, and investing microorganisms in extracting valuable materials and biotechnologies. Plants and making full use of plant products and farms. As well as interest in scientific specializations that would employ the characteristics of living organisms to produce biological materials and educate society on how to exploit these capabilities in various areas of life, taking into account preserving the basic characteristics of these organisms and their diversity and not disturbing the natural biological balance.

3. Program Objectives

1. Preparing specialists familiar with the basics of biotechnology, theoretically and practically, who are able to fill the needs of the labor market.
2. Conduct scientific research and try to keep pace with the scientific development of biotechnology.
3. Cooperating with state institutions and the private sector by providing advice and scientific advice and conducting laboratory analyzes in the fields of genetic, environmental, industrial and microbiology engineering.
4. Encouraging scientific research and providing students with basic skills in biotechnology and its applications in all fields.
5. Encouraging the academic staff to participate in scientific forums inside and outside the country.
6. Contributing to solving scientific problems in the service of national development plans.

4. Program Accreditation

None

5. Other external influences

None

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	5	10		Computer skills English language Freedom and Democracy Human rights Baath Party crimes
College Requirements	6	7		Biostatistics Physics Analytical chemistry and instrumental analysis Organic chemistry Biochemistry 1 Biochemistry 2
Department Requirements	34	102		All core and elective subjects for stages 2, 3 and 4
Summer Training	1	--	--	After the third stage
Other	--	--	--	--

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
2nd stage				
First semester 2023-2024	ChBC338	Biochemistry 1	2 Theoretical	2 Practical
	BIOT200	Microbiology 1	2 Theoretical	2 Practical
	BIOT210	Histology and Microtechnique	2 Theoretical	2 Practical
	BIOT205	Microbial environment	2 Theoretical	2 Practical
	BIOT355	Biological control	2 Theoretical	2 Practical
	CS225	Computer skills	--	2 Practical
	GS114	English language	2 Theoretical	--
		Baath Party crimes	2 Theoretical	--
Second semester 2023-2024	ChBC345	Biochemistry 2	2 Theoretical	2 Practical
	BIOT 205	Microbiology 2	2 Theoretical	2 Practical
	BIOT220	Animal physiology	2 Theoretical	2 Practical

	BIOT230	Plant physiology	2 Theoretical	2 Practical
	BIOT225	Phycology	2 Theoretical	2 Practical
	225CS	Computer skills	-	2 Practical
3rd stage				
First semester 2023-2024	BIOT300	Molecular biology	2 Theoretical	2 Practical
	BIOT310	Plant biotechnology	2 Theoretical	2 Practical
	BIOT215	Gene and biochemical technique	2 Theoretical	2 Practical
	BIOT305	Pathogenic bacteria	2 Theoretical	2 Practical
	BIOT320	Fermentation technology	2 Theoretical	2 Practical
	BIOL330	Mycology	2 Theoretical	2 Practical
4th stage				
Second semester 2023-2024	BIOT345	Microbial genetics	2 Theoretical	2 Practical
	BIOT315	Food microtechnology	2 Theoretical	2 Practical
	BIOT325	Antibiotics	2 Theoretical	2 Practical
	BIOT330	Immunology	2 Theoretical	2 Practical
	BIOT335	Environmental biotechnology	2 Theoretical	2 Practical
	BIOT340	Nanobiotechnology	2 Theoretical	2 Practical
	314 GS	English language	2 Theoretical	--
		Research methodology	1 Theoretical	
First semester 2023-2024	BIOT400	Principles of genetic engineering	2 Theoretical	2 Practical
	BIOT405	Animal tissue culture	2 Theoretical	2 Practical
	BIOT410	Plant tissue culture	2 Theoretical	2 Practical
	BIOT430	Principles of Immunogenetics	2 Theoretical	2 Practical
	BIOT435	Virology and vaccines	2 Theoretical	2 Practical
	414 GS	English language	2 Theoretical	-
	PROJ401	Graduation Project	-	2 Practical
Second semester 2023-2024	BIOT415	Applications of genetic engineering	2 Theoretical	2 Practical
	BIOT420	Cytogenetics	2 Theoretical	2 Practical
	BIOT425	Industrial biotechnology	2 Theoretical	2 Practical
	BIOT445	Genetic diseases and molecular diagnosis	2 Theoretical	2 Practical
	BIOT350	Application of Animal tissue culture	2 Theoretical	2 Practical
	PROJ402	Graduation Project	-	2 Practical

8. Expected learning outcomes of the program

Knowledge

1. Enabling students to obtain knowledge and understanding of the intellectual framework, foundations and applications of bio- and nano-technology
2. Enabling students to obtain knowledge and understanding of industrial, environmental and food microbiology
3. Enabling students to obtain knowledge and understanding of genetics, genetic engineering, and cellular genetics
4. Enabling students to obtain knowledge and understanding of botany, plant and animal tissues and their applications
5. Enabling students to obtain knowledge and understanding of pathology, immunity, and pathogenic bacteria
6. Enable students to obtain knowledge and understanding of cell science and microbiology standards
7. Enabling students to obtain knowledge and understanding of life statistics and the English language

Skills

1. Scientific and practical skills.
2. Memorization and analysis skills.
3. Skills of use, application and development.
4. General and qualifying transferable skills (other skills related to employability and personal development).

Ethics

- 1-Openness about the methods, intentions, and potential consequences of biotechnology research and applications.
- 2-Recognizing the intrinsic value of all living organisms and considering their well-being in biotechnological endeavors.
- 3-Strive to use biotechnology to enhance the well-being of individuals and society while minimizing harm and commit to honesty, accuracy and reliability in conducting and reporting biotechnology research
- 4-Ensure equitable distribution of the benefits and burdens of progress in biotechnology across different societies and socio-economic groups.
- 5-Take responsibility for the environmental impacts of biotechnology activities and work to find sustainable solutions.
- 6-Respect the rights of individuals to make informed decisions about their health care and to participate in medical interventions or clinical trials. Implementing medical treatments or treatments and protecting the privacy and confidentiality of patient information and genetic data in research
- 7-Ensure that patients or participants fully understand the risks, benefits, and alternatives of medical procedures or participation in research studies before providing consent
- 8-Upholding strict standards for the safety and effectiveness of pharmaceutical products through transparent research, testing and regulatory processes.

9. Teaching and Learning Strategies

Teaching and learning strategies and methods adopted in the implementation of the program in general.

10. Evaluation methods

Weekly, monthly, daily exams and the end-of-semester exam.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)	Number of the teaching staff	
	General	Special		Staff	Lecturer
Professor	17			17	
Assistant professor	18			18	
Instructor	42			42	
Assistant instructor	50			50	

12. Professional Development

Mentoring new faculty members

Participating in courses on teaching methods, Arabic and English language proficiency, passing the teaching aptitude exam, and other professional teaching courses.

Professional development of faculty members

1. Training in evaluating teaching performance of all types and giving it importance in educational and development courses.
2. Attending training courses.
3. Attending continuing education courses and seminars.
4. Online learning.
- 5- Discussions inside and outside the work environment, which helps in career development.

13. Acceptance Criterion

Admission to the Biotechnology Department program in the College of Science is based on the grade point average and the student's interest in the department.

14. The most important sources of information about the program

All biotechnology programs combine multiple areas of science and technology with research and development for many types of organisms. Subjects cover a wide range of scientific topics, from microbiology, chemistry and molecular biology to genetic engineering, pharmacology and virology. As well as cloning, fermentation, tissue culture and immunology.

In the practical part in the laboratories, students learn different techniques and processes to work with DNA, bacteria, plant cells and much more. Biotechnology programs are offered as a four-year bachelor's degree, after which the participant obtains a bachelor's degree in biotechnology.

15. Program Development Plan

- Implementing a review and development policy for academic programs and the goals and strategies included in the strategic plan of the Department of Biotechnology, and reviewing programs and courses.
- Work on submitting proposals to begin the review process for programs that have completed four years from the last academic review, and follow up on reviewing courses every two semesters through program officials and course coordinators.
- The department seeks to obtain local or international program accreditation, such as the biotechnology program, audit quality in the institutional program, and review and develop policy procedures for counterpart biotechnology departments in other colleges.
- • Forming a technical committee for quality assurance to follow up on the department's efforts in preparing evaluation reports against institutional standards as part of the college's efforts to obtain institutional accreditation.

16. Program Skills Outline

				Required program Learning outcomes											
Year/Level 2023/2024	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
2 nd stage 1 st semester	ChBC338	Biochemistry 1	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT200	Microbiology 1	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT210	Histology and Microtechnique	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT205	Microbial environment	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT355	Biological control	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	CS225	Computer skills	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	GS114	English language	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Baath Party crimes	Basic	√	√	√	√	√	√	√	√	√	√	√	√
2 nd stage 2 nd semester	ChBC345	Biochemistry 2	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT 205	Microbiology 2	Basic	√	√	√	√	√	√	√	√	√	√	√	√

	BIOT220	Animal physiology	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT230	Plant physiology	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT225	Phycology	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	225CS	Computer skills	Basic	√	√	√	√	√	√	√	√	√	√	√	√
3rd stage 1st semester	BIOT300	Molecular biology	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT310	Plant biotechnology	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT215	Gene and biochemical technique	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT305	Pathogenic bacteria	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT320	Fermentation technology	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOL330	Mycology	Basic	√	√	√	√	√	√	√	√	√	√	√	√
3rd stage 2nd semester	BIOT345	Microbial genetics	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT315	Food microtechnology	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT325	Antibiotics	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT330	Immunology	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT335	Environmental biotechnology	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT340	Nanobiotechnology	Basic	√	√	√	√	√	√	√	√	√	√	√	√

	314 GS	English language	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Research methodology	Basic	√	√	√	√	√	√	√	√	√	√	√	√
4th stage 1st semester	BIOT400	Principles of genetic engineering	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT405	Animal tissue culture	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT410	Plant tissue culture	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT430	Principles of Immunogenetics	optional	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT435	Virology and vaccines	optional	√	√	√	√	√	√	√	√	√	√	√	√
	414 GS	English language	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	PROJ401	Graduation Project	Basic	√	√	√	√	√	√	√	√	√	√	√	√
4th stage 2nd semester	BIOT415	Applications of genetic engineering	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT420	Cytogenetics	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT425	Industrial biotechnology	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT445	Genetic diseases and molecular diagnosis	optional	√	√	√	√	√	√	√	√	√	√	√	√
	BIOT350	Application of Animal tissue culture	optional	√	√	√	√	√	√	√	√	√	√	√	√
	PROJ402	Graduation Project	Basic	√	√	√	√	√	√	√	√	√	√	√	√

Please tick the boxes corresponding to the individual program learning outcomes under evaluation.

Course Description Form For 2nd stage subjects

Biochemistry 1

1. Course Name:
Biochemistry1
2. Course Code:
ChBC338
3. Semester / Year:
1 st semester / 2023-2024
4. Description Preparation Date:
10-2023
5. Available Attendance Forms:
Weekly attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Lamia shaker ashoor Email: Lamia.s@sc.uobaghdad.edu.iq
8. Course Objectives
This course aims to:- <ul style="list-style-type: none">• Expanding students' awareness of modern technologies adopted globally• Contributing to preparing sound scientific thinking for students to solve obstacles in the fields of scientific research• Providing the labor market with graduates with experience and competence in the applied fields of biotechnology
9. Teaching and Learning Strategies
<ol style="list-style-type: none">1. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint.2. Providing students with homework.3. Preparing reports related to academic vocabulary.4. Visit websites to obtain additional knowledge of academic subjects.5. Brainstorming during lectures.
10. Course Structure: Theory

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1st	2	Carbohydrate (1)	Carbohydrate- definition and classification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2nd	2	Carbohydrate (2)	Physical and chemical properties of Carbohydrate	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3rd	2	Carbohydrate(3)	Monosaccharide's , isomerism , derivatives of monosaccharides	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4th	2	Carbohydrate(4)	Disaccharides , classification of disaccharides	First semester exam	First semester exam
5th	2	Carbohydrate(5)	Polysaccharides , classification of polysaccharides	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6th	2	First Exam	First Exam	First semester exam	First semester exam
7th	2	Lipids(1)	Lipids – Definition - Properties – Classification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8th	2	Lipids(2)	Simple Lipids , Essential fatty acids , saturated and unsaturated fatty acids	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9th	2	Lipids(3)	Compound Lipid - Phospholipids , sphingolipids, Cholesterol	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10th	2	Second Exam	Second Exam	Second semester exam	Second semester exam

11 th	2	Amino acids, Polypeptides and Proteins(1)	Amino acids - Classification of Amino Acids	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Amino acids, Polypeptides and Proteins(2)	Properties of Amino Acids , Biologically Important Peptides , Glutathione	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13 th	2	Amino acids, Polypeptides and Proteins(3)	Proteins - difination and classification Based on Functions	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Amino acids, Polypeptides and Proteins(4)	classification Based on Physical and chemical properties (Simple proteins - Conjugated proteins and Derived proteins	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Amino acids, Polypeptides and Proteins(4)	Structure of Proteins , Denaturation of Proteins	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

Course Structure: Practical

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	General safety in the laboratory	General definitions	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	General test of carbohydrates	Theoretical and practical explanation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Special tests for carbohydrates	Theoretical and practical explanation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

4 th	2	Special tests for carbohydrates	Theoretical and practical explanation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Special tests for carbohydrates	Theoretical and practical explanation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	First Exam	First Exam	First semester exam	First semester exam
7 th	2	lipids	Theoretical and practical explanation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Special tests for lipids	Theoretical and practical explanation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Special tests for lipids	Theoretical and practical explanation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Special tests for lipids	Theoretical and practical explanation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Second Exam	Second Exam	Second semester exam	Second semester exam
12 th	2	amino acids	Theoretical and practical explanation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13 th	2	General test for amino acids	Theoretical and practical explanation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Special tests for amino acids	Theoretical and practical explanation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

15 th	2	Exam	Exam		
11. Course Evaluation					
Overall score out of 100 (Semester grade = 40, including: 25 for theoretical + 15 for practical) (End-of-semester exam score = 60, including 40 for theory + 20 for practical)					
12. Learning and Teaching Resources					
Required textbo (curricular books, if any)		Introduction to general organic and biochemistry Tenth Edition Morris Hein Mount San Antonio College Scott Pattison Ball State University Susan Arena University of Illinois, Urbana-Champaign			
Main references (sources)		Introduction to general organic and biochemistry Tenth Edition Morris Hein Scott Pattison Susan Arena Biochemistry Lehninger			
Recommended books and references (scientific journals, reports...)		Introduction to general organic and biochemistry Tenth Edition Morris Hein Scott Pattison Susan Arena Biochemistry Lehninger			
Electronic Websites		Referenc Many websites dealing with biochemistry, including medical websites, YouTube, and scientific research			

Microbiology 1

13. Course Name:
Microbiology I
14. Course Code:
BIOT220
15. Semester / Year:
1 st semester / 2023-2024
16. Description Preparation Date:
1-10-2023
17. Available Attendance Forms:

Weekly attendance					
18. Number of Credit Hours (Total) / Number of Units (Total)					
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)					
19. Course administrator's name (mention all, if more than one name)					
Name: Asist. Prof. Dr. Aida Hussain Ibrahim Email: aida.h@sc.uobaghdad.edu.iq					
20. Course Objectives					
<ul style="list-style-type: none"> - This course aims to provide a course of study in microbiology, based on knowledge of the basic principles of microbiology. - To develop more skills for basic sciences in the field of microbiology. - To prepare students for a number of natural science courses in bacteriology, virology, mycology, parasitology, immunology and pathology, among others. 					
21. Teaching and Learning Strategies					
6. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint. 7. Providing students with homework. 8. Preparing reports related to academic vocabulary. 9. Visit websites to obtain additional knowledge of academic subjects. 10. Brainstorming during lectures.					
22. Course Structure: Theory					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Introduction and history of microbiology	The lecture includes an introduction to microbiology and a historical overview of some discoveries in this field	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Eukaryotes and prokaryotes cells. And Bacterial cell structure and function	It includes an explanation of prokaryotic and eukaryotic cells. The lecture also includes a detailed explanation of the structure and shape of bacterial cells It also includes the cellular structure of bacteria in all its details, along with the	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			function of each structure or organ		
3rd	2	Growth and Nutrition of the bacteria	It includes the stages of bacterial growth and the nutritional needs of bacteria necessary for growth	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4th	2	Physiology and Metabolism of the bacteria	The lecture includes an explanation of the physiology of bacteria as well as the metabolic and chemical processes of bacteria	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5th	2	Bacterial virulence and pathogenesis	It includes all the virulence factors of pathogenic bacteria with a comprehensive explanation of the course of the disease.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6th	2	--	Seasonal Exam		
7th	2	Sterilization and disinfection	It includes an explanation of the means, methods, and materials for sterilization and disinfection used to eliminate bacterial contamination.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8th	2	Antibiotics and chemotherapeutic agents	It includes a comprehensive explanation of antibiotics in all their details	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9th	2	Bacterial genetics	It includes a comprehensive explanation of the genetics of bacterial cells.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10th	2	Mycology / introduction	Giving a comprehensive introduction to mycology, also including the shapes and characteristics of fungi.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11th	2	Structure, growth, nutrition and reproductive	It includes a comprehensive explanation of its cellular structures,	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			growth, nutrition, and methods of reproduction		
12th	2	--	Seasonal exam		
13th	2	Classification and pathogenesis	Includes classification of fungi and their pathogenesis	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14th	2	Fungal infection and their causative agents	The lecture includes a detailed explanation of fungal diseases and their causes	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15th	2	--	Exam	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

Course Structure: Practical

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1st	2	Biosafety procedure and precautions and Microscope	The first lecture for the practical course includes a comprehensive explanation of biosafety and addresses cautions when working in the laboratory, as well as an explanation of the parts and types of the microscope.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2nd	2	Tools, instruments and equipment	The introductory lecture for the practical course includes a comprehensive and preferred explanation of all tools, tools, and laboratory equipment	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

3 rd	2	Staining methods of bacteria	The third practical lecture included a discussion of staining methods and their types that are used to stain bacteria	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Acid fast stains (Ziehl – Nielson technique) and special stains	The fourth practical lecture included a continuation of the third lecture on the types of differential dyes. It also included a discussion of the special dyes that are used to dye flagella, capsules, and boards.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Capsule stain and their types	The fifth practical lecture includes a continuation of the fourth lecture, which included special dyes, and here the methods of dyeing the capsule, i.e. the capsule, were explained.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Culture media , preparation and their types	The sixth practical lecture includes a comprehensive explanation of the planting medium, its preparation methods, and its types	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	--	Seasonal exam.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Growing and Cultivation of the bacterial species in the lab.	The eighth practical lecture includes a comprehensive explanation of methods for propagating and developing bacterial species or species within the laboratory.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Cultivation of the bacteria in the liquid media	The ninth practical lecture includes a continuation of the	Paper lectures Electronic screen	Daily, semester and final exams

		(broth) / Motility tests	eighth lecture, which included methods for multiplying bacteria in liquid media, as well as a comprehensive explanation of motile bacteria and methods for detecting them.	Video lectures via electronic classes	
10 th	2	Biochemical tests	The tenth lecture includes a comprehensive explanation of most of the biochemical tests that are used to detect bacteria		
11 th	2	--	Seasonal exam.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Fungal staining methods	The twelfth practical lecture includes methods of staining fungi		
13 th	2	Isolation and cultivation methods of fungi in the lab.	The thirteenth lecture includes methods for isolating and multiplying fungi in the laboratory	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Labrotary diagnosis of clinical specimens of fungi	The fourteenth lecture includes laboratory diagnostic methods for clinical models of fungal infections	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2		Exam		

23. Course Evaluation

Overall score out of 100

(Semester grade = 40, including: 25 for theoretical + 15 for practical)

(End-of-semester exam score = 60, including 40 for theory + 20 for practical)

24. Learning and Teaching Resources

Required textbo - Gillies R.R. & Dodds, 1984: Bacteriology illustrated, edition. Long man group limited. USA. (Text book).

Main references (sources) 1- Katherine N. Ward, A. Christine McCartney & Bishan Thakker 2009: Notes On Medical Microbiology, 2nd edition. Churchill Livingstone Elsevier. UK.

	<p>2- Morello, Mizer & Granato 2006: Laboratory manual and Workbook in Microbiology “Application to patient care”, Eighth edition. The McGraw-Hill Companies Inc., USA.</p> <p>3- Whitman, William B; Rainey, Fred; Kämpfer, Peter; Trujillo, Martha; Chun, Jonsik; Devos, Paul; Hedlund, Brian; Dedysh, Svetlana (eds.) (2015). <i>Bergey's Manual of Systematics of Archaea and Bacteria</i>. John Wiley and Sons.</p> <p>4- Richard A. Harvey, Cynthia Nau Cornelissen and Bruce D. Fisher. Microbiology. (Lippincott's Illustrated Reviews) 3rd edition. 2014</p> <p>5- Bailey and Scott's.(2014). Diagnostic microbiology.Elseiver,2014.</p> <p>6-- Brock TD.Madigan M. Martinko J. et al.editors: Biology of microbiology. Upper Saddle River, NJ.2009. Prentice Hall</p>
Recommended books and references (scientific journals, reports...)	- Scientific journals, periodicals and research in the field
Electronic Websites	<ul style="list-style-type: none"> • https://en.wikipedia.org/wiki/Microbiology • https://en.wikipedia.org/wiki/Medical_microbiology. • https://rlmc.edu.pk/themes/images/gallery/library/books/Microbiology/Text_Book_of_Microbiology.pdf.

Histology and Microtechnique

25. Course Name:
Animal Physiology

26. Course Code:					
BIOT210					
27. Semester / Year:					
1 st semester / 2023-2024					
28. Description Preparation Date:					
1-10-2023					
29. Available Attendance Forms:					
Weekly attendance					
30. Number of Credit Hours (Total) / Number of Units (Total)					
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)					
31. Course administrator's name (mention all, if more than one name)					
Name: Prof. Dr. Shaima Razaq Ibraheem Email: shaima.ibraheem@sc.uobaghdad.edu.iq					
32. Course Objectives					
To provide students with knowledge about the fine microscopic structure of cells; The microscopic structure of human tissues and organs and their function To develop an understanding of how organ integrity and function are maintained through the regulation of cells and tissues To provide the student with in-depth knowledge of how to take tissue samples and prepare them for microscopic examination using an optical and electron microscope.					
33. Teaching and Learning Strategies					
11. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint. 12. Providing students with homework. 13. Preparing reports related to academic vocabulary. 14. Visit websites to obtain additional knowledge of academic subjects. 15. Brainstorming during lectures.					
34. Course Structure: Theory					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Introduction to microtechnique	Definition & laboratory rules history , microscopy , types of microscopes , microscope technique , None sectioning methods for samples preparation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

2 nd	2	Paraffin method	Sectioning methods (Paraffin) Fixation,, washing, dehydration , clearing , Embedding, , advantages and disadvantages	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Staining	Sectioning , microtomes , types of microtomes , frozen sections , mounting, Staining, classification of stains, labeling , Immunological staining	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Introduction to microtechnique	Introduction in histology ,Components of tissues , basic types of tissues, Epithelial tissue, classification, types	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Epithelial tissue	Epithelial cell polarity, Specialization of the apical cell surface, Glandular epithelium, classification. Glands classification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Connective tissue	Connective tissues, component, proper conn. Tissue, Specialize connective tissues , adipose tissue , Cartilage		
7 th	2	Supporting connective tissue	Specialize connective tissues , Cartilage,	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

8 th	2	Supporting connective tissue	bone, Process of Bone Formation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Skin histology	Histology of the skin, cells , layers,	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Muscular tissue	Muscular system (structure. Arteries and veins sections	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Nervous tissue	Nervous system , component , neuron , supporting cells	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Digestive tract tissues	Digestive tract, Sections		
13 th	2	Digestive system tissues	liver, spleen Pancreas,	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Kidney histology	Urinary system , kidney	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2		Exam	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

Course Structure: Practical

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Compound Microscope	Lab1 Compound Microscope- Inverted microscope, Fluorescence microscopy, Wet mounts slide	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

2 nd	2	Non – sectioning methods	Lab 2 The different methods in microscopic slide preparation- Dry Mount, Wet Mount, Squash Slides, Staining, Blood smear: Types of stains: Some blood abnormalities distinguished by a blood smear: Preparation of Peripheral Blood Smear: Leishman's Stain:	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Paraffin methods	Lab 3 Paraffin methods , killing process, Gross Examination , Fixation, Type of fixative solutions , Dehydration, Paraffin Embedding , Blocking, Sectioning, Staining, Mounting	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Dissection	Lab 4- Mouse Dissection	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Exam	Exam	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Epithelial tissues	lab 5 Epithelial tissues	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Connective tissues	Lab 6 Connective tissues	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Cartilage	Lab 7 Cartilage	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

9 th	2	Bone	Lab 8 Bone	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Exam	Exam		
15 th	2				
35. Course Evaluation					
Overall score out of 100 (Semester grade = 40, including: 25 for theoretical + 15 for practical) (End-of-semester exam score = 60, including 40 for theory + 20 for practical)					
36. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Microscopic preparations/ Kawakib Al-Mukhtar		
Main references (sources)			Microtechnique /Gray /1977 ,A text and atlas / Ross and Pawlina /2006		
Recommended books and references (scientific journals, reports...)			Junqueira's Basic Histology Text & Atlas (14th ed.) Anthony L Mescher ..2016		
Electronic Websites			Referenc Histology guide http://www.histologyguide.com/about-us/atlas-of-human-histology.html An Atlas of Histology https://www.springer.com/gp/book/9780387949543		

Microbial environment

37. Course Name:
Environmental Microbiology
38. Course Code:
BIOT205
39. Semester / Year:
1 st semester / 2023-2024
40. Description Preparation Date:
1/10/2024
41. Available Attendance Forms:
Weekly attendance
42. Number of Credit Hours (Total) / Number of Units (Total)
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours

Total number of hours per section = 90 hours
 Number of units = 3 units (theoretical 2 + practical 1)

43. Course administrator's name (mention all, if more than one name)

Name: Prof. Dr. Nadhim Hasan Hayder
Email: Nadhim.Haider@sc.uobaghdad.edu.iq

44. Course Objectives

- This course aims to:
- Definition of environmental microbiology, Ecosystem components, types of microbiology
 - Study environmental microbiology and its roles in different environments such as in water, soil and air
 - Study the waterborne disease, soil born disease, Roles of microbes as microbial indicators of water and food
 - Roles of microorganism in metabolism of organic compounds (Carbon, nitrogen, sulfur and phosphorous)
 - Study types of microorganisms in soil (Bacteria, Fungi and Actinomycetes), their roles and activities in soil

45. Teaching and Learning Strategies

16. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint.
17. Providing students with homework.
18. Preparing reports related to academic vocabulary.
19. Visit websites to obtain additional knowledge of academic subjects.
20. Brainstorming during lectures.

46. Course Structure: Theory

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Definitions of Environmental Microbiology	Definitions of Environmental Microbiology, Classification of Environment, Components of Ecosystem, Some important terms in Environmental Microbiology	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

2 nd	2	Aquatic microbiology	<p>Definition of Aquatic microbiology, Importance of aquatic microorganisms, The role of microorganisms in nutrient cycles and in the food web, Water column and temperature, Microbial activity of this part of water column, Metabolic Rate and Temperature, Factor affects the enzyme functioning, Gases and Aquatic Microorganisms, Salinity</p>	<p>Paper lectures Electronic screen Video lectures via electronic classes</p>	<p>Daily, semester and final exams</p>
3 rd	2	Role of Microorganisms in biogeochemical cycles (Metabolism of C and N compounds)	<p>The Carbon Cycle and metabolism, Biodegradation, Nitrogen Cycle and metabolism, Steps of N compound fixation and metabolism, N fixation, ammonification, nitrification, denitrification,</p>	<p>Paper lectures Electronic screen Video lectures via electronic classes</p>	<p>Daily, semester and final exams</p>
4 th	2	Microorganisms in P and S compounds Metabolism	<p>Main forms of phosphorous, Phosphorus is an essential element in biological systems,</p>	<p>Paper lectures Electronic screen Video lectures via electronic classes</p>	<p>Daily, semester and final exams</p>

			Microorganisms in Sulfur Cycle and Metabolism, Sulfur oxidizing bacteria and characterization, Sulfate reducing bacteria, Sulfur (Sulfate) Reduction, Characteristics Sulfate- or Sulfur-Reducing Bacteria		
5 th	2	Water and Pathogens	Microbial Water Pollution, Main Sources of Water Microbial Pollution, swage, agriculture and industrial sources, Waterborne diseases, Water-associated or related diseases, Water-based route, Insect vector route	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	First Exam	First Exam		
7 th	2	Indicators of microbial water quality المحاضرة	Indicator Microorganism, Types of indicators, Coliform Organisms, Thermotolerant Coliform Bacteria, E coli. Fecal Streptococci,	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			Bacteriophage, Heterotrophic bacteria, Current methods of detection Microbial indicators, Most Probable Number (MPN), Heterotrophic Plate Counts (HPC), Membrane filtration and culture on selective media		
8 th	2	Soil Microbiology and microbial interaction	Definition of soil microbiology, Major components of soil, soil profile, Soil Living organic matter (Soil Biota or organisms), <i>Living organisms present in the soil</i> , Soil Microflora, bacteria, Rhizosphere,	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Actinomycetes in the soil	The general characteristics of Actinomycetes, The relation of Actinomycetes to Fungi, Distribution and abundance, Environmental Influences on actinomycetes, Major groups of Actinomycetes, Activity and	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			function of Actinomycetes in the Soil, Significance of Actinomycetes, Actinomycetes Antibiotics		
10 th	2	Fungi in soil environment	Environmental influences on the fungus in soil, Yeast, The most important relationship between fungi and plants in soil, Fungi in soil play variety roles and activities	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Second Exam	Second Exam	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Microbial processes in soil	Organic matter decomposition (cellulose, hemicellulose)		
13 th	2	Microbial processes in soil	Organic matter decomposition, humus matter and other organic compound).	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Air born microorganisms Distribution of microorganisms on air, aerosols.	Distribution of microorganisms on air, transport and deposition of aerosols	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

15 th	2	Methods to study air borne disease	Techniques for studying microorganisms in air.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
Course Structure: Practical					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	1. Introduction of environmental microbiology	1. Introduction of environmental microbiology	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	2. Dilution and Plating of Bacteria and Growth Curve	2. Dilution and Plating of Bacteria and Growth Curve	Paper lectures	Daily, semester and final exams
3 rd	2	3. Preparation of Microbiological Culture Media	3. Preparation of Microbiological Culture Media	Electronic screen	Daily, semester and final exams
4 th	2	4. Bacteriological Examination of Water: The Coliform MPN Test	4. Bacteriological Examination of Water: The Coliform MPN Test	Video lectures via electronic classes	Daily, semester and final exams
5 th	2	5. water quality	5. water quality	Paper lectures	Daily, semester and final exams
6 th	2	First Exam	First Exam	Electronic screen	Daily, semester and final exams
7 th	2	6. Isolation of fungi and	6. Isolation of fungi and	Video lectures via electronic classes	Daily, semester and final exams

		Actinomycetes from soil	Actinomycetes from soil		
8 th	2	7. Antibacterial activity of bioactive compounds produced by Streptomyces spp. isolated from agricultural soil	7. Antibacterial activity of bioactive compounds produced by Streptomyces spp. isolated from agricultural soil	Paper lectures	Daily, semester and final exams
9 th	2	8. Biological Oxygen Demand Measurement (BOD)	8. Biological Oxygen Demand Measurement (BOD)	Electronic screen	Daily, semester and final exams
10 th	2	9.biofilm	9.biofilm	Video lectures via electronic classes	Daily, semester and final exams
11 th	2	10.Isolation of fungi	10.Isolation of fungi	Paper lectures	Daily, semester and final exams
12 th	2	Second Exam	Second Exam	Second Exam	Second Exam
13 th	2			Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2			Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2				

47. Course Evaluation

Overall score out of 100

(Semester grade = 40, including: 25 for theoretical + 15 for practical)

(End-of-semester exam score = 60, including 40 for theory + 20 for practical)

48. Learning and Teaching Resources

Required text books (curricular books, if any)	Not found
Main references (sources)	1. Environmental Microbiology Third edition by Ian L. Pepper Charles P. Gerba Terry J. Gentry, (2015). 2. Environmental Microbiology Second Edition by Eugene L. Madsen (2016) 3. Environmental Biotechnology by T. Srinivas. (2008).
Recommended books and references (scientific journals, reports...)	
Electronic Websites	

Biological control

49. Course Name:
Biological control
50. Course Code:
BIOT355
51. Semester / Year:
1st semester / 2023-2024
52. Description Preparation Date:
1/10/2023
53. Available Attendance Forms:
Weekly attendance
54. Number of Credit Hours (Total) / Number of Units (Total)
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)
55. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Hutaf Abd Almalik Ahmed Alsalam Email: hutaf.alsalim@sc.uobaghdad.edu.iq
56. Course Objectives
This course aims to provide a course of study in the physiology of mammals, especially humans, based on Knowledge of basic physiological principles of living organisms To develop more practical biological skills in the field of organismal physiology. To prepare students for a number of natural sciences courses in physiology, development and neuroscience, as well Pharmacology, pathology and zoology, among others.

57. Teaching and Learning Strategies

21. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint.
22. Providing students with homework.
23. Preparing reports related to academic vocabulary.
24. Visit websites to obtain additional knowledge of academic subjects.
25. Brainstorming during lectures.

58. Course Structure: Theory

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1st	2	Important terms in biological control	General definitions and subject-specific terms	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2nd	2	Introduction to biological control	What is biological pest control, General Advantages of Biological Control, General Limitations of Biological Control, Natural Control, The pests, The natural enemies	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3rd	2	Strategies of biological control	Classical Biological Control, Augmentative Biological Control Conservation Biological Control	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4th	2	The general methods of pest control	1.The traditional methods (Chemical, Cultural, Physical), 2. Modern methods (Microbial, Insect pheromones, Genetic, insect sterility)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5th	2	Interactions between Plants and Beneficial Microbes	Mechanisms of Biological Control, Mycoparasitism, Antibiosis, Metabolite production, competition, Induction of resistance	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6th	2	--	Seasonal Exam		

7 th	2	Microbial Insecticides	Microbial Insecticides, Advantages of microbial insecticides, Disadvantages of microbial insecticides	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Microbial Insecticides	Bacterial insecticides (Mechanism of action of Bt on caterpillars, Bt formulation that are now commercially available and its types of pest control	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Biological control of Nematodes	Mechanisms of Nematodes Control, Conservation and augmentation of antagonists, Research needs-biological control.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Biological control of filamentous Algae	Algae cause a number of problems in water, Value and Concerns to the Pond Ecosystem, Preventing filamentous algae problem, Filamentous Algae control (Physical/mechanical control, biological control, Cultural control, Chemical control), Notes about Algaecides.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Biological control of weeds	Introduction, Methods Used in Biocontrol of Weeds, Biological Control Agents, Procedures in Classical Biological Control Plant Pathogens As Biocontrol Agents of Weeds (Conventional approach, Biological Herbicides), Aquatic Weed Control, Biological Weed Control Program at Macdonald College	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	--	Seasonal exam		

13 th	2	Biological Control of Fungi	Biocontrol of different fungal pathogens, The use of compost as biofertilizer, Methods of application of antagonists	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Fungi as Agents of Biocontrol	Bioinsecticides: Insect biological control fungi, Mechanism of action of <i>Beauveria bassiana</i> , Other Potential Fungi as Biocontrol Agents, advantages of using fungi for biocontrol Bioherbicides: Commercial Mycoherbicides and mycoinsecticides	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Control of Plant Diseases Using Viruses	Viral (Insect Viruses), Viruses used against different insect-pests of plants	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

Course Structure: Practical

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Introduction to biological control	1. Definition of biological control 2. History of the development of biological control 3. Factors affecting biological control 4. Natural enemies that are effective in biological control 5. Determinants of biological control	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Isolation of pathogenic bacteria from the rhizosphere	1. The protocol of isolation of bacteria from rhizosphere 2. Materials that will be used in the experiment 3. How to work (insulation steps)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Isolation of beneficial bacteria	How are the culture media prepared?	Paper lectures Electronic screen	Daily, semester and final exams

		(pathogenic bacteria) in biological control from insect	How are bacteria diagnosed? Pathogenicity testing Proof of pathogenicity The steps	Video lectures via electronic classes	
4 th	2	Species Interactions: Biological relationships	Species interactions: Terms Major types of species 1. Predation 2. Parasitism 3. Competition 4. Mutualism 5. Commensalism 6. Amensalism Adaptations in Predators	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Biological control of weed	What is biological control of weeds? Aim of Biological control of weeds Considerations of species for introducing pest to control weeds Examples of weeds bio-control How does it work? How biological control programs are created	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Biological control of fungi	. Introduction . Economic threats . What is the role fungi . Mycotoxins . Biological control of foliar Diseases . Biological control of post harvested diseases	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Biological control of Fungi	. Biological control of soil-borne diseases. . The most commonly used fungal agents. . Mechanisms involved in Biological Control by fungi.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Biological Control of Nematodes	. Characteristics of nematodes . Types of nematodes . What do nematodes do in the soil? . Biological control agents	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			. Developmental process of biological agents . Fungi used for nematode control		
9 th	2	Biological control of filamentous Algae	Biological control of filamentous algae Forms of algae Types of algae Development of algal bloom Problems and causes Algae control biological control of harmful algal blooms	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2		Exam		
11 th	2	Biological control of plant pathogens 1	. Introduction to plant diseases . Types of plant pathogens . Forms of plant diseases . Plant disease control factors . Methods of disease control	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Biological control of plant pathogens 2	Using insects to control plant pathogens	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13 th	2	Biological control of plant pathogens 3	The use of fungi to control plant pathogens	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Biological control of plant pathogens 4	The use of bacteria to control plant pathogens	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2		Exam		

59. Course Evaluation

Overall score out of 100

(Semester grade = 40, including: 25 for theoretical + 15 for practical)

(End-of-semester exam score = 60, including 40 for theory + 20 for practical)

60. Learning and Teaching Resources

Required textbooks (curriculum books, if any)	- Jean Michel Mérillon and Kishan Gopal Ramawat. 2012. Plant Defence: Biological Control. Springer Dordrecht Heidelberg London New York.
Main references (sources)	-Plant Defence: Biological Control(Jean MM& Kishan G R) -Biological Control A Global Perspective(Charles V, Mark S.G, and George L) -Trophic and Guild in Biological Control(Jacques Brodeur and Guy Boivin) Biological Control of Weeds: theory and practical application (Mic Julier Graham White)
Recommended books and references (scientific journals, reports...)	-Biological Control: Benefits and Risks(James Lynch)
Electronic References, Websites	https://www.youtube.com/playlist?list=PL5-EckJGqf8prKfTVQwfcNxQk8KyG1SDC

English language

61. Course Name:	English language
62. Course Code:	GS114
63. Semester / Year:	1 st semester / 2023-2024
64. Description Preparation Date:	1-10-2023
65. Available Attendance Forms:	Weekly attendance
66. Number of Credit Hours (Total) / Number of Units (Total)	2 Theoretical hours/week, one section * 15 weeks = 30 hours Total number of hours per section = 30 hours Number of units = 2 units
67. Course administrator's name (mention all, if more than one name)	Name: Lec. Dr. Ramina Mekhael Khoshaba Email: ramina.khoshaba@sc.uobaghdad.edu.iq
68. Course Objectives	<ol style="list-style-type: none"> 1. This course helps undergraduates get better at speaking, listening, and writing in English. 2. It teaches the right methods and language for a formal academic style, important for reading global research and writing reports. 3. Students learn academic phrases, vocabulary, and how to organize their writing correctly. 4. 4- It boosts skills in reading and understanding scientific texts from various fields.
69. Teaching and Learning Strategies	

26. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint.
27. Providing students with homework.
28. Preparing reports related to academic vocabulary.
29. Visit websites to obtain additional knowledge of academic subjects.
30. Brainstorming during lectures.

70. Course Structure: Theory

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Getting to know you	-Tenses (present , past and future) - Questions and Questions words	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Getting to know you	-Words with more than one meaning. -Social expressions - Reading p.11	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	It all went wrong	-Past tenses(simple and continuous) -Form(positive and negative) -Past continuous yes and no question Reading p. 22	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	It all went wrong	-Irregular verbs -Nouns,verb and adjective suffixes to make different parts of speech -Making negatives	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Exam	Exam	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

6 th	2	Let's go shopping	-Quantity (Much and many) - some and any -Something, anyone, nobody, everywhere.	Paper lectures Electronic screen Video lectures via electronic classes	
7 th	2	Let's go shopping	Articles(a, an, the) Listening My uncle's shopkeeper	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	What do you want to do?	-Future intentions(going to and will) - Listening	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Tell me!What's like	What's like- What Paris like- -Comparative and Superlative adjectives	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Exam	Exam	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Fame	-Present Perfect and Past Simple For and since- - Adverbs	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

12 th	2	Do's and don't's	Have to- Shall Must -Words that go together -Compounds nouns	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13 th	2	Things that changed the world	-Verbs and past participles -Verbs and nouns that go together	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Going places	Time and conditional clauses as soon as, when, Hot verbs Compound nouns	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Exam	Exam	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

71. Course Evaluation

Overall score out of 100
(Semester grade = 40)
(End-of-semester exam score = 60)

72. Learning and Teaching Resources

Required textbo (curricular books, if any)	Pre-Intermediate students' book Headway Plus (John and Liz Soars)
Main references (sources)	English Grammar in use. (book) https://www.englisch-hilfen.de/en/grammar/tenses_table.pdf Pre-Intermediate teachers' book Headway Plus (John and Liz Soars)
Recommended books and references (scientific journals, reports...)	English Grammar understanding the basic.
Electronic References, Websites	British Council , English club , YouTube BBC Learning English, Duolingo

Biochemistry 2

73. Course Name:					
Biochemistry 2					
74. Course Code:					
ChBC345					
75. Semester / Year:					
2 nd semester / 2023-2024					
76. Description Preparation Date:					
1-10-2023					
77. Available Attendance Forms:					
Weekly attendance					
78. Number of Credit Hours (Total) / Number of Units (Total)					
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)					
79. Course administrator's name (mention all, if more than one name)					
Name: Prof. Dr. Lamia shaker ashoor Email: Lamia.s@sc.uobaghdad.edu.iq					
80. Course Objectives					
This course aims to:- <ul style="list-style-type: none"> • Expanding students' awareness of modern technologies adopted globally • Contributing to preparing sound scientific thinking for students to solve obstacles in the fields of scientific research • Providing the labor market with graduates with experience and competence in the applied fields of biotechnology 					
81. Teaching and Learning Strategies					
31. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint. 32. Providing students with homework. 33. Preparing reports related to academic vocabulary. 34. Visit websites to obtain additional knowledge of academic subjects. 35. Brainstorming during lectures.					
82. Course Structure: Theory					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method

1st	2	Enzymes	Enzymes –Definition –Cofactors -Location of enzyme - How Enzymes work	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2nd	2	Enzymes	Mechanism of enzymes action - Enzymes classification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3rd	2	Enzymes	Specificity of enzyme action - Factors Affecting the Velocity of Enzyme Reaction	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4th	2	Enzymes	Enzyme kinetics - Enzyme inhibition - Allosteric enzyme- Isozymes	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5th	2	First Exam	First Exam	First semester exam	First semester exam
6th	2	Metabolism	Metabolism - Definition- Carbohydrates metabolism - Digestion of carbohydrate	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7th	2	Carbohydrates Metabolism	Glycolysis - Reaction of glycolysis - Regulation of glycolysis	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8th	2	Carbohydrates Metabolism	Citric acid cycle - Reaction and significance of TCA- Regulation of TCA	Second semester exam	Second semester exam
9th	2	Carbohydrates Metabolism	Gluconeogenesis- Definition-Location- Characteristic- Reaction of gluconeogenesis- Regulation and significance	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10th	2	Carbohydrates Metabolism	Glycogen metabolism – Glycogenesis – Definition-Location- Characteristic - Reaction of glycogenesis	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

11 th	2	Carbohydrates Metabolism	Glycogenolysis - Definition-Location- Characteristic - Reaction of glycogenolysis	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Carbohydrates Metabolism	Regulation of glycogenesis and glycogenolysis	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13 th	2	Second Exam	Second Exam	Second semester exam	Second semester exam
14 th	2	Lipid metabolism	Lipid digestion - Fatty acid oxidation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Lipid metabolism	- Reaction and regulation of beta oxidation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

Course Structure: Practical

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	General safety in the laboratory	General definitions	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Blood	Blood-Types and serum, plasma	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	General urine examination	Theoretical and practical explanation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Blood glucose	Theoretical and practical explanation	Paper lectures Electronic screen	Daily, semester and final exams

				Video lectures via electronic classes	
5 th	2	Lipid profile	Theoretical and practical explanation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	cholesterol	Theoretical and practical explanation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Triglyceride	Theoretical and practical explanation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	First Exam	First Exam	First semester exam	First semester exam
9 th	2	Urea	Theoretical and practical explanation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Creatinine	Theoretical and practical explanation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Uric acid	Theoretical and practical explanation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Total protein	Theoretical and practical explanation		
13 th	2	Liver enzymes	Theoretical and practical explanation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Liver enzymes	Theoretical and practical explanation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Second Exam	Second Exam	Second semester exam	Second semester exam

83. Course Evaluation					
Overall score out of 100 (Semester grade = 40, including: 25 for theoretical + 15 for practical) (End-of-semester exam score = 60, including 40 for theory + 20 for practical)					
84. Learning and Teaching Resources					
Required textbooks (curricular books, if any)	Introduction to general organic and biochemistry Tenth Edition Morris Hein Mount San Antonio College Scott Pattison Ball State University Susan Arena University of Illinois, Urbana-Champaign				
Main references (sources)	Introduction to general organic and biochemistry Tenth Edition Morris Hein Scott Pattison Susan Arena Biochemistry Lehninger				
Recommended books and references (scientific journals, reports...)	Introduction to general organic and biochemistry Tenth Edition Morris Hein Scott Pattison Susan Arena Biochemistry Lehninger				
Electronic Websites	References	Many websites dealing with biochemistry, including medical websites, YouTube, and scientific research			

Microbiology 2

85. Course Name:
Microbiology II
86. Course Code:
BIOT220
87. Semester / Year:
2nd semester / 2023-2024
88. Description Preparation Date:
1-10-2023
89. Available Attendance Forms:
Weekly attendance

90. Number of Credit Hours (Total) / Number of Units (Total)					
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)					
91. Course administrator's name (mention all, if more than one name)					
Name: Asist. Prof. Dr. Aida Hussain Ibrahim Email: aida.h@sc.uobaghdad.edu.iq					
92. Course Objectives					
<ul style="list-style-type: none"> - This course aims to provide a course of study in microbiology, based on knowledge of the basic principles of microbiology. - To develop more skills for basic sciences in the field of microbiology. - To prepare students for a number of natural science courses in bacteriology, virology, mycology, parasitology, immunology and pathology, among others. 					
93. Teaching and Learning Strategies					
36. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint. 37. Providing students with homework. 38. Preparing reports related to academic vocabulary. 39. Visit websites to obtain additional knowledge of academic subjects. 40. Brainstorming during lectures.					
94. Course Structure: Theory					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1st	2	Host defenses and immune system	The lecture includes a definition of immunology, a detailed explanation of the immune response and its types	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2nd	2	Adaptive, Specific Immunity and Immunization	Definition and explanation of acquired immunity with a detailed explanation of antigens and antibodies, as well as an explanation of their functions and types	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

3 rd	2	Introduction to parasitology Intestinal protozoa <i>Entamoeba histolytica</i> : <i>Giardia lamblia</i>	It deals with the definition of parasites, giving a clear introduction to them. This lecture also includes the classification of parasites and the types of relationships they have with the host, along with giving some protozoan parasites that infect the intestines.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Urogenital protozoa such as , <i>Trichomonas vaginalis</i> Blood and tissue protozoa such as <i>Plasmodium spp.</i>	It provides a detailed explanation of the protozoan parasites that infect the reproductive system, blood, and tissues	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Blood and tissue protozoa: <i>Toxoplasma gondii</i>	Completing the explanation and enumeration of the protozoa that infect the blood and tissue such as <i>Toxoplasma gondii</i> .	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Seasonal Exam	Seasonal Exam		
7 th	2	Blood and tissue protozoa <i>Leishmania spp.</i>	A detailed explanation of this type of parasite, the protozoan class, which is included among the protozoa that infect blood and tissues. The lecture includes their location, reproduction, forms, life cycle, and epidemiology, as well as methods of diagnosis, treatment, and prevention.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Blood and tissue protozoa: <i>Trypanosoma spp.</i>	A detailed explanation of this type of parasite, the protozoan class,	Paper lectures Electronic screen	Daily, semester and final exams

			which is included among the protozoa that infect blood and tissues. The lecture includes their location, reproduction, forms, life cycle, and epidemiology, as well as methods of diagnosis, treatment, and prevention.	Video lectures via electronic classes	
9th	2	Other sporozoans such as Isospora and cryptosporidium	A detailed explanation of this type of parasite, the protozoan class, which falls within the protozoa that infect the intestines.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10th	2	Helminthes: Trematodes	This lecture includes a comprehensive explanation of flatworms that infect humans, and also includes their location, reproduction, forms, life cycle, and epidemiology, as well as methods of diagnosis, treatment, and prevention.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11th	2	Helminthes : Cestodes	This lecture includes a comprehensive explanation of tapeworms that infect humans, and also includes their location, reproduction, forms, life cycle, and epidemiology, as well as methods of diagnosis, treatment, and prevention.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12th	2	Seasonal exam	Seasonal exam		
13th	2	Helminthes : Nematodes	A general overview of worms and their types, giving examples of roundworms that infect humans.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

14 th	2	Filiraial worm	The lecture includes a detailed explanation of filarial worms and the diseases they cause, mentioning their locations, their epidemiology, and methods of diagnosing and treating them.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	--	Exam	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

Course Structure: Practical

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Instructions for the lab. work and learn how to make the blood smear.	The first lecture of the practical course includes a comprehensive explanation of the general instructions for laboratory work as well as making blood smears	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Detection and counting method of the WBC	The second lecture for the practical course includes a comprehensive and preferred explanation of methods for investigating white blood cells as well as methods for counting them	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Laboratory diagnosis methods of parasitic	The third practical lecture includes a discussion of diagnostic methods for parasitic causes, along	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

		protozoa and helminthes	with an explanation of the staining methods that are used to stain parasites. It also includes a discussion of the number and devices used for diagnosis.		
4 th	2	Kingdom: Protista and Animalia: and intestinal protozoa	The fourth practical lecture includes an explanation of the protozoan phylum and the protozoan class with the examples mentioned, detailing the infective phase of each parasite with a drawing.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Intestinal protozoa : as <i>Giardia lamblia</i> And urogenital protozoa ; <i>Trichomonas vaginalis</i>	The fifth practical lecture includes the previous lecture's discussion of the types of intestinal amoeba, such as: <i>Giradia lambelia:</i> urogenital parasites such as <i>Trichomonas vaginalis</i>	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Blood and tissue protozoa such as : Plasmodium - Species	The sixth practical lecture includes a comprehensive explanation of hemospores, for example: malaria of all kinds.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Exam	Seasonal exam.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

8 th	2	Blood and tissue protozoa: such as - <i>Toxoplasma gondii</i>	The eighth practical lecture includes a sequel to Hemosporidiosis. Example: <i>Toxoplasmosis gondii</i>	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	- hemamphlagellates such as : Leishmania Spp.	The ninth lecture of the practical course includes an explanation of flagellates of blood and tissues, such as leishmaniasis, its various types and causes, as well as methods of diagnosis and methods of preventing them.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Extracellular in BLOOD & TISSUES protozoa : Trypanosoma spp.	The tenth lecture of the practical material includes an explanation of flagellates of blood and tissues (extracellular in blood and tissues). Such as the causes of sleeping sickness in Africa, etc		
11 th	2	Exam	Seasonal exam.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Kingdom : Animalia Sub kingdom :Metozoa Phylum :Platyhemintnes Class : Trematoda	The twelve lectures of the practical material include a comprehensive explanation of the known types of flukes, which are intestinal flukes, pulmonary flukes, and blood flukes.		
13 th	2	Cestoda	The thirteenth lecture includes an explanation of tapeworms, such as: Beef tapeworm and unarmed tapeworm	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Nematoda	The fourteenth lecture includes an explanation of nematodes such as	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			whipworms and pin worms. The snake's stomach is caused by <i>Ascaris lumbricoides</i>		
15 th	2	--	Exam		
95. Course Evaluation					
Overall score out of 100 (Semester grade = 40, including: 25 for theoretical + 15 for practical) (End-of-semester exam score = 60, including 40 for theory + 20 for practical)					
96. Learning and Teaching Resources					
Required (curricular books, if any)	textbo	- Gillies R.R. & Dodds, 1984: Bacteriology illustrated, edition. Long man group limited. USA. (Text book).			
Main references (sources)		<p>1- Katherine N. Ward, A. Christine McCartney & Bishan Thakker 2009: Notes On Medical Microbiology, 2nd edition. Churchill Livingstone Elsevier. UK.</p> <p>2- Morello, Mizer & Granato 2006: Laboratory manual and Workbook in Microbiology “Application to patient care”, Eighth edition. The McGraw-Hill Companies Inc., USA.</p> <p>3- Whitman, William B; Rainey, Fred; Kämpfer, Peter; Trujillo, Martha; Chun, Jonsik; Devos, Paul; Hedlund, Brian; Dedysh, Svetlana (eds.) (2015). <i>Bergey's Manual of Systematics of Archaea and Bacteria</i>. John Wiley and Sons.</p> <p>6- Richard A. Harvey, Cynthia Nau Cornelissen and Bruce D. Fisher. Microbiology. (Lippincott's Illustrated Reviews) 3rd edition. 2014</p> <p>7- Bailey and Scott's.(2014). Diagnostic microbiology.Elseiver,2014.</p> <p>6-- Brock TD.Madigan M. Martinko J. et al.editors: Biology of microbiology. Upper Saddle River, NJ.2009. Prentice Hall</p>			
Recommended books and references (scientific journals, reports...)		- Scientific journals, periodicals and research in the field			
Electronic Websites	Referenc	<ul style="list-style-type: none"> • https://en.wikipedia.org/wiki/Microbiology • https://en.wikipedia.org/wiki/Medical_microbiology. 			

	<ul style="list-style-type: none"> • https://rlmc.edu.pk/themes/images/gallery/library/books/Microbiology/Text_Book_of_Microbiology.pdf.
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Animal physiology

97. Course Name:
Animal Physiology
98. Course Code:
BIOT220
99. Semester / Year:
2 nd semester / 2023-2024
100. Description Preparation Date:
1-4-2024
101. Available Attendance Forms:
Weekly attendance
102. Number of Credit Hours (Total) / Number of Units (Total)
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)
103. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Shaima Razaq Ibraheem Email: shaima.ibraheem@sc.uobaghdad.edu.iq
104. Course Objectives
<p>This course aims to provide a course of study in the physiology of mammals, especially humans, based on Knowledge of basic physiological principles of living organisms</p> <p>To develop more practical biological skills in the field of organismal physiology.</p> <p>To prepare students for a number of natural sciences courses in physiology, development and neuroscience, as well Pharmacology, pathology and zoology, among others.</p>
105. Teaching and Learning Strategies
<p>41. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint.</p> <p>42. Providing students with homework.</p> <p>43. Preparing reports related to academic vocabulary.</p> <p>44. Visit websites to obtain additional knowledge of academic subjects.</p> <p>45. Brainstorming during lectures.</p>
106. Course Structure: Theory

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1st	2	Introduction to physiology	Physiology definitions, scientific research, homeostasis	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2nd	2	Nervous system physiology	General function, Neuron, types, supporting cells, Myelin	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3rd	2	Nervous system physiology	Impulse formation, Synapses , types	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4th	2	Muscular system physiology	General function, Muscle types, structure	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5th	2	Muscular system physiology	Contraction and relaxation mechanism, sliding theory, muscle fuel	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6th	2	--	Seasonal Exam		
7th	2	Circulatory system physiology	General function, subdivisions, heart, blood vessels	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8th	2	Circulatory system physiology	Capillaries, conduction system, cardiac output	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9th	2	Respiratory system physiology	General function, structure, Alveoli structure, function, respiration stages , mechanism of breathing	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10th	2	Respiratory system physiology	Respiratory volumes, Gas transport	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

11 th	2	Urinary system physiology	General function, Kidney, Nephron , structure and function	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	--	Seasonal exam		
13 th	2	Urinary system physiology	Urine formation, Filtration, Reabsorption, Secretion,	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Digestive system physiology	General function, Alimentary tract ,type of digestion, digestive enzymes in stomach, intestine, pancreas	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Endocrine system physiology	Glands , hormones	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

Course Structure: Practical

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Hematology	Blood collection	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Hematology	Anticoagulant	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Hematology	Hemoglobin determination	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Hematology	Erythrocyte sedimentation rate determination	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

5 th	2	Hematology	Bleeding time and Clotting time determination	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Hematology	RBC count	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Hematology	WBC count	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Hematology	Differential count of WBC	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Hematology	Blood group and RH typing	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Hematology	Exam		
11 th	2	Hematology	Blood pressure, Blood diseases	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Hematology	Fragility tests		
13 th	2	Muscle function	Muscle twitch	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Liver function	Liver function test	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2		Exam		

107. Course Evaluation

Overall score out of 100

(Semester grade = 40, including: 25 for theoretical + 15 for practical)

(End-of-semester exam score = 60, including 40 for theory + 20 for practical)

108. Learning and Teaching Resources	
Required textbo (curricular books, if any)	-Basics of Physiology / Abdul Rahim Ashir and Sa Nasser Al-Alwaji
Main references (sources)	-A textbook of practical physiology, 2013 (8 th edition) -Endocrine secrets, 6 th ed., Michael T. McDermott,2013
Recommended books and references (scientific journals, reports...)	-Human Physiology/ Stuart Iron Fox/2004
Electronic Referenc Websites	https://en.wikipedia.org/wiki/Physiology https://www.medicalnewstoday.com/articles/ 248791

Plant Physiology

109. Course Name:
Plant Physiology
110. Course Code:
BIOT230
111. Semester / Year:
2nd semester / 2023-2024
112. Description Preparation Date:
1/10/2023
113. Available Attendance Forms:
Weekly attendance
114. Number of Credit Hours (Total) / Number of Units (Total)
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)
115. Course administrator's name (mention all, if more than one name)
Name: Assistant Prof. Dr. Alaa Abd AlHussein Jabr AL-Behadili Email: alaa.abd@sc.uobaghdad.edu.iq
116. Course Objectives
Introducing the student to the plant cell, its components of organelles, and their role in performing vital and metabolic functions important to plant life.
117. Teaching and Learning Strategies
46. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint. 47. Providing students with homework. 48. Preparing reports related to academic vocabulary.

49. Visit websites to obtain additional knowledge of academic subjects.
50. Brainstorming during lectures.

118. Course Structure: Theory

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Plant cells and tissues and their components	Concepts, definitions and foundations in plant physiology	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Absorption and transport of mineral fluids	Fluid transport theories	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Exchange of organic substances in plant cells	Theories of ion exchange and transport mechanics	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Factors affecting the exchange of organic fluids	Paths and theories of transmission mechanics	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Respiration and factors affecting it	Respiration and gas exchange, respiratory coefficient and factors affecting it	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	--	Seasonal Exam		
7 th	2	Definition, discovery and impact on growth	Hormones and growth regulators	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Its chemical composition, metabolic pathway, and physiological effect	Auxins	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

9 th	2	Its chemical composition, metabolic pathway, and physiological effect	Cytokinins	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Its chemical composition, metabolic pathway, and physiological effect	Gibberellin	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Its chemical composition, metabolic pathway, and physiological effect	Ethylene	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	--	Seasonal exam		
13 th	2	Its chemical composition, metabolic pathway, and physiological effect	Absic acid	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Bud dormancy	Influencing factors, artificially breaking dormancy, expected benefits	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	stress	Water, thermal and salt stress	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

Course Structure: Practical

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	organization	The Root and Shoot system	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

2 nd	2	The solution	Terms About Solution	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Diffusion, Osmosis and Imbibition part:1	Plant cells as osmotic systems	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Diffusion, Osmosis and Imbibition part2	Plant cells as osmotic systems	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Transpiration in plant	Discuss of water transport through the xylem	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Transpiration in plant	Mechanism of stomatal transpiration	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Plant pigments	Chlorophylls, carotenoids and phycobilins	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	The plant Hormones: part1	Auxins , cytokines , Gibberelline	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	The plant Hormones: part 2	Ethylen , Abscisic acide	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2		Exam		
11 th	2	The plant defense mechanisms : part1	Physical structures and barriers	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	The plant defense mechanisms : part2	Defens responses against pathogens / chemical signals	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

13 th	2	The plant defense mechanisms : part3	(Zigzag Model)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	The plant defense mechanisms : part4	(Zigzag Model)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2		Exam		

119. Course Evaluation

Overall score out of 100

(Semester grade = 40, including: 25 for theoretical + 15 for practical)

(End-of-semester exam score = 60, including 40 for theory + 20 for practical)

120. Learning and Teaching Resources

Required textbo (curricular books, if any)	Fundamentals Of Plant Physiology, By: V.K.Jain, 2008.S.Chand & company LTD
Main references (sources)	Introduction to Plant Physiology By: William G. Hopkins and Norman P. A. H Turner / 2008
Recommended books and references (scientific journals, reports...)	PLANT PHYSIOLOGY By: Vince Ördög/ 2011
Electronic Referenc Websites	<ul style="list-style-type: none"> https://en.wikipedia.org/wiki/Plant_physiology https://academic.oup.com/plphys

Phycology

1. Course Name:	Phycology
2. Course Code:	BIOT225
3. Semester / Year:	2 nd semester / 2023-2024
4. Description Preparation Date:	1-10-2023
5. Available Attendance Forms:	Weekly attendance

6. Number of Credit Hours (Total) / Number of Units (Total)					
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)					
7. Course administrator's name (mention all, if more than one name)					
Name: Prof. Dr. Abdulkareem Jasim Hashim Email: abdulkareem.hashim@sc.uobaghdad.edu.iq					
8. Course Objectives					
This course deals with the basic concept of Phycology and to understand the role of Phycology in the biotechnology field					
9. Teaching and Learning Strategies					
The main strategy that will be adopted in delivering this module is to encourage students' participation in the collection of different samples, media preparation. Isolation and primitive identification according to the acquired skills from the theoretical and practical information through lectures and Lab.					
10. Course Structure: Theory					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Introduction to phycology	Introduction , Old classification systems, Fossils record, Occurrence and distribution, Algal forms	Paper lectures Data show	Daily, semester and final exams
2 nd	2	Cell structure	Cell wall, Protoplast, Plastid and pigments, Storage products	Paper lectures Data show	Daily, semester and final exams
3 rd	2	Cell structure and life cycle	Nucleus, Flagella, Growth in algae, Reproduction and life cycles	Paper lectures Data show	Daily, semester and final exams
4 th	2	Classification of Algae Division: Cyanophyta	Others classification systems, Division: Cyanophycophyta, General characteristics, Morphology, Cell wall structure and	Paper lectures Data show	Daily, semester and final exams

			gliding, Protoplasmic structures,		
5th	2	Division: Cyanophyta	Pigments, Akinetes , Heterocysts , Reproduction, ,Occurrence and Habitat, Classification	Paper lectures Data show	Daily, semester and final exams
6th	2	--	Seasonal Exam		
7th	2	Division: Chlorophyta	Introduction, Occurrence and Habitat , General characteristics, Cell fine structure, Phototaxis and eyespots, Classification, Order: Chlorellales, Order: Vovocales	Paper lectures Data show	Daily, semester and final exams
8th &9th	2	Division: Chlorophyta	Genus: Volvox, Orders: Tetrasporales, Ulothrichales, Oedogoniales, Cladophorales, Zygnematales, andOrder: Siphonocladales	Paper lectures Data show	Daily, semester and final exams
10th	2	Division: Charophyco phyta	Order: Charales, General characteristics, Growth, Reproduction	Paper lectures Data show	Daily, semester and final exams
11th	2	Division: Euglenophyc ophyta	, General characteristics, Cell structure and Nutrition,Classificati on,	Paper lectures Data show	Daily, semester and final exams

			Order: Euglenales, Genus: Euglena, Description under light and electronic Microscope.		
12th	2	--	Seasonal exam		
13th	2	Division: Xanthophyc ophyta	, Introduction, General characteristics , Classification, Order: Mischococcales, Order: Tribonematales, Order: Botrydiales, Order: Vaucheriales	Paper lectures Data show	Daily, semester and final exams
14th	2	Division: Phaeophyc ophyta	General characteristics, Reproduction, Life cycle and Growth, Classification, Order:Ectocarpales , Family: Ectocarpaceae	Paper lectures Data show	Daily, semester and final exams
15th	2	Division: Pyrrhophyc ophyta, Division: Rhodophyc ophyta	General characteristics, Classification, Toxins, Red tides and its causes. , General characteristics, Commercial utilization of red algal mucilages, Reproduc tive structures, Classification, Order: Ceramiales	Paper lectures Data show	Daily, semester and final exams
Course Structure: Practical					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method

1 st	2	Phycology	Algal forms	Paper lectures Algal slides by Data show	Daily, semester and final exams
2 nd	2	Phycology	Taxonomic and collection methods for algae	Paper lectures Algal slides by Data show	Daily, semester and final exams
3 rd	2	Phycology	Division: Cyanophyta	Paper lectures Algal slides by Data show	Daily, semester and final exams
4 th	2	Phycology	Chlorophyta part1	Paper lectures Algal slides by Data show	Daily, semester and final exams
5 th	2	Phycology	Cholorophyta part 2	Paper lectures Algal slides by Data show	Daily, semester and final exams
6 th	2	Phycology	Euglanophyta and Pyrrophyta	Paper lectures Algal slides by Data show	Daily, semester and final exams
7 th	2	Phycology	Xanthophyta and Chrysophyta	Paper lectures Algal slides by Data show	Daily, semester and final exams
8 th	2	Phycology	Phaeophyta and Bacillariophyta	Paper lectures Algal slides by Data show	Daily, semester and final exams
9 th	2	Phycology	Rhodophyta	Paper lectures Algal slides by Data show	Daily, semester and final exams
10 th	2	Phycology	Exam		
11 th	2	Phycology	Isolation and identification	Samples collection	Daily, semester and final exams
12 th	2	Phycology	Isolation and identification	Algae separation and identification	
13 th	2	Phycology	Isolation and identification	Algae separation and identification	Daily, semester and final exams
14 th	2	Phycology	Isolation and identification	Algae separation and identification	Daily, semester and final exams

15 th	2		Exam		
11. Course Evaluation					
Overall score out of 100 (Semester grade = 40, including: 25 for theoretical + 15 for practical) (End-of-semester exam score = 60, including 40 for theory + 20 for practical)					
12. Learning and Teaching Resources					
Required (curricular books, if any)	textbo	Phycology, by Robert Edward Lee, Fourth Edition, Cambri 2008.			
Main references (sources)		Phycology, by Robert Edward Lee, Fourth Edition, Cambridge 2008.			
Recommended books and references (scientific journals, reports...)					
Electronic Websites	Referen	https://en.wikipedia.org/wiki/Phycology https://www.twinkl.com			

Course Description Form for the 3rd stage subjects

Molecular biology

121. Course Name:
Molecular Biology
122. Course Code:
BIOT300
123. Semester / Year:
2 nd semester / 2023-2024
124. Description Preparation Date:
1-10-2023
125. Available Attendance Forms:
Weekly attendance
126. Number of Credit Hours (Total) / Number of Units (Total)
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)
127. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Nuha Joseph Najeeb Kandala Email: nuha.najeeb@sc.uobaghdad.edu.iq
128. Course Objectives
This course covers the concepts of molecular biology, introducing students to one of its fundamental branches, which is molecular biology. This branch entails the study of the molecular nature of large molecules such as DNA, RNA, and proteins, along with the biological information associated with them. The course includes an introduction and a historical overview of the development of molecular biology, a comprehensive understanding of cellular functions at the molecular level in both prokaryotic and eukaryotic cells, types of nucleic acids and their chemical structures, characteristics and features of DNA and RNA, DNA replication, the discovery of the genetic code, gene expression (transcription), the basic steps of transcription, and the enzymes responsible for transcription in prokaryotic and eukaryotic cells. The translation also includes primitive and true nucleus, types of functional and structural proteins, types of RNA, regulation of gene expression in prokaryotic and eukaryotic cells, and an introduction to genetic engineering. This course description provides a concise summary of the main features of the course and the expected learning outcomes for students, ensuring whether they have maximized their learning and educational opportunities.
129. Teaching and Learning Strategies
51. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint.

52. Providing students with homework.
 53. Preparing reports related to academic vocabulary.
 54. Visit websites to obtain additional knowledge of academic subjects.
 55. Brainstorming during lectures.

130. Course Structure: Theory

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	History of molecular biology	A-Introduction of molecular biology B-Definition of Molecular biology B-Identified DNA as the primary agent of genetic material C-key experiments which identified DNA as the primary genetic material D-The two major piece of evidence supporting DNA as the geneticsmaterial	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	The chemical composition of nucleic acid	A-The chemical composition of nucleic acid B-The structure of DNA and RNA. C-What is the structure of DNA? How is the structure related function? D-Chargaff's Law : the experiment , examples of Chargaff's Law applications . E-Some studies of DNA structure	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	The Watson and Crick model	A-The Watson and Crickmodel. B-Watson andF.H.C.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			<p>Crick Physical characteristics of the model</p> <p>C-Base Pairs and Stacking</p> <p>D-Alternative DNA Structures</p> <p>E-Compare between prokaryotic and eukaryotic cells</p> <p>F-DNA and RNA Molecules in different types of cells</p>		
4 th	2	Structure of DNA in the Cell	<p>A-Different types of nucleic acid</p> <p>B-Supercoiling is Necessary for Packaging of Bacterial DNA</p> <p>C-The Eukaryotic Nucleosome.</p> <p>D-Some examples of genome in different organisms</p>	<p>Paper lectures</p> <p>Electronic screen</p> <p>Video lectures via electronic classes</p>	<p>Daily, semester and final exams</p>
5 th	2	Replication process in prokaryotic cells	<p>A-DNA Replication Introduction to Prokaryotic replication</p> <p>B-Mechanism of DNA replication</p> <p>C-Stages of replication process(initiation ,elongation and termination)</p> <p>D-Types of enzymes in stages of replication</p>	<p>Paper lectures</p> <p>Electronic screen</p> <p>Video lectures via electronic classes</p>	<p>Daily, semester and final exams</p>
6 th	2	Replication process in Euokaryotic cells	<p>A-Eukaryotic Chromosomes</p> <p>B-Synthesis of Eukaryotic DNA</p> <p>C-Types of enzymes in stages of replication</p> <p>D- Stages of replication process</p>		

			E-Cell Division in Higher Organisms.		
7th	2	Exam	Exam		
8th	2	Introduction to Gene Expression	Types of RNA The structure of RNAs Genetic code Characterization of Genetic code	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9th	2	First process in Gene expression: The transcription process	A-Transcription process in prokaryotic and eukaryotic cells B-Stages of transcription C-Enzymes in transcription stages	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10th	2	Exam	Exam		
11th	2	Processing and modification of pre-mRNA in eukaryotic cells	A-Modification methods: 1-Add cap in 5UTR 2-Add poly A in 3UTR B-Splicing methods	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12th	2	Protein structure and function	A-Types of proteins B- the types of amino acids C-classification of amino acids according to function and structure D-characteristic of Genetics code		
13th	2	Translation process	A-Translation process in prokaryotic and eukaryotic cells B-Stages of translation . C-Enzymes in translation stages D-compare between prokaryotes and	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			eukaryotes cells in transcription and translation process		
14 th	2	Types of DNA sequencing in Eukaryotes cells	A-Types of methods for study the sequence of DNA. B-Types of sequences in DNA	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Final exam			

Course Structure: Practical

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	The laboratory apparatus and equipment	Introduction to the The laboratory apparatus and equipment	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Determination of small liquid volumes.	Micro-pipette tool: <ol style="list-style-type: none"> 1. Positive displacement and air displacement. 2. Obtaining precise measurements with the micro-pipette. 3. Avoiding contamination of the micro-pipette. 4. Method of use. 5. Verification of the micro-pipette's functionality. 	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			6. Cleaning and storage of the micro-pipette."		
3 rd	2	"Preparation of Buffers and Laboratory Solutions."	"Understanding Different Types of Chemical Substances and the Laws Governing Their Preparation."	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Exam			
5 th	2	"General Introduction to Nucleic Acid Extraction."	"The Basic Steps of Extraction from Various Sources."	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	DNA extraction from bacteria	"Preparation of Bacterial Samples and Solutions Used for Extraction, and Understanding the Sequential Steps Involved."	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	DNA extraction from blood	"Preparation of blood Samples and Solutions Used for Extraction, and Understanding the Sequential Steps Involved."	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	DNA extraction from plant	Preparation of plant Samples and Solutions Used for Extraction, and Understanding the Sequential Steps Involved."	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Exam			
10 th	2	RNA extraction methods	"The different methods for RNA extraction include preparation techniques for		

			solutions and the use of the manual method as well as the kit-based extraction."		
11 th	2	Measure the concentration and purity of nucleic acid	"Understanding the Wavelengths Used for Measuring Concentration and Purity."	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Gel electrophoresis Part 1	General understanding to the gel electrophoresis method		
13 th	2	Gel electrophoresis Part 2	General understanding to the gel electrophoresis method	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	"Measuring the Melting Temperature of Deoxyribonucleic Acid (DNA)."	Definition of Melting Temperature (T _m), The Basic Principle of Melting Temperature, Experimental Measurement of Melting Temperature (T _m)."	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Final exam			

131. Course Evaluation

Overall score out of 100

(Semester grade = 40, including: 25 for theoretical + 15 for practical)

(End-of-semester exam score = 60, including 40 for theory + 20 for practical)

132. Learning and Teaching Resources

Required textbo
(curricular books, if any)

Molecular Biology Authored by Dr. Ghalib Al-Bakri"

Main references (sources)

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

1-Analysis of Genes and Genomes .
by Richard .J .Reece. . 2004 .
2-Genetics .
By Leland ,H.Hartwell.;Leroy
Hood.;Michael,L.Goldberg .;Ann,E.Reynolodset
al., .2000.

	3-Essential of Genetics . By Williams,S.Klug anMichael,R.Cummings.2002.fifth edition .
Electronic-References, Websites	https://drive.google.com/file/d/1Ao2R1fWEy02I4ZmcB4hpBJSmLt4s7jMG/view https://youtu.be/yYIZgS-L5Sc https://youtu.be/q6PP-C4udkA https://www.thermofisher.com/iq/en/home/brands/in-vitrogen/molecular-biology-technologies https://www.youtube.com/watch?v=DT5CSgNu61Y

Plant Biotechnology

133. Course Name:
Plant Biotechnology
134. Course Code:
BIOT310
135. Semester / Year:
1stsemester / 2023-2024
136. Description Preparation Date:
1-10-2023
137. Available Attendance Forms:
Weekly attendance
138. Number of Credit Hours (Total) / Number of Units (Total)
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)
139. Course administrator's name (mention all, if more than one name)
Name: Assist . Prof. Dr. Majid Rasheed Majeed
Email:

140. Course Objectives

This course aims to provide a course of study in the plant biotechnology, plant extraction, its role in the medical and pharmaceutical fields .

To develop more practical biological skills in the plant biotechnology.

141. Teaching and Learning Strategies

56. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint.

57. Providing students with homework.

58. Preparing reports related to academic vocabulary.

59. Visit websites to obtain additional knowledge of academic subjects.

60. Brainstorming during lectures.

142. Course Structure: Theory

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Introduction to biotechnology	definitions, scientific research,	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	What is plant biotechnology (introduction)	General function, types,	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Secondary metabolites, classification: Terpenoids	General function, types, structure	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Nitrogen containing compounds	General function, , structure	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Phenolics	General function, types, structure	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Production of secondary metabolites in culture	General function, types, structure	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

7 th	2	Elicitors and hairy roots	General function, types, structure	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	First Mid. Exam.			
9 th	2	Bioreactors	General function, structure	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Transgenic plants: Agrobacterium, Expression	Learn about the importance of Transgenic plants: Agrobacterium	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Bt, herbicide and virus resistant plants	General function, structure and types	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Methods of DNA transformation to plant cell	Learn about the importance of DNA transformation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13 th	2	DNA transformation in protoplast	General function, structure and types	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	DNA transformation in tissue	General function, structure and types	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Second Mid. Exam.			
Course Structure: Practical					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Significance of medicinal plants to human being	Learn about the importance of medicinal and industrial plants	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

2 nd	2	Extraction techniques of medicinal plants	Extraction of medicinal plants	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Some of Plant Secondary Metabolites (Terpenoids)	Extraction of Terpenoids	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Some of Plant Secondary Metabolites (Essential Oils)	Extraction of Essential Oils	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Some of Plant Secondary Metabolites (Alkaloids)	Extraction of Alkaloids	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Some of Plant Secondary Metabolites (Drug application of Alkaloids)	Learn about the importance of Drug application of Alkaloids)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Some of Plant Secondary Metabolites Phenolic compounds (phenols)	Extraction of Phenolic compounds	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Some of Plant Secondary Metabolites Tannins	Extraction of Tannins compounds	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Exam			
10 th	2	Some of Plant Secondary Metabolites (Flavonoids)	Extraction of Flavonoids	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Separation and isolation techniques	Learn about the importance of Secondary Metabolites	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

12 th	2	Cellular Biotechnology for Obtaining Medicinal Plants	Importance Some of Plant Secondary Metabolites for Obtaining Medicinal Plants	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13 th	2	Regulation of synthesis of secondary compounds	Importance of synthesis of Secondary Metabolites	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	The relationship of nanotechnology with plant biotechnology	Importance of synthesis of Secondary Metabolites with nanotechnology	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Exam			

143. Course Evaluation

Overall score out of 100

(Semester grade = 40, including: 25 for theoretical + 15 for practical)

(End-of-semester exam score = 60, including 40 for theory + 20 for practical)

144. Learning and Teaching Resources

Required textbo (curricular books, if any)	Plant biotechnology , K.G. Ramawat 2008
Main references (sources)	PLANT BIOTECHNOLOGY AND TRANSBENIC PLANTS By: KIRSI-MARJA OKSMAH-CALDENTY and WOLFGANG H. BARZ/ 2002
Recommended books and references (scientific journals, reports...)	Plant Biotechnology: Recent Advancements and Developments By:Suresh Kumar Gahlawat • Raj Kumar and Salar Priyanka Siwach/ 2007
Electronic Referenc Websites	PRINCIPLES OF PLANT BIOTECHNOLOGY ICAR eCourse / 2015

Gene and biochemical technique

145. Course Name:
Gene and biochemical technique
146. Course Code:
BIOT215
147. Semester / Year:
1 nd semester / 2023-2024
148. Description Preparation Date:
1-10-2023

149. Available Attendance Forms:					
Weekly attendance					
150. Number of Credit Hours (Total) / Number of Units (Total)					
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)					
151. Course administrator's name (mention all, if more than one name)					
Name: Prof. Dr. Asmaa Mohammed Saud Email: asmaa.saud@sc.uobaghdad.edu.iq					
152. Course Objectives					
This course aims to deal with the cellular products of proteins, enzymes, and other living organisms, whether microorganisms, plants, or animals, in order to achieve the maximum benefit from them medically, therapeutically, nutritionally, industrially, agriculturally, and economically. To prepare students for a number of natural science courses in identifying important methods for purifying the vital materials of all organisms and estimating their weights to benefit from them at all levels.					
153. Teaching and Learning Strategies					
61. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint. 62. Providing students with homework. 63. Preparing reports related to academic vocabulary. 64. Visit websites to obtain additional knowledge of academic subjects. 65. Brainstorming during lectures.					
154. Course Structure: Theory					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Introduction - Extraction of proteins by different source	- Protein purification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Ammonium sulfate precipitation, saturation table,	Precipitation and differential solubilization	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Removing the ammonium sulphate by Dialysis,	Dialysis Ultracentrifugation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

4th	2	Examples and applications	Preparing a Purification Table	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5th	2	Ion exchange resins contain charged groups, Some Biochemically Useful Ion Exchangers.	Column chromatography	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6th	2	--	Seasonal Exam		
7th	2	Types of gels used, Advantages of Gel filtration, Applications of gel filtration	Gel filtration chromatography	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8th	2	Example and applications	Estimation of molecular weight by gel filtration:	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9th	2	- Reversible Denaturing of DNA, Gene Technology	Structure & Function of DNA	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10th	2	CsCl (Cesium Chloride) Centrifugation of DNA: -Solid-phase Nucleic Acid Extraction: - oligo(dT) affinity chromatography to isolate mRNA:	Nucleic acid purification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11th	2	Comet assay technique, Principle action,	DNA damage detection	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

		Potential applications			
12 th	2	--	Seasonal exam		
13 th	2	I. Blotting II-PCR (polymerase chain reaction) -Synthesis PCR cycle is composed of three steps:	Nucleic Acids Detection Techniques	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Types of DNA microarrays, Principles of DNA Microarray experiments	-Microarray technique:	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Methods of DNA exchanged, - Electroporation Works	DNA Exchanged, Electroporation technique	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

Course Structure: Practical

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Extraction Techniques	Protein purification Techniques	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Techniques by salts	Precipitation of proteins	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Techniques by used Chromatography column	Ion Exchange Chromatography	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Techniques by used Chromatography column	Gel filtration chromatography	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

5 th	2	DNA Extraction Techniques	DNA Structure	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Techniques	Polymerase Chain Reaction	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	PCR-Techniques	DNA and Protein sequence online databases	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Online databases	Southern Blot	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Techniques	Electroporation Technique	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Techniques	Comet assay	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Techniques of Comet assay(preparation of buffers and slides)	Saturation table	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Saturation table application,	Saturation table	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13 th	2	Preparing a Purification Table application	Preparing a Purification Table	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	online	Primer design	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2		Exam		

155. Course Evaluation	
Overall score out of 100 (Semester grade = 40, including: 25 for theoretical + 15 for practical) (End-of-semester exam score = 60, including 40 for theory + 20 for practical)	
156. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	- Book of microbial biotechnology / Prof. Dr. Zaid Mahmoud Nasser Al-Khafaji - Publication year 2008
Main references (sources)	- Palmer P L Bonner Enzymes 2nd Biochemistry, Biotechnology, Clinical Chemistry 2007. Wilson and walkers principles and techniques of biochemistry and molecular biology, 8th, 2018
Recommended books and references (scientific journals, reports...)	- Robert A. Copeland ENZYME: A Practical Introduction to Structure, Mechanism, and Data Analysis SECOND EDITION A JOHN WILEY & SONS, INC. PUBLICATION, 2000
Electronic Websites	References https://drive.google.com/file/d/101HqrT0NeZ9xBCfQ5oLjWASOahWJD69/view?usp=drivesdk

Pathogenic bacteria

157. Course Name:
Pathogenic bacteria
158. Course Code:
BIOT305
159. Semester / Year:
2 nd semester / 2023-2024
160. Description Preparation Date:
1-10-2023
161. Available Attendance Forms:
Weekly attendance
162. Number of Credit Hours (Total) / Number of Units (Total)
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)
163. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Suhad Saad Mahmood

Email: suhad.mahmood@sc.uobaghdad.edu.iq

164. Course Objectives

This course aims to provide a course of study in the physiology of mammals, especially humans, based on Knowledge of basic physiological principles of living organisms

To develop more practical biological skills in the field of organismal physiology.

To prepare students for a number of natural sciences courses in physiology, development and neuroscience, as well Pharmacology, pathology and zoology, among others.

165. Teaching and Learning Strategies

66. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint.

67. Providing students with homework.

68. Preparing reports related to academic vocabulary.

69. Visit websites to obtain additional knowledge of academic subjects.

70. Brainstorming during lectures.

166. Course Structure: Theory

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Introduction to Bacteriology	Bacteria Compared with, Other Microorganisms . Structure of Bacterial Cell,. Growth, Classification of Medically Important Bacteria	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Bacterial Pathogenesis and Host Interactions	General features, Pathogenesis, Clinical significance, Laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Normal flora	General features, Pathogenesis, Clinical significance, Laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Gram positive bacteria- Staphylococci	General features, Pathogenesis, Clinical significance, Laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

5 th	2	Streptococci	General features, Pathogenesis, Clinical significance, Laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2		Seasonal Exam		
7 th	2	Gram negative rod	General features, Pathogenesis, Clinical significance, Laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Escherichia coli	General features, Pathogenesis, Clinical significance, Laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	bacillus species	General features, Pathogenesis, Clinical significance, Laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Neisseria	General features, Pathogenesis, Clinical significance, Laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Salmonella and shigella	General features, Pathogenesis, Clinical significance, Laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	--	Seasonal exam		
13 th	2	Haemophilus influenzae,	General features, Pathogenesis, Clinical significance, Laboratory identification,	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Pseudomonas spp.	General features, Pathogenesis, Clinical significance, Laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Un typical bacteria	General features, Pathogenesis, Clinical significance, Laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

Course Structure: Practical

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Introduction in practical bacteriology	practical bacteriology	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Biosafety in biological laborites	Biosafety principles	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Staphylococci	General characteristics laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Streptococci	General characteristics laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Gram negative rod	General characteristics laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Exame		Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Neisseria	General characteristics laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Escherichia coli	General characteristics laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	SALMONELL A and SHIGELLA	General characteristics laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

10 th	2	CLOSTRIDIA	General characteristics laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Bacteroides	General characteristics laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Review and rendering all labs	All identifications tests	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13 th	2	Exam			
14 th	2	Mycobacterium	General characteristics laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Spirochetes	General characteristics laboratory identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

167. Course Evaluation

Overall score out of 100

(Semester grade = 40, including: 25 for theoretical + 15 for practical)

(End-of-semester exam score = 60, including 40 for theory + 20 for practical)

168. Learning and Teaching Resources

Required textbooks (curriculum books, if any)

Main references (sources)

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

Electronic References, Websites

Fermentation technology

169. Course Name:

Fermentation technology

170. Course Code:

BIOT320

171. Semester / Year:

1st semester-3rd class / 2023-2024					
172. Description Preparation Date:					
1-10-2023					
173. Available Attendance Forms:					
Weekly attendance					
174. Number of Credit Hours (Total) / Number of Units (Total)					
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)					
175. Course administrator's name (mention all, if more than one name)					
Name: Prof. Dr. Khalid Jaber Kadhum Email: Khalid.kadhumi@sc.uobaghdad.edu.iq					
176. Course Objectives					
<ol style="list-style-type: none"> 1. Enabling students to gain knowledge and understanding the definition and scope of fermentation technology. 2. Students will learn the upstream processing (USP) and downstream processing (DSP). 					
177. Teaching and Learning Strategies					
<p>71. Providing students with the basics and additional topics related to the outputs of thinking and analysis of biotechnologies</p> <p>72. Forming discussion groups during lectures to discuss topics in biotechnology that require thinking and analysis.</p> <p>73. Asking students a set of thinking questions during lectures such as what, how, why and why for specific topics.</p> <p>74. Giving student's homework that requires self-explanations in causal ways..</p>					
178. Course Structure: Theory					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	An introduction to fermentation technology	An introduction	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Upstream Processing	Upstream Processing	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

3 rd	2	Industrial strains.	Industrial strains.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Media for industrial fermentation.	Media and substrate	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Culture systems: Batch culture.	Culture systems	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Fed batch culture.	Culture systems		
7 th	2	Continuous culture.	Culture systems	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Mid Exam	Mid Exam	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Solid-state fermentation.	Solid-state fermentation.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Fermenters: definition and types of fermenters.	Fermenters: definition and types of fermenters.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Fermenter design and construction.	Fermenter	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Fermenter control and monitoring,	Fermenter		
13 th	2	Sterilization of the fermenter: The achievement and maintenance of	Fermentor	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

		aseptic conditions.			
14 th	2	Downstream processing	Downstream processing	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	The Recovery and Purification of Fermentation Products	The Recovery and Purification of Fermentation Products	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
Course Structure: Practical					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Production of ethanol by yeast.	Microbial metabolites	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Isolation of Industrial Microorganisms from Soil and their Potential to Produce Antibiotics.	Isolation of Industrial Microorganisms	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	The rate of fermentation varies with the type of sugar being metabolized.	Fermentation and carbon source	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Fermentation of lactose by lactic acid producing bacteria: Yoghurt	Fermentation of lactose	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Exam	Exam	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

6 th	2	How fermentation varies with changes in temperature.	Fermentation and temperature	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Yeast fermentation with and without aeration	Yeast fermentation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Anaerobic fermentation	Anaerobic fermentation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Production of protease by <i>Aspergillus niger</i> in liquid culture	Submerged Fermentation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Production of protease by <i>Aspergillus niger</i> in solid state fermentation	Solid- State Fermentation		
11 th	2	Bioreactor: design and construction	Bioreactor	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	How to sterilize bioreactor	Bioreactor		
13 th	2	Downstream processing: how to extract and purified a microbial product from fermentation culture.	Downstream processing	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Downstream processing: Purification of enzymes from liquid culture	Downstream processing	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Downstream processing: Purification of enzymes from	Downstream processing		

		solid state fermentation			
179. Course Evaluation					
Overall score out of 100 (Semester grade = 40, including: 25 for theoretical + 15 for practical) (End-of-semester exam score = 60, including 40 for theory + 20 for practical)					
180. Learning and Teaching Resources					
Required textbo (curricular books, if any)	- Industrial biotechnology for Dr.Nedam Al-Hydari.				
Main references (sources)	1. Manual of Industrial Microbiology and Biotechnology (Third edition 2010) By Richard H. Baltz <i>et. al</i> 2- Principles of fermentation technology (second edition 2003) By Stanbury PF; Whitaker; Hall SJ 3- Bioprocess Engineering: Basic concepts by Fikret Kargi ➤				
Recommended books and references (scientific journals, reports...)	1. Fermentation Microbiology and Biotechnology A.L Demain <i>et. al</i> 2. Practical Fermentation Technology Brain Mchneil & Linda M. Harvey				
Electronic Websites	Referenc WWW.Fermentation technology.org				

Mycology

1. Course Name:
Mycology
2. Course Code:
BIOL330
3. Semester / Year:
2nd semester / 2023-2024
4. Description Preparation Date:

1-10-2023

5. Available Attendance Forms:

Weekly attendance

6. Number of Credit Hours (Total) / Number of Units (Total)

2 Theoretical hours/week, one section * 15 weeks = 30 hours

4 Practical hours/week per section * 15 weeks = 60 hours

Total number of hours per section = 90 hours

Number of units = 3 units (theoretical 2 + practical 1)

7. Course administrator's name (mention all, if more than one name)

Name: Prof. Dr. Abdulkareem Jasim Hashim

Email: abdulkareem.hashim@sc.uobaghdad.edu.iq

8. Course Objectives

1. This course deals with the basic concept of mycology.
2. To understand the role of mycology in biotechnology field.

9. Teaching and Learning Strategies

The main strategy that will be adopted in delivering this module is to encourage students' participation in the collection of different samples, media preparation. Isolation and primitive identification according to the acquired skills from the theoretical and practical information through lectures and Lab.

10. Course Structure: Theory

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Introduction	Introduction, Classification systems of fungi, Morphology of fungi, Sexual and asexual spores	Paper lectures Data show	Daily, semester and final exams
2 nd	2	Important of fungi and Reprpduction	Important of fungi, Living mode, Elements and environmental requirements for fungi cultivation, Sexual and asexual	Paper lectures Data show	Daily, semester and final exams

			reproduction, sexual compatibility.		
3 rd	2	Classification of fungi. Division 1: Myxomycota,	Classification of fungi, Division 1: Myxomycota, general characteristics, the classes involved in this division. Myxomycetes and Plasmodiophoromycetes (One example for each class).	Paper lectures Data show	Daily, semester and final exams
4 th	2	Division 2: Eumycota	General characteristics, Class 1, Chytridiomycetes and its classification, Order 1: Chytridiales, order 2: Blastocladales, order 3: Monoblepharidales. Class 2, Hyphochytridiomycetes.	Paper lectures Data show	Daily, semester and final exams
5 th	2	Division 2: Eumycota	Class 3: Oomycetes, general characteristics, and the classification of this class. Order 1: Saprolegniales Order 2: Peronosporales and the families involved in this order: Family 1:- Pythiaceae, Family 2:- Peronosporaceae Family 3:- Albuginaceae.	Paper lectures Data show	Daily, semester and final exams

6 th	2	Division 2: Eumycota	Class 4: Zygomycetes, general characteristics, Orders involved in this class. Order 1: Mucorales Order 2: Entomophthorales Order 3: Zoopagales . The role of some strains in production of biomaterials		
7 th	2		Mid-term Exam.		
8 th	2	Division 2: Eumycota	Class 5: Ascomycetes, general characteristics, Subclasses involved in this class. Subclass 1: Hemiascomycetidae which classified into Order 1: Endomycetales contains two families. Family 1:- Endomycetaceae and Family 2: Saccharomycetacea e. Order 2: Taphrinales. The role of some strains in production of biomaterials, food manufacturing, plant pathogens, Human pathogens.	Paper lectures Data show	Daily, semester and final exams

9 th .		Division 2: Eumycota	<p>Class 5: Ascomycetes, Subclass 2: Euascomycetidae, general characteristics. Classification of this subclass which involves three Series: Series 1: Plectomycetes Genus 1: Aspergillus and Genus 2: Penicillium their role in biotechnology. The role of some strains in production of biomaterials, food manufacturing, plant pathogens, Human pathogens.</p> <p>Series 2: Pyrenomycetes: which involve 5 orders: Order 1: Erysiphales, Order 2: Chaetomyales, Order 3: Claviceptales, Order 4: Shpaeriales and Order 5: Hypocreales</p>		
10 th	2	Division 2: Eumycota	<p>Class 5: Ascomycetes, Series 3: Discomycetes: general characteristics, This Series classified into two groups: Group 1: Hypogean: which presence under the surface of soil.</p> <p>Group 2: Epigean</p>	Paper lectures Data show	Daily, semester and final exams

			Subclass 3: Loculoascomycetidae		
11 th	2	Division 2: Eumycota	Class 6: Basidiomycetes, general characteristics, Subclasses involved in this class. Subclass 1: Heterobasidiomycetidae, general characteristics, This subclass involves two orders: Order 1: Uredinales (Rust fungi) Order 2: Ustilaginales (Smut fungi) These two orders contain very economically important strains.	Paper lectures Data show	Daily, semester and final exams
12 th	2	Division 2: Eumycota	Class 6: Basidiomycetes, Subclasses 2: Holobasidiomycetidae, general characteristics. The role of some strains in production of enzymes such laccase, peroxidase, cellulose, Edible and poisoning mushroom.		
13 th	2		Exam.		
14 th	2	Division 2: Eumycota	Class 7: Deutromycetes, general characteristics, Orders involved in this class.	Paper lectures Data show	Daily, semester and final exams

			Order 1: Moniliales, Order 2: Sphaeropsidales, Order 3: Melanconiales And Order 4: Mycelia sterile		
15 th	2	Medical mycology and Mycotoxins	Medical mycology which involve: classification of this fungi according to the site of infection. Mycotoxins which involve the main groups of mycotoxins.	Paper lectures Data show	Daily, semester and final exams

Course Structure: Practical

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Mycology	Introduction	Paper lectures Algal slides by Data show	Daily, semester and final exams
2 nd	2	Mycology	Isolation of fungi	Paper lectures Algal slides by Data show	Daily, semester and final exams
3 rd	2	Mycology	Fungal classification (Division: Myxomycota)	Paper lectures Algal slides by Data show	Daily, semester and final exams
4 th	2	Mycology	Division: Eumycota Subdivision: Mastigomycotina Class: Chytridiomycetes	Paper lectures Algal slides by Data show	Daily, semester and final exams
5 th	2	Mycology	Division: Eumycota Subdivision: Mastigomycotina Class: Oomycetes	Paper lectures Algal slides by Data show	Daily, semester and final exams

6 th	2	Mycology	Division: Eumycota Subdivision: Mastigomycotina Class: Zygomycetes	Paper lectures Algal slides by Data show	Daily, semester and final exams
7 th	2	Mycology	Exam.		
8 th	2	Mycology	Subdivision: Ascomycotina Class: Hemiascomycetes (Protoascomycetes)	Paper lectures Algal slides by Data show	Daily, semester and final exams
9 th	2	Mycology	Subdivision: Ascomycotina Class: Ascomycetes Subclass: Plectomycetidae	Paper lectures Algal slides by Data show	Daily, semester and final exams
10 th	2	Mycology	Subdivision: Ascomycotina Class: Ascomycetes Subclass: Loculloscomycetidae	Paper lectures Algal slides by Data show	
11 th	2	Mycology		Paper lectures Algal slides by Data show	Daily, semester and final exams
12 th	2	Mycology	Subdivision: Ascomycotina Class: Ascomycetes Subclass: Discomycetida	Paper lectures Algal slides by Data show	
13 th	2	Mycology	Exam.		
14 th	2	Mycology	Samples collection and fungi isolation, purification and identification	Practical	
15 th	2		Samples collection and fungi isolation, purification and identification	Practical	

11. Course Evaluation

Overall score out of 100

(Semester grade = 40, including: 25 for theoretical + 15 for practical)

(End-of-semester exam score = 60, including 40 for theory + 20 for practical)

12. Learning and Teaching Resources

Required textbo (curricular books, if any)	Introductory mycology by Alexopoulos, C.J and C.W.Mi Third edition.
Main references (sources)	Introduction to fungi by John Webster and Roland W.S.Weber 2007. Cambridge.
Recommended books and references (scientific journals, reports...)	Introductory mycology by Alexopoulos, C.J and C.W.Mi Third edition.
Electronic Referenc Websites	https://en.wikipedia.org/wiki/Mycology

Microbial genetics

13. Course Name:
Microbial Genetics
14. Course Code:
BIOT345
15. Semester / Year:
2 nd semester / 2023-2024
16. Description Preparation Date:
1-10-2023
17. Available Attendance Forms:
Weekly attendance
18. Number of Credit Hours (Total) / Number of Units (Total)
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)
19. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Nuha Joseph Najeeb Kandala Email: nuha.najeeb@sc.uobaghdad.edu.iq
20. Course Objectives
The course aims to introduce students to one of the branches of genetics, which is the Microbial Genetics, and to study all the factors that participate in revealing the facts about the genetics of microorganisms. It includes a historical overview of the genetics of microorganisms, the use of bacteria and viruses in genetic studies, the replication of the nuclear material of bacteria, and bacteriophages (prokaryotes), the genetic code, transcription and translation, mutations and their types and everything related to them, the mechanism of gene transfer (conjugation, transformation and connection), means of gene transfer (plasmids, phages and vector elements), re-association and repair of the resulting defect. This course aims to develop students' competence providing them with the basic skills related to genetics and the more precise ones related to microbiology and biotechnology and their applications in all fields to make them able

to fill the work need and keep pace with scientific development by employing them in research centers.

21. Teaching and Learning Strategies

- 75. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint.
- 76. Providing students with homework.
- 77. Preparing reports related to academic vocabulary.
- 78. Visit websites to obtain additional knowledge of academic subjects.
- 79. Brainstorming during lectures.

22. Course Structure: Theory

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Introduction to Genetics of Microorganisms	A-Advantages for using bacteria and viruses for genetics study B-Classification of Organisms C-The Bacterial Genome D-Bacteria Were Used for Fundamental Studies of Cell Function E-Viruses and Bacterial Viruses	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Replication in bacteria and viruses	A-Types and principle of replication. B-The mechanism of replication . C-The role of enzymes in replication. C-Replication in phage and archaeobacteria D-Repair Systems	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Gene expression: Transcription in Bacteria	A-RNA Molecules B-The Structure of RNA C-Transcription: Synthesizing RNA	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			from a DNA Template D-The Substrate for Transcription E-The Process of Bacterial Transcription		
4 th	2	Translation in Bacteria	A- Bacteria- Synthesizing proteins (amino acids) from RNA B-The Substrate for Translation C-The Process of Bacterial Translation . .	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Exam	exam		
6 th	2	Mutations	A-Definition of mutations B-Classification of mutation . C-Nomenclature of mutatin D-Mechanisms of mutations. E-The influence of chemicals and phiscal agents among mutations	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Inheritance in bacteria	A-Luria and Delbruck experiment. B-The Newcombeexperime nt . C-The Lederbergs experiment. D-Mutation rates E-Calculation mutation rates.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

8th	2	Mobile elements: The Plasmids	A-The Characteristic features of Plasmid B-Classified plasmids according to the function . C-Plasmids replication and control	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9th	2	Movable Genes	The Nature of Transposable Elements General Characteristics of Transposable Elements Mechanisms of Transposition Transposable Elements in Bacteria	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10th	2	Exam	Exam		
11th	2	Viral Genetics	A--Types of cycle in Bacteriophages B-Techniques for the Study of Bacteriophages	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12th	2	Gene Transfer: Conjugation	A-Mechanism of conjugation B-Fertility plasmid C- Types of conjugation in gram positive and gram negative bacteria		
13th	2	Transformation	A-types of transformation B-Mechanisms of transformation C- the factors effect of transformation D-transformation in plasmid	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14th	2	Transduction	Types of transduction Generalized and specialized transduction	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			C-phages and gene transfer, lytic and lysogenic cycles of bacteria .		
15 th	2	Final exam			
Course Structure: Practical					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	مقدمة عامة / طرق انتقال المواد الوراثية بين البكتيريا	مقدمة تعريفية عن وراثة الاحياء المجهرية وطرق انتقال المادة الوراثية فيما بينها	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	جودة التجارب المختبرية	مكونات التجربة 1. العينة وتهيئة العينة 2. الطريقة 3. استخدام سيطرة موجبة وسيطرة سالبة 4-تحليل وعرض النتائج	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	تهيئة العينات البكتيرية	1. الاوساط الزرع لخلايا بكتيرية سليمة 2. تهيئة الوساظالزرعية 3-فصل الحلايا البكتيرية	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Exam			
5 th	2	دراسة انتقال المادة الوراثية بطريقة التحول البكتيري	الفهم الكامل لطريقة التحول البكتيري وكيفية تهيئة الخلايا البكتيرية اجراء تجربة عملية توضح ظاهرة التحول	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	الاقتران البكتيري	دراسة انتقال المادة الوراثية بطريقة الاقتران البكتيري من خلال اجراء تجربة عملية توضح ظاهرة الاقتران.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Transduction	دراسة انتقال المادة الوراثية بطريقة الاصابة بالعائياتالبكتيرية اجراء تجربة عملية توضح ظاهرة التوصيل	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	EXAM	EXAM		

9 th	2	الطفرات في البكتريا	الطفرات في البكتريا 2-انواع الطفرات 3- انواعالمطفرات / الكيميائية والفيزيائية. 4-المستوى الجزيئي في عزل الطفرات 5-الطرق الجزيئية للكشف عن الطفرات	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 ^t h	2	الطفرات في البكتريا الجزء الثاني	الكشف عن الطفرات في البكتريا باستخدامالمطفراتالكيميائية الفيزيائية في الاوساط الصلبة والسائلة .		
11 ^t h	2	الكشف عن الطفرات المقاومة للمضادات الحيوية في البكتريا	استخدام احد طرق الكشف عن الطفرات المقاومة للمضادات الحيوية .	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 ^t h	2	استخلاص البلازميدات من البكتريا	استخدام طرق مختلفة لاستخلاص البلازميد 1- Alkaline method 2- Boiling method 3- Phenol – chloroform method 4- Using kit in extraction		
13 ^t h	2	تقنية الترحيل الكهربائي في الكشف عن البلازميدات	استخدام الترحيل الكهربائي في الكشف عن البلازميدات المستخلصة بطرق مختلفة	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 ^t h	2	Polymerase chain reaction	-التعرف على مبدا 1 هذه التقنية تقنية تفاعل البلمرة المتسلسل 2-خطوات التقنية 3- تطبيق عملي على الكشف عن احد الجينات في البكتريا	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 ^t h	2	Final exam	Exam		
23. Course Evaluation					

Overall score out of 100 (Semester grade = 40, including: 25 for theoretical + 15 for practical) (End-of-semester exam score = 60, including 40 for theory + 20 for practical)	
24. Learning and Teaching Resources	
Required textbooks (curriculum books, if any)	-علم الاحياء المجهرية (ج1,ج2). د. وفاء جاسم رجب 2-اساسيات ومبادئ الوراثة . أ.د.عبد الخالق مراد 3-علم الوراثة ج 1 تنظيم وتضاعف المادة الوراثية د.محمد علي الحاجي
Main references (sources)	
Recommended books and references (scientific journals, reports...)	1-Molecular Genetics of Bacteria.4th EditionJeremy W. Dale and Simon F. Park ,2004. 2-Genetics.Leland H.Hartwell.(2000) 3-Color atlas of genetics Eberhad ,Passarge. (2001). -Microbial Genetics. Keya Chaudhari , 2013 4-Genetics of Bacteria.Shrivastava, Sheela ,2013 5-Modern Microbial Genetics, Uldis N. Streips ,Ronald E. Yasbin.(2002). Second Edition 6-Fundamentals of Microbiology by Jeffrey Pommerville .(2014). 10th Edition
Electronic-References, Websites	المواقع العديدة التي تعني بـ وراثه احياء مجهرية ومن ضمنها المواقع الطبية واليوتيوب والبحوث العلمية https://drive.google.com/file/d/1Ao2R1fWEy02I4ZmCB4hpBJSmLt4s7jMG/view https://www.snvdz.com/2019/08/geneticmolecular.html https://www.youtube.com/watch?v=tl_u--Ufnkg https://www.youtube.com/watch?v=URUJD5NEXC8 https://www.youtube.com/watch?v=2ctmJJmLzuU https://www.youtube.com/watch?v=XY0_KBa7y5Q https://www.neelwafurat.com/itempage.aspx?id=lbb127823-87950&search=books

Food biotechnology

25. Course Name:
Food microtechnology
26. Course Code:
BIOT315

27. Semester / Year:					
2 nd semester / 2023-2024					
28. Description Preparation Date:					
1-10-2023					
29. Available Attendance Forms:					
Weekly attendance					
30. Number of Credit Hours (Total) / Number of Units (Total)					
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)					
31. Course administrator's name (mention all, if more than one name)					
Name: Prof. Dr. Hutaf Abd Almalik Ahmed Alsalm Email: hutaf.alsalim@sc.uobaghdad.edu.iq					
32. Course Objectives					
<p>This course aims to provide a course of study in the physiology of mammals, especially humans, based on Knowledge of basic physiological principles of living organisms</p> <p>To develop more practical biological skills in the field of organismal physiology.</p> <p>To prepare students for a number of natural sciences courses in physiology, development and neuroscience, as well Pharmacology, pathology and zoology, among others.</p>					
33. Teaching and Learning Strategies					
80. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint.					
81. Providing students with homework.					
82. Preparing reports related to academic vocabulary.					
83. Visit websites to obtain additional knowledge of academic subjects.					
84. Brainstorming during lectures.					
34. Course Structure: Theory					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	-History and development of food microbiology -Characteristics of predominant microorganisms in food	-Development of food microbiology - Characteristics of predominant microorganisms in food (mold, yeast, viruses, bacteria) -Important bacterial genera	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

2 nd	2	Sources of microorganisms in food	Sources of microorganisms in food: Predominant microorganisms in different sources (Plants, animals, air, soil, sewage, water, humans, food ingredients, equipment, miscellaneous)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Microbiological standard of food Common Microbial Spoilage of foods	-Microbiological standard of food (Adulterated and misbranded food and Bacteriological standard of food) Common Microbial Spoilage of foods (types of common microbial spoilage)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Microbial growth characteristics	Microbial growth characteristics: Natural of microbial growth in food (Mixed Population, Sequence of Growth, Growth in Succession, Symbiotic Growth, Synergistic Growth, and Antagonistic Growth)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Factors influencing microbial growth in food	Factors influencing microbial growth in food: -Intrinsic factors or food environment (Nutrients, Growth Factors and Inhibitors, Water Activity, pH, Redox Potential) - External Factors (Temperature)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Seasonal Exam	الامتحان الشهري الاول		
7 th	2	Microbial food spoilage -Important factors in microbial food spoilage.	Microbial food spoilage -Important factors in microbial food spoilage (Significance of microorganisms, and	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

		-Spoilage of Specific Food Groups	(Significance of foods) -Spoilage of Specific Food Groups: Meat (red meat, Poultry, Fish) and eggs		
8 th	2	Microbial food spoilage -Spoilage of Specific Food Groups. Food Spoilage by Microbial Enzymes	-Spoilage of Specific Food Groups (Milk and their products, Vegetables, fruits and nuts, cereals and their products, canned foods, soft drinks, fruit juices and, vegetable juices, mayonnaise, salad dressings, and condiments, pickles) -Food Spoilage by Microbial Enzymes (Intracellular and extracellular enzymes)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Microbial foodborne diseases	-Important Facts in Foodborne Diseases. -Foodborne Intoxications	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Microbial foodborne diseases	-Foodborne Infections. -Foodborne Toxicoinfections.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Microbial foodborne diseases	- Parasites - Indicators of Bacterial Pathogens.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	الامتحان الشهري الثاني	Seasonal exam		
13 th	2	Control of microorganisms in food	-Control of access (Cleaning and Sanitation). -Control by physical removal. -Control by Heat.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Control of microorganisms in food	-Control by Low Temperature. -Control by Reduced Aw. Control by Low pH and Organic Acids.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

15 th	2	Control of microorganisms in food	-Control by Modified Atmosphere (or Reducing O-R Potential). -Control by Antimicrobial Preservatives. -Control by Irradiation.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

Course Structure: Practical

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Preparation of samples	How to prepare and examine samples of canned food: Receipt and storage (Size, handling, containers, transportation, Request for examination, Receipt and description at the laboratory)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Methods for Microbiological Examination of Foods Direct Methods Indirect Methods	Train students on how to benefit from the diversity of examination methods and the importance of each method (Microbiological Examination Methods, Microscopic examination, ATP photometry, Rapid Method). Indirect Methods: (Plate count, Culturing Technique, Pour plate)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Microbiological Examination of Milk	How to detect milk contaminants and the factors affecting and helping to cause contamination: Milk Examination, Screening the quality of milk, the microbiological tests of milk (Standard Plate Count, Coliform Count, The Breed count),	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			Biochemical tests used to characterize bacteria.		
4 th	2	Microbiological Examination of meat	How to detect meat and the factors affecting its approval	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Microbiological Examination of poultry	How to detect poultry and the factors affecting its approval	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Microbiological Examination of fish	How to detect fish and the factors affecting its approval	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Microbiological examination of eggs	How to detect egg contaminants and the factors affecting them and helping them to become contaminated	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Microbiological examination of Fruit	How to detect fruit contaminants and the influencing factors and help with their contamination	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Microbiological examination of Vegetables	How to detect vegetable contaminants and the influencing factors and help with their contamination	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	الامتحان	Exam		
11 th	2	Microbiological examination of grains	How to detect grain contaminants and influencing factors and help in their contamination	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Microbiological examination of fruit juices and bottled water	How to detect contaminants in fruit juices and bottled water, and the factors affecting and helping to contaminate them		

13 th	2	The canned food	The health effects of canned food, the materials used in manufacturing the cans, and the preservatives used in canning	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	The toxins	Types of toxins and their sources	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2		Exam		

35. Course Evaluation

Overall score out of 100
(Semester grade = 40, including: 25 for theoretical + 15 for practical)
(End-of-semester exam score = 60, including 40 for theory + 20 for practical)

36. Learning and Teaching Resources

Required textbo (curricular books, if any)	-Fundamental food microbiology (Bibek Ray,2004)
Main references (sources)	-Food microbiology (Mantrile TY,1987) -Practical food microbiology (D Robert & M Green wood, 2003)
Recommended books and references (scientific journals, reports...)	-Food microbiology (William GF,1958) -Food Microbiology Laboratory Manual (Venata Vedum-Mai and Melissa J)
Electronic Referenc Websites	https://www.youtube.com/playlist?list=PL5-EckJGqf8qEwQaE-BpplaV82uYFq75M

Antibiotics

37. Course Name:
ANTIBIOTICS
38. Course Code:
BIOT325
39. Semester / Year:
2 nd semester / 2023-2024
40. Description Preparation Date:
1-10-2023
41. Available Attendance Forms:
Weekly attendance
42. Number of Credit Hours (Total) / Number of Units (Total)

2 Theoretical hours/week, one section * 15 weeks = 30 hours
 4 Practical hours/week per section * 15 weeks = 60 hours
 Total number of hours per section = 90 hours
 Number of units = 3 units (theoretical 2 + practical 1)

43. Course administrator's name (mention all, if more than one name)

Name: Prof. Dr. Suhad Saad Mahmood
Email: suhad.mahmood@sc.uobaghdad.edu.iq

44. Course Objectives

This course aims to provide a course of study in the physiology of mammals, especially humans, based on Knowledge of basic physiological principles of living organisms

To develop more practical biological skills in the field of organismal physiology.

To prepare students for a number of natural sciences courses in physiology, development and neuroscience, as well Pharmacology, pathology and zoology, among others.

45. Teaching and Learning Strategies

85. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint.

86. Providing students with homework.

87. Preparing reports related to academic vocabulary.

88. Visit websites to obtain additional knowledge of academic subjects.

89. Brainstorming during lectures.

46. Course Structure: Theory

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Discovering OF antibiotics	Introduction in antibiotics	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Biosynthesis of secondary metabolism pathways	Mechanisms of antibiotics synthesis	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Mechanism of action of antibiotics	Understanding the Mechanism of action of antibiotics on microbes	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Classification of antibiotics	Types of antibiotics groups	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

5 th	2	Antibiotics properties	General characters of antibiotics	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Antibiotics that inhibit the action of the bacterial cell wall	Types of groups and mode of action	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Seasonal Exam	Seasonal Exam		
8 th	2	Beta lactam antibiotics	Pharmaceutical specifications for this group, extent of its effect, and mechanism of action	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Pencillin group	Pharmaceutical specifications for this group, extent of its effect, and mechanism of action	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Cephalosporines	Pharmaceutical specifications for this group, extent of its effect, and mechanism of action	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Other beta lactam groups	Pharmaceutical specifications for this group, extent of its effect, and mechanism of action	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	A group of antibiotics that inhibit protein biosynthesis	Pharmaceutical specifications for this group, extent of its effect, and mechanism of action	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13 th	2	A group of antibiotics that inhibit the biosynthesis of nucleic acids,	Pharmaceutical specifications for this group, extent of its effect, and mechanism of action	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	A group of antibiotics that inhibit some metabolic	Pharmaceutical specifications for this group, extent of its effect, and mechanism of action	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

		pathways of bacteria Send feedback Side panels			
15 th	2	Resistance to antibiotics	Types and mechanisms of resistance	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

Course Structure: Practical

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Introduction to antimicrobial agents	The scientific history of antibiotics and their scientific definition	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Antibiotics	Its types and characteristics	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Evaluation of Disinfectants or comparison of antiseptics used against microorganisms	The practice steps of method	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Test of antibiotic susceptibility (sensitivity)	The practice steps of method	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Minimum inhibition , concentration	The practice steps of method	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Minimum bactericidal concentration	The practice steps of method	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

7 th	2	Epsilometer (E) test to detect bacterial sensitivity to antibiotics	The practice steps of method	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Exam		Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Use alternatives to antibiotics	Define of alternative ways and explain the characters benefit of each	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Antimicrobial Drugs Used in Combination	Explain the combination and the effect of it one antibiotic activity	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Detection of B-lactamases	The practice steps of method	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	The Vitek System	The practice steps of method	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13 th	2	Exam			

47. Course Evaluation

Overall score out of 100

(Semester grade = 40, including: 25 for theoretical + 15 for practical)

(End-of-semester exam score = 60, including 40 for theory + 20 for practical)

48. Learning and Teaching Resources

Required (curricular books, if any)	textbo	-Basics of Physiology / Abdul Rahim Ashir and Sa Nasser Al-Alwaji
Main references (sources)		-A textbook of practical physiology, 2013 (8 th edition) -Endocrine secrets, 6 th ed., Michael T. McDermott, 2013
Recommended books and references (scientific journals, reports...)		-Human Physiology/ Stuart Iron Fox/2004
Electronic Websites	Referenc	https://en.wikipedia.org/wiki/Physiology https://www.medicalnewstoday.com/articles/248791

Immunology

49. Course Name:
Immunology
50. Course Code:
BIOT330
51. Semester / Year:
2 nd semester / 2023-2024
52. Description Preparation Date:
1-4-2024
53. Available Attendance Forms:
Weekly attendance
54. Number of Credit Hours (Total) / Number of Units (Total)
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)
55. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Mouruj A. Al aubydi Email: mouruj.najeeb@sc.uobaghdad.edu.iq
56. Course Objectives
This course aims to provide a course of study in the immunology of mammals, especially humans, based on knowledge of basic immunological principles of living organisms. To develop more practical biological skills in the field of organisms related immunology. To prepare students for a number of natural science courses in autoimmunity, acquired immunology, and various immunological tests among others.
57. Teaching and Learning Strategies
90. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint. 91. Providing students with homework. 92. Preparing reports related to academic vocabulary. 93. Visit websites to obtain additional knowledge of academic subjects. 94. Brainstorming during lectures.
58. Course Structure: Theory

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Introduction to immunology	History and development of immunology	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Types of Innate immunity	Factors determining innate immunity	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Cellular factors	Inflammatory response, phagocytosis, and adaptive immunity	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Adaptive passive immunity	Comparison between adaptive active and adaptive passive immunity	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Lymphoid organs	The primary and the secondary lymphoid organs as components of the immune system	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Activation of immune cells	Primary and secondary immune response	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	1 st mid exam		Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Antigens	Immunogens, antigenic determinants of proteins	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Human leukocytes antigens	Major histocompatibility complex and blood groups	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

10 th	2	General characteristics of antibodies	Maturation of the immune system, theories of antibody formation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Antibody – antigen interactions (Humeral immunity)	Forces involved in antibody – antigen interactions	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Types of serological reactions	Precipitation and its applications, agglutination, and immunostaining		
13 th	2	Complement	Complement pathways; classical and alternative complement pathways	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Hypersensitivity	Hypersensitivity types	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	General revision		Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

Course Structure: Practical

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Animals identification	Proper identification of research animals, routes of administration, sampling methods	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	The bactericidal activity of serum	The bactericidal effect of normal serum, and heat-inactivated serum tested on bacteria.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

3 rd	2	Antigen Preparation	Preparation of somatic O antigen and H antigen	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Rosette Forming Cells (RFCs)	Quantitation of T cells	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	ABO Blood Grouping System	ABO and Rh factor typing procedure, Compatibility testing – The cross matching	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Enumeration of developed activated B cells (plasma cells)	Quantitation of plasma cells	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Phagocytosis	Phagocytic index of different organs	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	1 st mid exam		Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Agglutination test	Qualitative and quantitative agglutination	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Precipitation test	Oudin tube test, Ouchterlony plate test	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Complement fixation test	Complement Fixation Test: Principle, Procedure and Results	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

12 th	2	Enzyme-Linked Immunosorbent Assays (ELISA)	Types of ELISA	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13 th	2	2 nd mid exam		Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2			Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2		Exam		

59. Course Evaluation

Overall score out of 100

(Semester grade = 40, including: 25 for theoretical + 15 for practical)

(End-of-semester exam score = 60, including 40 for theory + 20 for practical)

60. Learning and Teaching Resources

Required textbooks (curric books, if any)	
Main references (sources)	<ul style="list-style-type: none"> Immunology, 2013 (3^{ed} edition) Clinical immunology and serology, 2010 (3^{ed} edition)
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	<ul style="list-style-type: none"> https://books.google.iq/books/about/Immunology.html?id=fEZrwuvrPKUC&redir_esc=y https://www.youtube.com/watch?v=1KdlU1sQcy

Environmental biotechnology

61. Course Name:
Environmental Biotechnology
62. Course Code:
BIOT335
63. Semester / Year:
Second semester / 2023-2024
64. Description Preparation Date:
1-10-2023
65. Available Attendance Forms:
Weekly attendance
66. Number of Credit Hours (Total) / Number of Units (Total)
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)
67. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Nadhim Hasan Hayder Email: Nadhim.Haider@sc.uobaghdad.edu.iq
68. Course Objectives
<p>This course aims to:</p> <ul style="list-style-type: none"> - Application of different environmental techniques and biological systems for removal of pollutants - The role of microorganisms in metabolism and manufacturing of different organic compounds - Using of bioremediation techniques for <i>in situ</i> and <i>ex situ</i> rendering of pollutants - Biodegradation of hydrocarbons by microorganisms - Exploitation of microorganism's potential for production of primary and secondary products such as biosurfactant, bio pesticides, biofuel and organic fertilizer in different fields.
69. Teaching and Learning Strategies
<p>95. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint.</p> <p>96. Providing students with homework.</p> <p>97. Preparing reports related to academic vocabulary.</p> <p>98. Visit websites to obtain additional knowledge of academic subjects.</p> <p>99. Brainstorming during lectures.</p>

70. Course Structure: Theory					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1st	2	Introduction to Environmental Biotechnology	Importance of Environmental Biotechnology, Biomethylation, Biomagnification, Important terms in Environmental Biotechnology	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2nd	2	Biological Treatment Process	Techniques used in biological treatment, Process variables used in control of the biological processes, HRT, BOD load, F/ M ratio, Advantages of biological treatment plant, Attached film growth, Trickle filter, Biological disk, Fluidized bed reactor	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3rd	2	Waste nature and microbial growth	Source of wastewater, The nature and composition of waste water, Soft and hard organic matter (BOD) digestion, Microbial ecology, Types of bacteria in activated sludge, Bacterial flocs, Metabolism of bacteria, Microbial processes, ingestion, secretion, respiration, Growth of bacteria, the effect of pH, temp. Substrate concentration, toxicity	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4th	2	Metabolism of Nitrogen, phosphorous and Sulfur compounds	Source of nitrogen compounds, Ammonification, Nitrification of ammonia, denitrification, Metabolism of	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			phosphorous compounds, Metabolism of sulphur compounds, Wastewater treatment (Algal photosynthesis), Algal genera, Eutrofication		
5 th	2	Biodegradation	Difinition of biodegradation process, Factors that effect in biodegradation, Aerobic and anaerobic degradation, _The advantage and disadvantages of anaerobic process, Sequential degradation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	First Exam	First Exam		
7 th	2	Biodegradation OF HERBICIDES AND PESTICIDES	Cometaboli of MCA and MCPA, Biodgradation steps of 2,4-D, Biodegradation OF HYDROCARBONS, Aliphatic hydrocarbons, <i>Aromatic hydrocarbons</i> , Biodegradation OF SOME SPECIFIC WASTES <i>Poly cyclic aromatic hydrocarbons</i>	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Bioremediation of Environmental Pollutants	Principles of Bioremediation, Factors effects the Bioremediation, Characteristics of Microbial Populations for Bioremediation Processes, Mechanisms of	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			oxidation, Environmental Factors, Bioremediation Strategies, Advantages and disadvantage of bioremediation		
9 th	2	Biosurfactant in Microbiology and Biotechnology	Definition of Biosurfactants, Biosurfactant Classification and Their Microbial Origin, The mechanisms of biosurfactant interaction, Major biosurfactant classes and microorganisms involved , Physiological Role of Biosurfactants, Factors effecting biosurfactant production, Advantages, Applications of Biosurfactants	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Metal Uptake (Recovery) By Microorganisms	Metal recovery by microbes, BIOLEACHING, BIOSORPTION by Bacteria and Fungi, Microbial Mechanisms for Removal of Metal Ions, <i>Immobilization</i> , <i>volatilization</i> , Extracellular Precipitation, <i>intracellular</i> <i>Accumulation</i> ,	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Secon Exam	Secon Exam	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Microbial Bio pesticides	Definition of Microbial pesticides, Advantages and disadvantages of		

			Microbial pesticides, Bacteria insecticides, Mechanism of action of <i>Bacillus thuringiensis</i> on caterpillars, maximize the effectiveness of <i>Bt</i> treatments, Mechanisms of biological control, Antibiotic-mediated suppression		
13 th	2	Bioleaching	Introduction – General biological principles – Application of bioleaching: 1. Mining process 2. Environmental protection 3. Bioleaching in conventional reactors.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Biomethanation	Introduction – Anaerobic process – Microbiological requirements – Process design –	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Reactors	Types of reactors – Environmental application	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

Course Structure: Practical

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Production of cellulose by microorganisms	Production of cellulose by microorganisms	Production of cellulose by microorganisms	Production of cellulose by microorganisms
2 nd	2	Bioremediation	Bioremediation	Bioremediation	Bioremediation
3 rd	2	Biological Oxygen Demand Measurement (BOD)	Biological Oxygen Demand Measurement (BOD)	Biological Oxygen Demand Measurement (BOD)	Biological Oxygen Demand Measurement (BOD)
4 th	2	4. Biofilm	4. Biofilm	4. Biofilm	4. Biofilm

5 th	2	First Exam	First Exam	First Exam	First Exam
6 th	2	5. Biodegradation	5. Biodegradation	5. Biodegradation	5. Biodegradation
7 th	2	6. Production of biosurfactant by bacteria	6. Production of biosurfactant by bacteria	6. Production of biosurfactant by bacteria	6. Production of biosurfactant by bacteria
8 th	2	Bio absorption of heavy metal by microorganism	Bio absorption of heavy metal by microorganism	Bio absorption of heavy metal by microorganism	Bio absorption of heavy metal by microorganism
9 th	2	Antibacterial activity of bioactive compounds produced by Streptomyces spp. isolated from agricultural soil	Antibacterial activity of bioactive compounds produced by Streptomyces spp. isolated from agricultural soil	Antibacterial activity of bioactive compounds produced by Streptomyces spp. isolated from agricultural soil	Antibacterial activity of bioactive compounds produced by Streptomyces spp. isolated from agricultural soil
10 th	2	Effect of environmental factors on microbial growth	Effect of environmental factors on microbial growth	Effect of environmental factors on microbial growth	Effect of environmental factors on microbial growth
11 th	2	Second Exam	Second Exam	Second Exam	Second Exam
12 th	2	Bioconversion (biotransformation)	Bioconversion (biotransformation)	Bioconversion (biotransformation)	Bioconversion (biotransformation)
13 th	2			Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2			Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2				

71. Course Evaluation

Overall score out of 100

(Semester grade = 40, including: 25 for theoretical + 15 for practical)

(End-of-semester exam score = 60, including 40 for theory + 20 for practical)

72. Learning and Teaching Resources

Required text books (curricular books, if any)	Not found
Main references (sources)	1. Environmental Microbiology Third edition by Ian L. Pepper Charles P. Gerba Terry J. Gentry, (2015). 2. Environmental Microbiology Second Edition by Eugene L. Madsen (2016) 3. Environmental Biotechnology by T. Srinivas. (2008).
Recommended books and references (scientific journals, reports...)	
Electronic Websites	

Nanobiotechnology

73. Course Name:
Nanobiotechnology
74. Course Code:
BIOT340
75. Semester / Year:
2 nd semester / 2023-2024
76. Description Preparation Date:
1-10-2023
77. Available Attendance Forms:
Weekly attendance
78. Number of Credit Hours (Total) / Number of Units (Total)
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)
79. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Israa Ali Zaidan Email: israa.zaidan@sc.uobaghdad.edu.iq
80. Course Objectives
1. This course deals with the basic concept of nanotechnology 2. To understand the important of nanotechnology and its applications in biotechnology.
81. Teaching and Learning Strategies

1. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint.
2. Providing students with homework.
3. Preparing reports related to academic vocabulary.
4. Visit websites to obtain additional knowledge of academic subjects.
5. Brainstorming during lectures.

82. Course Structure: Theory

Week	Hour	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Introduction to the course	Nanotechnology definitions, To know the new properties of nanomaterials	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Historical perspective of micro and nano scale	To know the definition and history of nanotechnology	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Nano manufacturing technology, Advantages and disadvantages	To Describe the different methods of synthesis nanomaterials	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	applications of nanotechnology	Determine the applications of nanotechnology in different aspects	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Overview of Nano Fabrication Methods: Top-down and bottom-up approaches	To know the types of synthesis nanomaterials	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Exam 1			
7 th	2	Types of nanomaterials organic and inorganic nanomaterials	Explain specific types of nanomaterials	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Quantum dots, etc., Organic compounds	To determine the physical base of quantum phenomena	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

		and bio-applications of nano materials			
9 th	2	Characterization Tools, Optical microscopy and Spectrophotometer, Scanning Electron Microscope, AFM	Explain the characterization of nanomaterial by using different techniques	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Quantum dots, etc., Organic compounds and bio-applications of nano materials	Applications of nanotechnology in biomedical field	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Characterization Tools, Optical microscopy and Spectrophotometer, Scanning Electron Microscope, AFM	Explain Direct and indirect methods of characterization	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Microscope, AFM	Explain Direct methods of characterization		
13 th	2	Application of nano materials, Carbon Nano Tubes	Applications of nanotechnology in biomedical field	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Nanopharmaceuticals and Nanomedical Device	Applications of nanotechnology in biotechnology field	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Bioengineered Nanomaterials	Learn new technology of using nanomaterials	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
Course Structure: Practical					
Week	Hour	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method

1 st	2	Introduction	Examples for comparison	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Synthesis Metal Nanoparticles	Metal salt and reducing agents	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Synthesis of nanomaterials by chemical method	Metal salt and chemical reducing agents	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Synthesis of nanomaterials by physical method	Laser and substrate	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Synthesis of nanomaterials by biological method	Metal salt and plant extract	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Exam 1		Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Nanomaterial characterization techniques	Characterization Instruments	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Biological bio-medical applications: Antibacterial activity test	Bacteria and culture media	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Antifungal activity test	Fungal and culture media	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Nanosensors	Glass slide with different materials		
11 th	2	Nanopolymer	Chitosan	Paper lectures Electronic screen	Daily, semester and final exams

				Video lectures via electronic classes	
12 th	2	Mechanical method	Glass ball		
13 th	2	Applications of nanomaterials	Biomedical applications	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2			Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Exam 2			

83. Course Evaluation

Overall score out of 100
 (Semester grade = 40, including: 25 for theoretical + 15 for practical)
 (End-of-semester exam score = 60, including 40 for theory + 20 for practical)

84. Learning and Teaching Resources

Required textbooks (curriculum books, if any)	- Textbook of Nanoscience Nanotechnology B S Murty, P Shankar, Baldev Raj, B B Rath and James Murday.2
Main references (sources)	- Nanomaterials in Bionanotechnology: Fundamentals and Applications. Singh and Kshitij RB Singh. ISBN: 9780367689445.2021
Recommended books and references (scientific journals, reports...)	- Textbook of Nanoscience Nanotechnology B S Murty, P Shankar, Baldev Raj, B B Rath and James Murday.2
Electronic References, Websites	https://web.pdx.edu/~pmoeck/phy381/intro-nanotech.pdf

Research methodology

85. Course Name:
Research methodology
86. Course Code:
87. Semester / Year:
2 nd semester / 2023-2024
88. Description Preparation Date:
1-10-2023
89. Available Attendance Forms:
Weekly attendance

90. Number of Credit Hours (Total) / Number of Units (Total)					
2 Theoretical hours/week, one section * 15 weeks = 15 hours Total number of hours per section = 15 hours Number of units = 1 units (theoretical 1)					
91. Course administrator's name (mention all, if more than one name)					
Name: Prof. Dr. Asmaa Mohammed Saud Email: asmaa.saud@sc.uobaghdad.edu.iq					
92. Course Objectives					
<p>The goal is a general element and its presence is essential in research. Studies emphasize the necessity of including goals in the methodology of scientific research. This element indicates the goal that the researcher seeks to achieve and predicts the results that can be reached. The reader is interested in the goals, so the statements must be motivating and Close to his mind and expectations, and the objectives of scientific research should be set carefully and masterfully.</p> <ul style="list-style-type: none"> • The research methodology aims at the way in which the researcher writes his research papers after the studies that he has worked on, the experiments that he conducted, and the previous studies from which he extracted his information and data, after collecting all the data that will benefit his study through known data collection tools, the most important of which are Previous studies, which may be information on which the researcher builds his research or uses them to prove a theory, and these studies must be documented at the end of the research as one of the conditions for publication in well-known scientific publishing outlets, of which peer-reviewed scientific journals are considered at the forefront. 					
93. Teaching and Learning Strategies					
<p>100. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint.</p> <p>101. Providing students with homework.</p> <p>102. Preparing reports related to academic vocabulary.</p> <p>103. Visit websites to obtain additional knowledge of academic subjects.</p> <p>104. Brainstorming during lectures.</p>					
94. Course Structure: Theory					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Introduction to Research	Research Methodology Course objectives	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Eight-Step Model	Main components of any research work	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

3 rd	2	Considerations in selecting a good research problem,	The Research Problem	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Writing a research report	Preparation of the research	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Meaning of review of literature	Literature review	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	--	Seasonal Exam		
7 th	2	Objectives of review of literature(Problems Identified in Writing a Literature Review	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Types of study designs	Research Methods	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	- Types of Research Data	Data collection methods	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Research tools:	Methods of Collecting Primary Data	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	-Meaning and definition of sampling -Functions of population and sampling -Methods of sampling	Sampling	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

12 th	2	--	Seasonal exam		
13 th	2	Presentation of student research 1	-Application	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Presentation of student research 2	-Application	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Presentation of student research 3	-Application	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
95. Course Evaluation					
Overall score out of 100 (Semester grade = 40 for theoretical) (End-of-semester exam score = (60 theory only)					
96. Learning and Teaching Resources					
Required textbooks (curricular books, if any)					
Main references (sources)		Corlien M. Varkevisser, Indra Pathmanathan, and Ann Brownlee. Designing and conducting health systems research projects: Volume 1 Proposal development and fieldwork. KIT/IDRC. 2003			
Recommended books and references (scientific journals, reports...)		Teaching and Learning Research Methodologies in Education: A Systematic Literature Review, Educ. Sci. 2023, 13(2), 173; https://doi.org/10.3390/educsci13020173			
Electronic Websites		https://ecpr.eu/Events/AcademicProgramme/Courses?eventID=223&gclid=CjwKCAjwhJukBhBPEiwAnilcNXmKk5qFg1VgiT-UvtF9U1xfAyqkOY			

Course Description Form for the 4th stage subjects

Principles of genetic engineering

97. Course Name:
Principles of genetic engineering
98. Course Code:
BIOT400
99. Semester / Year:
1 st semester / 2023-2024
100. Description Preparation Date:
1-10-2023
101. Available Attendance Forms:
Weekly attendance
102. Number of Credit Hours (Total) / Number of Units (Total)
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)
103. Course administrator's name (mention all, if more than one name)
-Name: Assist. Prof. Dr. Reema Mohammed Abed Email: Reema.abed@sc.uobaghdad.edu.iq -Name: Email: Prof.Dr. Abdulkareem Al-kazaz -Name: lecturer Dr. Zaid Ali Hussain
104. Course Objectives
Principles of Genetic Engineering is a field of <u>Biology</u> that deals with the manipulation of DNA and genes of an organism through gene cloning in order to alter or modify a certain characteristic of an organism. An organism's genes are manipulated through artificial synthesis or entering a new DNA strand to the already existing genes of an organism in order to change a specific function or characteristic of that organism. These genetically modified organisms are then used for various purposes, for example, a plant can be genetically modified in order to produce fruits that have a longer shelf life. Genetic Engineering has done some groundbreaking research in the field of agriculture and was one of the key factors in the green revolution.
105. Teaching and Learning Strategies
105. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint. 106. Providing students with homework. 107. Preparing reports related to academic vocabulary. 108. Visit websites to obtain additional knowledge of academic subjects. 109. Brainstorming during lectures.

106. Course Structure: Theory					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Genetic Engineering	Introduction to the science of technology and the scientists who discovered this science	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Cloning Steps	The steps of the cloning process, which are 7 steps, are explained in detail	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Isolation of total DNA	DNA isolation In different ways	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Isolation of plasmid DNA	Different methods of isolating plasmids	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Restriction enzymes	Introduction to cutting enzymes and how they work	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Types of Restriction enzymes	Types of cutting enzymes, their names, and different cutting methods	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Factor affecting on restriction enzymes	Factors that affect the work of cutting enzymes, such as temperature, concentration, ions, and pH	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Cloning vectors	Introduction to cloning vectors	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

9 th	2	Types of cloning vectors	Types of natural and manufactured cloning vectors and their discovery	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	plasmids	Types of plasmids, their composition, and the genetic map for each plasmid	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	phages	Types of phages, their composition, and the genetic map for each phage	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	cosmids	Types of cosmids, their structure, and the genetic map for each cosmid	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13 th	2	expression vectors	Types of expression vectors, their composition, and the genetic map for each vector	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Application of cloning vectors in genetic engineering	Applications of cloning vectors in the medical, agricultural and industrial aspects and benefiting from them	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	exam	-	-	-
Course Structure: Practical					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Types of buffers used	Solutions and buffers	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

2nd	2	Methods of extraction from prokaryotes	Total DNA extraction from prokaryotic organisms (bacteria)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3rd	2	Methods of extraction from humans	Total DNA extraction from eukaryotic organisms (human blood)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4th	2	Methods of extraction from plants	Total DNA extraction from eukaryotic organisms (plants)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5th	2	Methods for extracting plasmids from bacteria	Extraction of plasmid DNA from prokaryotic organisms (bacteria)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6th	2	Different methods of measuring DNA and purity	Measuring the concentration and purity of extracted DNA	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7th	2	Electrical relay and its types	Electrophoresis of extracted DNA	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8th	2	Methods for retrieving electrophoresed DNA	Retrieval of electrophoresed DNA	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9th	2	Restriction enzymes, their types, and ligase	Restriction and ligase	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10th	2	Exam	-	-	-
11th	2	Explain the conjugation	Insertion of genetic material (conjugation)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

12 th	2	Transformation process	Introduction of genetic material (transformation)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13 th	2	Introduction to the polymerase reaction and its discovery Types of polymerase reactions and their discovery	Polymerase chain reaction technology (PCR) Types of PCR technology	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Introduction to mutagenesis, different types and its discovery	Types of mutagenesis	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Exam	-	-	-

107. Course Evaluation

Overall score out of 100

(Semester grade = 40, including: 25 for theoretical + 15 for practical)

(End-of-semester exam score = 60, including 40 for theory + 20 for practical)

108. Learning and Teaching Resources

Required textbooks (curricular books, if any)	-principle of genetic engineering / Ghalib Al-Bakri
Main references (sources)	- Puehler, A. <i>et al</i> , A.K. 1984. Advanced molecular genetics - Rogen L., 1999. Applied molecular genetics. -Leland, H. <i>et al</i> . 2019. Genetics
Recommended books and references (scientific journals, reports...)	-genetic, genes, genetic engineering
Electronic Websites	www. Genetic genie.org

Animal tissues Culture

109. Course Name:

Animal tissues Culture					
110. Course Code:					
BIOT420					
111. Semester / Year:					
1st semester / 2023-2024					
112. Description Preparation Date:					
1-10-2024					
113. Available Attendance Forms:					
Weekly attendance					
114. Number of Credit Hours (Total) / Number of Units (Total)					
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)					
115. Course administrator's name (mention all, if more than one name)					
Name: Prof. Dr. Maha Fakhry Altaee Email: Maha.Fakhry@sc.uobaghdad.edu.iq					
116. Course Objectives					
1-The course aims to introduce the student to everything related to the animal cell and its morphological forms. 2- Familiarize the student with methods of cell development, transplantation, and propagation in ex vivo media. 3- Studying various structures and how to utilize them to direct cells towards specialized growth for a specific type of cell. 4- Introducing the student to how to isolate cells from each other using biological techniques. 5- Evaluating the important methods for evaluating cell growth and the methods used to inhibit the growth of some of them through therapeutic methods.					
117. Teaching and Learning Strategies					
110. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint. 111. Providing students with homework. 112. Preparing reports related to academic vocabulary. 113. Visit websites to obtain additional knowledge of academic subjects. 114. Brainstorming during lectures.					
118. Course Structure: Theory					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1st	2	History of cell culture, Basic and application of cell culture	The major scientist who contribute to development of it	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

2 nd	2	Origin of culture cells	From which kind of cells to collect	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	The culture environment	Ph, temperature, osmosis, etc	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Subculture	How to made subculture	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Differentiation of cells	How cell differentiate in culture to have specific function	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2		Seasonal Exam		
7 th	2	Cell line	How to prepare cell line	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Cloning and the principle of selection,	Cloning and selection of cells	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Isolation techniques for Monolayer clone	Monolayers	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Cell separation: Suspension & Others	How to select particular cell type form suspension	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Cell Interaction with substrate	Cell to cell interaction to make tissue	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Isolation cell technology :Cell Density and isopyc sedimentation	Separation of cells depending of cell characteristics	Paper lectures Electronic screen Video lectures via electronic classes	
13 th	2		Seasonal exam		

14 th	2	Cell strains	How to made cell strain	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Some applications of tissue culture	Drugs , toxins toxic effect study	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
Course Structure: Practical					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Sterilization of glassware and media	-types of media -glassware -media preparation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Morphology of cell culture	-Origin of culture -Types of cell	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Cell culture contamination	-types of contamination	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Primary cell culture	-Preparation primary culture -passage no.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Secondary cell culture	Methods for culturing	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Material and method	Culture of chick embryo fibroblast	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2		Seasonal exam		
8 th	2	Methods for culturing	Sub- culturing	Paper lectures Electronic screen	Daily, semester and final exams

		Suspension and adherent cells		Video lectures via electronic classes	
9 th	2	-Cryopreserve media -cryopreserve process	Cryopreservation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Methods for culturing Suspension and adherent cells	Transformation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Methods for culturing Suspension and adherent cells	Immortalization of animal cell	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Surgical procedure Primary culture of bone marrow	Isolation of stem cells	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13 th	2		Seasonal Exam		
14 th	2	Isolation of stem cells	Isolation of cells classic protocol mesenchymal stem isolation by ficoll or percol	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	seminar			
119. Course Evaluation					
Overall score out of 100 (Semester grade = 40, including: 25 for theoretical + 15 for practical) (End-of-semester exam score = 60, including 40 for theory + 20 for practical)					
120. Learning and Teaching Resources					
Required-textbooks (curricular books, if any)			No required books, only lectures.		
Main references (sources)			Cell Culturing theory and practice , ed. By Tim Walton Animal cell culture and Technology, (2005) 2 nd by Michael Butler		
Recommended books and references (scientific journals, reports...)			Any book in animal tissue culture		

Electronic Websites	Referenc	www.animaltissueculture .org
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Plant tissue culture

121. Course Name:					
Plant tissue culture					
122. Course Code:					
BIOT410					
123. Semester / Year:					
1 st semester / 2023-2024					
124. Description Preparation Date:					
1-10-2024					
125. Available Attendance Forms:					
Weekly attendance					
126. Number of Credit Hours (Total) / Number of Units (Total)					
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)					
127. Course administrator's name (mention all, if more than one name)					
Name: lecturer. Dr. zainab farqad Mahmood mukhtar Email: zainab.mukhtar@sc.uobaghdad.edu.iq					
128. Course Objectives					
<p>This course explains the concept of plant tissue culture It aims to deal with the techniques of tissue culture for different plants in order to produce a new whole plant from stem cells, single cells , parts of leaves or roots to produce a new plant on a culture medium supplemented with nutrients and plant growth regulators This science work on producing plants in a short period of time having new traits like GM plants or disease free plants that is important to man kind</p>					
129. Teaching and Learning Strategies					
115. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint.					
116. Providing students with homework.					
117. Preparing reports related to academic vocabulary.					
118. Visit websites to obtain additional knowledge of academic subjects.					
119. Brainstorming during lectures.					
130. Course Structure: Theory					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method

1st	2	Introduction of P.T.C.	Understanding what P.T.C is and its importance	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2nd	2	Importance and applications of P.T.C	The development of P.T.C techniques through history	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3rd	2	P.T.C initiation and applications	Callus production from different plant sources	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4th	2	Types of P.T.C and their importance	Applications of the different types of P.T.Cs	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5th	2	Mid exam 1			
6th	2	Totipotency, Cytodifferentiation and organogenesis	Identifying the plants differentiation mechanisms	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7th	2	Somatic and zygotic embryogenesis	Knowing the differences between types of plant embryos	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8th	2	Protoplast cultures	Introducing the types, mechanisms and applications of protoplast cultures	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9th	2	Meristem cultures	What is the meristem and its importance in creating disease free plants	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10th	2	Production of secondary metabolites using P.T.C	Mechanisms for increasing the production of S.M through P.T.C	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11th	2	Artificial seeds	Their definition, importance and production techniques	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

12 th	2	Genetically modified plants	What is G.M and how are they produced through P.T.C techniques	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13 th	2	Mid exam 2			
14 th	2	Nanotechnology and P.T.C	The use of nano particles in P.T.C science	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Somatic seeds	Introducing the techniques and importance of somatic seeds	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
Course Structure: Practical					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	P.T.C lab	Introducing the main and important tools and equipment used in P.T.C work	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Initiation of P.T.C cultures	Presenting the basic mediums and techniques used in P.T.C lab	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Callus cultures	Initiation of callus cultures from different plant origins	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Cell cultures	The production of cell cultures and their importance	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Midterm exam 1			
6 th	2	Cytodifferentiation and organogenesis	It's a continuous level after callus production to reach plantlets level	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Somatic embryogenesis	The production of somatic embryos from different plant sources	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

8 th	2	Protoplast cultures	The extraction of protoplast for different manipulation aims	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Disease free plants	Using meristem to produce disease free plants through P.T.C techniques	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Midterm exam 2			
11 th	2	Secondary metabolites	Using different P.T.C techniques to increase S.M production in callus cultures	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Artificial seeds	Techniques used for the production of artificial seeds	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13 th	2	N.P and P.T.C	Using different nanoparticles in P.T.C for various applications	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	G.M plants	Initiating plants with different enhanced traits through P.T.C	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2				

131. Course Evaluation

Overall score out of 100

(Semester grade = 40, including: 25 for theoretical + 15 for practical)

(End-of-semester exam score = 60, including 40 for theory + 20 for practical)

132. Learning and Teaching Resources

Required textbo (curricular books, if any)	<u>Plant biotechnology by Ramawatt K.G 2008</u>
Main references (sources)	<ul style="list-style-type: none"> Plant tissue culture by S.P.misra 2019
Recommended books and references (scientific journals, reports...)	<u>General Techniques of Plant Tissue Culture</u> Dagla, H. R. (2012). Plant tiss culture. Resonance.767-759 ,(8)17 ,
Electronic Websites	https://scholar.google.com/scholar?q=Plant+Tissue+Culture:+An+Introductory+Text&hl=en&as_sdt=0&as_vis=1&oi=scholart

Principles of Immunogenetics

133. Course Name:
Principles of Immunogenetics
134. Course Code:
BIOT415
135. Semester / Year:
2 nd semester / 2023-2024
136. Description Preparation Date:
1-4-2024
137. Available Attendance Forms:
Weekly attendance
138. Number of Credit Hours (Total) / Number of Units (Total)
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)
139. Course administrator's name (mention all, if more than one name)
Name Ibtihal A . Al-Karaawi ibtihal.Majeed@sc.uobaghdad.edu.iq Wasan Wael Mohammed Ali Wasan.Ali@sc.uobaghdad.edu.iq
140. Course Objectives
This course aims to provide a course of study in human immunogenetics, based on knowledge of basic genetic principles of living organisms , To develop more practical genetic skills in the field of human genetics, autoimmune diseases and related genetics. To prepare students for a number of natural science courses in immunology, genetics and the human genome, and also Pharmacogenomics, disease therapeutics and human genomics, among others.
141. Teaching and Learning Strategies
120. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint. 121. Providing students with homework. 122. Preparing reports related to academic vocabulary. 123. Visit websites to obtain additional knowledge of academic subjects. 124. Brainstorming during lectures.
142. Course Structure: Theory

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1st	2	-Innate immunity -Adaptive immunity -Principles of Immunogenetics	Introduction to the Immunogenetics	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2nd	2	-The Functions of MHC -MHC Class I ,II,III -Structure of MHC class I,II,III:	The major histocompatibility complex	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3rd	2	-Human MHC Class I Genes -Human MHC Class II Genes -Human Class III Genes	Major histocompatibility complex (MHC) genes	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4th	2	isoagglutinin, -Inheritance of A and -B genes -H gene codes	Genetics of ABO and H Antigen	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5th	2		EXAM	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6th	2	-Basic Structure -General Functions -Human Immunoglobulin Classes	Immunoglobulins		
7th	2	Gene class-Inheritance-	Genetics of immunoglobulin gene		

8 th	2	Bacterial diseases- Viral diseases- Parasitic diseases-	HLA and disease infectious	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	-Innate immunity -Adaptive immunity -Principles of ImmunogeneticS	Introduction to the Immunogenetics	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	The Functions of MHC - -MHC Class I -Structure of MHC class I:	The major histocompatibility complex		
11 th	2	-Human MHC Class I Genes - Human MHC Class II Genes -Human Class III Genes	Major histocompatibility complex (MHC) genes	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	- isoagglutinin,-- -Inheritance of A and -B genes -H gene codes	Genetics of ABO and H Antigen		
13 th	2		EXAM	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	-Basic Structure -General Functions -Human Immunoglobulin Classes	Immunoglobulins	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Gene class- Inheritance-	Genetics of immunoglobuline gene		

Course Structure: Practical					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Immunity types- Innate immunity- Adaptive immunity- -Immune cells	Immunogenetics Introduction and background	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Sources for DNA isolation Basic Steps in DNA Extraction DNA isolation from Blood Blood Collection DNA Isolation Procedure using a kit	DNA Extraction	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Phenol-chloroform method of DNA extraction from blood samples	Manual DNA extraction methods	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	-prepare gele -microwave soluble -put gele in ruk and thumb -electrophoreses	Gel Electrophoresis		
5 th	2	-prepar raction -master mix -primers -PCR programe	Polymerase chain reaction (PCR)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	HLA typing Methods for HLA typing HLA typing applications	Human leukocyte antigen (HLA)	Paper lectures Electronic screen Video lectures via	Daily, semester and final exams

				electronic classes	
7 th	2	The enzyme-linked immunosorbent assay (ELISA) ELISA Analysis ELISA application	Immunoassays	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	RFLP Analysis RFLP application	Restriction fragment length polymorphism (RFLP)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Sanger method Applications	The Comet Assay DNA sequencing		
10 th	2	Immunity types- Innate immunity- Adaptive immunity- Immune cells-	Immunogenetics Introduction and background		
11 th	2	Immunity types- Innate immunity- Adaptive immunity- Immune cells-	Immunogenetics Introduction and background	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Phenol-chloroform method of DNA extraction from blood samples	Manual DNA extraction methods		

13 th	2	-prepare gele -microwave soluble -put gele in ruk and thumb -electrophoreses	Gel Electrophoresis	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	-prepar raction -master mix - primers -PCR programe	Polymerase chain reaction (PCR)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	exam			

143. Course Evaluation

Overall score out of 100

(Semester grade = 40, including: 25 for theoretical + 15 for practical)

(End-of-semester exam score = 60, including 40 for theory + 20 for practical)

144. Learning and Teaching Resources

Required textbooks (curriculum books, if any)	"Molecular Biology Authored by Dr. Ghalib Al-Bakri"
Main references (sources)	1-Disease Delusion: by Jeffrey S. Bland (Author), Mark Hyman. 2015 2- Human Genetic Diseases. Edited by Dijana Plaseska-Karanfilska.2011
Recommended books and references (scientific journals, reports...)	Human Genetic Diseases1- • 2- The genetic basis of disease. Essays in Biochemistry 62(5):643-723 DOI: 10.1042/EBC20170053
Electronic Websites	Referenc -National human genome research institutes 2- Online Degrees Blog What You Need to Know About 5 Most Common Genetic Disorders

Virology and Vaccines

145. Course Name:
Virology and Vaccines
146. Course Code:
BIOT330
147. Semester / Year:
2nd semester / 2023-2024
148. Description Preparation Date:

1-10-2023					
149. Available Attendance Forms:					
Weekly attendance					
150. Number of Credit Hours (Total) / Number of Units (Total)					
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)					
151. Course administrator's name (mention all, if more than one name)					
Name: Ass. Prof. Dr. Wisal Salman Abd Email: wisal.abd@sc.uobaghdad.edu.iq					
152. Course Objectives					
This course includes coverage of the concepts of (viruses and vaccines) and includes the structures of viral forms, their classification, the rules upon which these classifications are built, the process of viral reproduction and pathogenesis, and how the virus causes diseases based on the precise strategy followed by the virus, the method of diagnosis and treatment, and the foundations upon which the therapeutic process is built. It also includes the foundations Vaccines Then we go into the viral groups individually in detail					
153. Teaching and Learning Strategies					
125. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint. 126. Providing students with homework. 127. Preparing reports related to academic vocabulary. 128. Visit websites to obtain additional knowledge of academic subjects. 129. Brainstorming during lectures.					
154. Course Structure: Theory					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Introduction to Virology	<ul style="list-style-type: none"> - What is the virus. - Evolutionary origin of the virus. - Classification of the virus. - Principles of virus structure. 	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Introduction to structure	<ul style="list-style-type: none"> - Chemical composition of viruses - Cultivation assays of viruses 	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

3 rd	2	Identification	<ul style="list-style-type: none"> -Purification and identification of viruses - Laboratory safety - Reactions to physical and chemical agents 	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Replication	<ul style="list-style-type: none"> - Replication of the viruses 	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2		امتحان فصلي اول	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Viral genome	<ul style="list-style-type: none"> - Defective viruses. - Interaction between viruses. - Viral genomes as a vector. 	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Pathogenesis	<ul style="list-style-type: none"> - Pathogenesis and control of viral disease. - Modes of transmission of viruses. - Emerging viral disease. 	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Classification of Virus	<ul style="list-style-type: none"> - DNA enveloped viruses: - Herpes viruses. - Hepatitis B virus. - Pox virus. 	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Classification of Virus	<ul style="list-style-type: none"> - Non enveloped viruses: - Adeno viruses. - Papilloma virus. 	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			- RNA enveloped viruses: Respiratory viruses.		
10 th	2	Immunity & antibody production against viruses	-Host immune response (Defense Mechanisms) -The nonspecific immune defenses -The specific immune defenses Activities of interferon -Humoral immunity -Cellular immunity	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Pathogenes	- Pathogenesis and control of viral disease. - Modes of transmission of viruses. - Emerging viral disease.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Prevention and treatment of viral infection	Antiviral Drug: Treatment for Flu and other Common Viruses Inhibiting DNA/RNA Synthesis Inhibiting Viral Entry/Exit Inhibiting Viral Spread Virotherapy		
13 th	2	Introduction of Vaccines	:Viral vaccines - Types of viral vaccines - Perpetration of viral vaccines - -	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

14 th	2	Viral Vaccines	Passive immunization active immunization	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	General revision		Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
Course Structure: Practical					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Introduction to virology lab	-History -virology laboratory and diagnosis -	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Introduction to virology lab	-Biosafety requirement	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	-Direct detection of Virus	-types of microscope used in detection	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Laboratory process	-Collection of specimen -Transport of specimen -Specimen processing and inoculation -Virus Identification	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2		Exam	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Virus culture and cultivation	-CPE -Haemagglutination -Plaque assay -TCID50 assay	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Detection of viral antibody	-Haemagglutination -Inhibition test -EIA\ELISA	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

8 th	2	Detection of viral Antigen	- Immunofluorescence -EIA\ELISA -Western blot -Imunopreceptation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	- Immunofluorescence -EIA\ELISA -Western blot - Imunopreceptation	-PCR -Southern& northern blot	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	-PCR -Southern& northern blot	-animal Inoculation -Inoculation of egg	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	-animal Inoculation -Inoculation of egg	In vitro cell culture	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	In vitro cell culture	Typed of Vaccines	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13 th	2	Typed of Vaccines	Types of preparation methods	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2		Vaccin manufacturing process	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2		Exam		
155. Course Evaluation					
Overall score out of 100 (Semester grade = 40, including: 25 for theoretical + 15 for practical) (End-of-semester exam score = 60, including 40 for theory + 20 for practical)					
156. Learning and Teaching Resources					
Required textbooks (curric books, if any)					
Main references (sources)			Medical microbiology • Bailey & Scott's Diagnostic Microbiology		

Recommended books and references (scientific journals, reports...)	Review of Medical Microbiology and Immunology PUBMed , Google scholar
Electronic References, Websites	PUBMed & Google scholar

English Language

157. Course Name:
English Language
158. Course Code:
414GS
159. Semester / Year:
1 ^s semester / 2023-2024
160. Description Preparation Date:
1-10-2023
161. Available Attendance Forms:
Weekly attendance
162. Number of Credit Hours (Total) / Number of Units (Total)
2 Theoretical hours/week, one section * 15 weeks = 30 hours Number of units = 2 units
163. Course administrator's name (mention all, if more than one name)
Name: Asst.Lec zahraa Abdulhasan Abdali Email: zahraa.a @sc.uobaghdad.edu.iq
164. Course Objectives
To help students further develop their language skill,achieve a high level of proficiency in English,focus on building on the foundation established in the previous levels.To Expand students' vocabulary, grammar, reading, writing, listening, and speaking abilities and to enhance students' understanding of cultural aspects related to the English languag
165. Teaching and Learning Strategies
1.Communicative Approach: Emphasize communicative activities that promote interaction among students. Encourage pair and group work, role-plays, and discussion to practice language skills in meaningful contexts. 2.Integrated Skills: Integrate the four language skills (speaking, listening, reading, and writing) in lessons to create a balanced approach to language learning. Provide opportunities for students to use and develop these skills simultaneously. 3.Vocabulary Expansion: Incorporate vocabulary-building exercises and activities throughout the course. Use real-life contexts, visuals, and practical examples to help students learn and remember new words. 4.Grammar Focus: Teach and reinforce grammar structures in a systematic and progressive manner. Provide clear explanations, examples, and practice exercises to ensure students understand and can apply the grammar rules correctly.

166. Course Structure: Theory					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1st	2	Unit 1 Life Stories	<ul style="list-style-type: none"> •Vocabulary: Describing personalities, relationships, and experiences. •Grammar: Narrative tenses (past simple, past continuous, and past perfect). •Skills: Discussing personal experiences and telling stories. 	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2nd	2	Unit2: Highs and Lows	<ul style="list-style-type: none"> •Vocabulary: Describing personalities, relationships, and experiences. •Grammar: Narrative tenses (past simple, past continuous, and past perfect). •Skills: Discussing personal experiences and telling stories. 	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3rd	2	Unit 3: Changing Lives	<ul style="list-style-type: none"> •Vocabulary: Describing personalities, relationships, and experiences. •Grammar: Narrative tenses (past simple, past continuous, and past perfect). •Skills: Discussing personal experiences and telling stories. 	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4th	2	Unit 4: Getting Away	<ul style="list-style-type: none"> •Vocabulary: Describing personalities, 	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			relationships, and experiences. •Grammar: Narrative tenses (past simple, past continuous, and past perfect). •Skills: Discussing personal experiences and telling stories.		
5 th	2	Unit 5: Communication Breakdown	Vocabulary Communication problems and strategies. Grammar: Reported speech (statements, questions, and commands) Skills: Dealing with misunderstandings and resolving conflicts.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Unit 6: The Business World --	Vocabulary: Business and workplace terminology. Grammar: Zero and first conditionals, expressions for giving advice Skills: Discussing business topics and presenting ideas.		
7 th	2	Mid-term Exam			

8 th	2	Unit 7: Technology and Society	Vocabulary: Technology-related words and phrases. Grammar: Passive voice, defining relative clauses. Skills: Discussing the impact of technology on society.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Unit 8: The Art of Persuasion	Vocabulary Persuasive language and techniques. Grammar: Modal verbs for deduction and speculation. Skills: Persuading and arguing a point of view.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Unit 9: Health Matters	•Vocabulary: Health and well-being vocabulary. •Grammar: Unreal past conditionals, expressing hypothetical situations. •Skills: Discussing health issues and giving advice.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Unit 10: The World of Work	Vocabulary: Work- related vocabulary and collocations. Grammar	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			<p>ar: Indirect questions, expressing purpose.</p> <p>Skills: Discussing career goals and work-related topics</p>		
12th	2	-- Unit 11: Cross-cultural Encounters	<p>Vocabulary: Cultural differences and customs.</p> <p>Grammar: Third conditional, expressions for giving opinions.</p> <p>Skills: Discussing cultural experiences and adapting to different cultures.</p>		
13th	2	Unit 11: Cross-cultural Encounters	<p>Vocabulary: Cultural differences and customs.</p> <p>Grammar: Third conditional, expressions for giving opinions.</p> <p>Skills: Discussing cultural experiences and adapting to different cultures.</p>	<p>Paper lectures Electronic screen Video lectures via electronic classes</p>	<p>Daily, semester and final exams</p>
14th	2	Unit 12: The Environment	<p>Vocabulary: Environmental</p>	<p>Paper lectures Electronic screen Video lectures via electronic classes</p>	<p>Daily, semester and final exams</p>

			issues and sustainability. Grammar: Future perfect, expressing speculation and possibility. Skills: Discussing environmental problems and solutions.		
15th		Preparatory week before the Final Exam			

167. Course Evaluation

Overall score out of 100
Semester grade = 40,
End-of-semester exam score = 60

168. Learning and Teaching Resources

Required (curricular books, if any)	textbooks	- Textbook: Soars, Liz and John (2003). <i>New Headway Upper-Intermediate</i> . Student's book
Main references (sources)		- Textbook: Soars, Liz and John (2003). <i>New Headway Upper-Intermediate</i> . Student's book
Recommended books and references (scientific journals, reports...)		New Headway Plus provides an integrated skills course with each unit divided into grammar, vocabulary, speaking and everyday English segments
Electronic Websites	References	Oxford University Press: The New Headway series is published by Oxford University Press. Visit their website at www.oup.com and search for "New Headway Plus, Special Edition, Upper-Intermediate" or browse their English language teaching section for information on the course.

Application of genetic engineering

169. Course Name:
Application of genetic engineering
170. Course Code:
BIOT415

171. Semester / Year:					
2 nd semester / 2023-2024					
172. Description Preparation Date:					
1-10-2023					
173. Available Attendance Forms:					
Weekly attendance					
174. Number of Credit Hours (Total) / Number of Units (Total)					
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)					
175. Course administrator's name (mention all, if more than one name)					
-Name: Assist. Prof. Dr. Reema Mohammed Abed Email: Reema.abed@sc.uobaghdad.edu.iq					
-Name: Email: Prof.Dr. Abdulkareem Al-kazaz					
-Name: lecturer Dr. Zaid Ali Hussain					
176. Course Objectives					
In this course, students will explore the molecular methods and applications of recombinant DNA technology and the issues regarding their use through case studies on the effect of genetic engineering on medicine, agriculture, biology, forensics and other areas of technology. The course has 3 major components: 1) techniques used in the generation of recombinant molecules, 2) application of recombinant technology to diagnostics and therapeutics and 3) genetically modified organisms. The discussion of potential ethic concerns of genome manipulations will also be included in the course.					
177. Teaching and Learning Strategies					
130. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint.					
131. Providing students with homework.					
132. Preparing reports related to academic vocabulary.					
133. Visit websites to obtain additional knowledge of academic subjects.					
134. Brainstorming during lectures.					
178. Course Structure: Theory					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	DNA ligation and joining methods	Types of restriction and ligation enzymes and methods of	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			restriction and ligation		
2 nd	2	Transformation	Introduction to the process of conjugation in bacteria and its discovery ^l	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Selection of recombinants	Methods of selection of clones cells	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Gene structure	Genetic structure of the gene and the basic components of the gene	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	First exam	First exam	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	<i>In vitro</i> mutagenesis	Types of in vitro mutagenesis and methods of mutagenesis	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Application of genetic engineering in medicine	Introduction to the applications of genetic engineering in the medical field and giving examples such as gene therapy	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Application of genetic engineering in agriculture	Introduction to the applications of genetic engineering in agriculture and giving examples ^l	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Application of genetic engineering in industry	Applications of genetic engineering in industry and giving examples	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	DNA chips	Introduction to DNA chips and their uses in all aspects	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Probe and primer design	Basics of designing primers and probes using various programs	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

12 th	2	PCR ,Real-time PCR, RFLP	Polymerase chain reaction technology and studying its different types	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13 th	2	Genomic mapping	Studying and discovering genetic maps and their types	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Second exam	-	-	-
15 th	2	Final exam	-	-	-

Course Structure: Practical

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Single nucleotide polymorphisms	Types of mutations and single-nucleotide mutations and methods for calculating them in the gene	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Single nucleotide polymorphisms experiment	Experimenting with the types of mutations and single-nucleotide mutations and methods for calculating them in the gene	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Sequencing	Sequencing methods and how to mark the form to send it to the sequencing	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Sequencing experiment	Experimenting with the sequence and how to teach the model to send it to the sequencing	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

5 th	2	Real time pcr	Introduction to the real-time polymerase chain reaction method	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Real time pcr experiment	Conduct a real-time polymerase chain reaction experiment	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	First exam	-		
8 th	2	Multiplex pcr	Introduction to the multiplex method	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Multiplex pcr experiment Part I	Conducting a laboratory multiplex experiment, part one	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Multiplex pcr experiment Part II	Conducting a laboratory multiplex experiment, part two	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Cloning	Introduction to the cloning	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Cloning experiment part I	Conducting a laboratory cloning experiment, part one	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13 th	2	Cloning experiment Part II	Conducting a laboratory cloning experiment Part two	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Second exam	-		-

				-	
15 th	2	Final exam	-	-	-
179. Course Evaluation					
Overall score out of 100 (Semester grade = 40, including: 25 for theoretical + 15 for practical) (End-of-semester exam score = 60, including 40 for theory + 20 for practical)					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)		-principle of genetic engineering / Ghalib Al-Bakri			
Main references (sources)		- Puehler, A. <i>et al</i> , A.K. 1984. Advanced molecular genetics - Rogen L., 1999. Applied molecular genetics. -Leland, H. <i>et al</i> . 2019. Genetics			
Recommended books and references (scientific journals, reports...)		-genetic, genes, genetic engineering			
Electronic Websites		www. Genetic genie.org			

Cytogenetic

180. Course Name:
Cytogenetic
181. Course Code:
BIOT405
182. Semester / Year:
2 nd semester / 2023-2024
183. Description Preparation Date:
1-10-2023
184. Available Attendance Forms:
Weekly attendance
185. Number of Credit Hours (Total) / Number of Units (Total)
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)
186. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Maha Fakhry Altaee Email: Maha.Fakhry@sc.uobaghdad.edu.iq
187. Course Objectives

This course includes coverage of the concepts of cytogenetic, which deals with the study of chromosomes in the medical and genetic fields, as well as early investigation of the chromosomes responsible for many hereditary diseases by following modern techniques of genetic and tissue culture of animal cells.

188. Teaching and Learning Strategies

135. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint.
136. Providing students with homework.
137. Preparing reports related to academic vocabulary.
138. Visit websites to obtain additional knowledge of academic subjects.
139. Brainstorming during lectures.

189. Course Structure: Theory

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Scope of genetics, Level of genetic testing	Types of genetics	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Cell Division and cell cycle	Stages of cell cycle Interphase and mitosis	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Mitosis division	Phases of mitosis	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Meiosis division	Phases of two stages of meiosis	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2		Seasonal Exam	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Gamete maturation	Oogenesis spermatogenesis		
7 th	2	Mendalin inheritance	Mendel laws of inheritance	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

8 th	2	Mode of inheritance	Dominant and recessives	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Chromosome structure and chromosome classification	Classification of chromosomes into seven groups	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Visualization of chromosome	How to use stains and techniques to study chromosomes	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11 th	2	Preparation cells for chromosome observation	Study the material that added to cells to make chromosomes more visible to study	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2		Seasonal exam		
13 th	2	Abnormal chromosome number (autosomal aneuploidy)	Dawn synd. Patau synd. Edward synd.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Sex-chromosome aneuploidy	Turner syndrome Klinefelter synd. Jacob synd	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Structural chromosome aberrations	Deletion , insertion , translocation , ring	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

Course Structure: Practical

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	List of apparatus	Apparatus in cytogenetic laboratory	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	-types of media -material used -media preparation	Specific and component of media used in cell culture	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

3 rd	2	-cell cycle -mitosis steps -meiosis steps -differences between mitosis & meiosis	Mitosis and Meiosis showed by slides and video	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Culturing process	Culturing of blood lymphocyte from human	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	-Preparation from mice -bone marrow -liver -tumor	Preparation of chromosome	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Staining methods	Staining of chromosome and Microscope	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2		exam	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	-Karyotype -chromosome number	Ordering chromosome as karyotype	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Numerical & structural	Chromosome aberration	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	sister chromatide exchange ,MI& MN)	Cytogenetic Analysis		
11 th	2	FISH, Ctyovision	Molecular Cytogenetic	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Diagnostic applications	Modern methods used in cytogenetic tests	Paper lectures Electronic screen	

				Video lectures via electronic classes	
13 th	2	Pedigreesymbols Punnett square	Pedigree Chart	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Seminars	Seminars	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2		Seasonal Exam		
190. Course Evaluation					
Overall score out of 100 (Semester grade = 40, including: 25 for theoretical + 15 for practical) (End-of-semester exam score = 60, including 40 for theory + 20 for practical)					
191. Learning and Teaching Resources					
Required-textbooks (curricular books, if any)		No required books, only lectures.			
Main references (sources)		Human genetic, 2013 (8 th edition)			
Recommended books and references (scientific journals, reports...)		Any book in Human Cytogenetic, Human Chromosome			
Electronic Websites		References www.cytogenetic.org			

Industrial biotechnology

192. Course Name:
Industrial biotechnology
193. Course Code:
BIOT425
194. Semester / Year:
2 nd semester-4 th class / 2023-2024
195. Description Preparation Date:
1-10-2023
196. Available Attendance Forms:
Weekly attendance
197. Number of Credit Hours (Total) / Number of Units (Total)
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)

198. Course administrator's name (mention all, if more than one name)					
Name: Prof. Dr. Khalid Jaber Kadhum					
Email: Khalid.kadhumi@sc.uobaghdad.edu.iq					
199. Course Objectives					
<p>1- Preparing specialists familiar with the basics of biotechnology, theoretically and practically, who are able to meet the needs of the labor market.</p> <p>2- Integrated fundamental concepts of biosciences and bioprocess engineering for the study of industrial biotechnology.</p> <p>3- Familiarisation with the tools used to study and application of microorganisms in industry</p> <p>4- Develop a good appreciation of the multidisciplinary aspects of biotechnology</p> <p>5- Encouraging scientific research and providing students with basic skills in biotechnologies and their applications in all fields.</p>					
200. Teaching and Learning Strategies					
140. Providing students with the basics and additional topics related to the outputs thinking and analysis of biotechnologies.					
141. - Forming discussion groups during lectures to discuss topics in industrial biotechnology that require thinking and analysis.					
142. - Asking students a set of thinking questions during lectures such as what, how, when and why for specific topics.					
143. - Giving student's homework that requires self-explanations in causal ways.					
201. Course Structure: Theory					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Industrial Biotechnology	Definition and scope	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Bioprocess technology	Basic concepts in Bioprocess technology	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Industrial microorganisms	Strategies of acquisition of an ideal producing microorganism	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Improvement of industrial strains	Optimizing the culture medium and growth conditions: Genetic modification: The selection of induced mutants synthesizing improved levels of primary metabolites:	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			feedback inhibition and repression		
5th	2	Improvement of industrial strains	The isolation of mutants which do not produce feedback inhibitors or repressors: The isolation of induced mutants producing improved yields of secondary metabolites	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6th	2	Production of microbial metabolites	Industrial microbiological products as primary and secondary metabolites		
7th	2	FIRST EXAM	FIRST EXAM		
8th	2	Production of Ethanol	Biosyntheses of ethanol; Ethanol Production process; Flocculence and Cell Recycling	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9th	2	Enzyme technology	Enzymes, Commercial production of enzyme; Improvement of enzyme production; improvement of enzymes production, enzyme immobilization	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10th	2	Production of antibiotics	Why do microorganisms synthesize antibiotic: Strategies for the improvement of antibiotics production: Production of Penicillin: Commercial production of penicillin	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11th	2	Microbial biomass production	Single cell protein; The choice of an organism for SCP	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			production; Substrate for SCP production; Single cell protein production processes		
12 th	2	SECOND EXAM	SECOND EXAM		
13 th	2	Production of amino acids	Production glutamic acid; production of Lysine	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Production of organic acids	production of Citric acid: Citric acid biosynthesis, Fermentation processes used in citric acid production	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Exam			
Course Structure: Practical					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Isolation of industrial microorganism s	Isolation of industrial microorganisms from the soil and their potential to produce antibiotics	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	industrial strains	Maintenance and preservation of industrial strains	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	single cell protein	Production of single cell protein (SCP) from yeast	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	ethanol (biofuel)	Production of ethanol (biofuel) using wastepaper as a feedstock	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	First exam			
6 th	2	Bacterial pigments	Production of prodigiosin by <i>Serratia marcescens</i>	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

7 th	2	bacteriocin	Production of bacteriocin from <i>Bacillus</i> isolate	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	protease	Production of protease by <i>Aspergillus niger</i> using solid state fermentation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	cellulase	Production of cellulase by soil microorganisms	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Second exam			
11 th	2	amylase	Production of amylase	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Immobilization	Immobilization of industrial microorganisms		
13 th	2	Immobilization	Immobilization of industrial microorganisms	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Immobilization 2	Immobilization of industrial microorganisms	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Exam			

202. Course Evaluation

Overall score out of 100

(Semester grade = 40, including: 25 for theoretical + 15 for practical)

(End-of-semester exam score = 60, including 40 for theory + 20 for practical)

203. Learning and Teaching Resources

Required textbo
(curricular books, if any)

Industreal biotechnology for Dr.Nedam Al-Hydari.

Main references (sources)

1. Manual of Industrial Microbiology and Biotechnology (Third edition 2010)

By Richard H. Baltz *et. al*

2- Principles of fermentation technology (second edition 2003) By Stanbury PF; Whitaker; Hall SJ

3- Bioprocess Engineering: Basic concepts

	by Fikret Kargi ➤
Recommended books and references (scientific journals, reports...)	<ol style="list-style-type: none"> 1. Fermentation Microbiology and Biotechnology A.L Demain <i>et. al</i> 2. Practical Fermentation Technology Brain Mchneil & Linda M. Harvey
Electronic Websites	Referenc WWW. Industrial technology.org

Genetic disease and molecular diagnosis

204. Course Name:
Genetic disease and molecular diagnosis
205. Course Code:
BIOT415
206. Semester / Year:
2 nd semester / 2023-2024
207. Description Preparation Date:
1-10-2023
208. Available Attendance Forms:
Weekly attendance
209. Number of Credit Hours (Total) / Number of Units (Total)
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)
210. Course administrator's name (mention all, if more than one name)
Name: Assistant Prof. Dr.Aseel Shaker and Assistant. Prof.Dr.Rasha Al-khalidi Email: rasha.ali@sc.uobaghdad.edu.iq Aseel.mahmood@sc.uobaghdad.edu.iq
211. Course Objectives
<ol style="list-style-type: none"> 1. Understanding the molecular basis of genetic diseases. 2. Learning various molecular diagnostic methods used in identifying genetic mutations and abnormalities. 3. Gaining proficiency in laboratory techniques such as PCR (Polymerase Chain Reaction), DNA sequencing, and other molecular biology assays. 4. Exploring the role of bioinformatics in genetic disease diagnosis, including data analysis and interpretation. 5. Understanding ethical considerations and implications associated with genetic testing and diagnosis. Overall, the course aims to equip students with the knowledge and skills necessary to accurately diagnose genetic disorders using molecular techniques, contributing to improved patient care and genetic counseling.
212. Teaching and Learning Strategies

144. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint.
145. Providing students with homework.
146. Preparing reports related to academic vocabulary.
147. Visit websites to obtain additional knowledge of academic subjects.
148. Brainstorming during lectures.

213. Course Structure: Theory

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Introduction in Genetics Disease	Introduction in Genetics Disease -History -Genetic Basis of Disease	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Polycystic kidney disease	Symptoms- -Inheritance Diagnosis-	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Burkitt's lymphoma	Types- Genetics- Symptoms- -Inheritance Diagnosis Inheritance-	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Multiple endocrine neoplasia	Genetics- Inheritance- -Molecular diagnosis	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Retinoblastoma	Genetics- Inheritance- -Molecular diagnosis	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	NEUROFIBROMATOSIS	Genetics- Inheritance- -Molecular diagnosis		
7 th	2	EXAM			
8 th	2	Congenital hypothyroidism	Genetics- Genetic cause of disease, , mechanism of disease, symptom, diagnosis by enzymatic reaction, diagnosis by sequencing , treatment, diet, follow up	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

9 th	2	cystic fibrosis	Cystic fibrosis, inheritance pattern of cystic fibrosis, mechanism of disease, respiratory sign and symptom, digestive sign and symptom, diagnosis by PCR , diagnosis by real time PCR	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	New-born Screening test	Molecular genetics testing, newborn screening test, newborn screen test in USA and Iraq, current molecular testing in newborn screening test, galactosemia, genetics cause, pathophysiology, clinical feature, diagnosis, diet, follow up		
11 th	2	Duchenne muscular dystrophy	Genetics Duchenne muscular dystrophy, characterization of sever DMD, dystrophic gene, dystrophic protein, mutation of DMD gene downstream effect of the absence of dystrophin, DNA diagnosis in BMB/DMD, detection the disease using PCR	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Alzheimer disease	Genetics- Inheritance- -Molecular diagnosis		
13 th	2	Schizophrenia	Genetics- Inheritance- -Molecular diagnosis	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

14 th	2	Breast cancer	-Detection brca 1 and brca 2 genes Inheritance- -Molecular diagnosis -	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	Final exam			
Course Structure: Practical					
Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Nested PCR polymerase chain reaction detection Polycystic kidney disease	-DNA Extraction -PCR primer for <i>PKD1</i> gene -PCR for <i>PKD2</i> gene - Gele electrophoreses	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Gene-expression profiling to Burkitt's lymphoma	-RNA extraction -Real time PCR - detection <i>Myc's</i> gene expression	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Multiplex PCR to multiple endocrine neoplasia	DNA Extraction- -specific primers to <i>MEN1</i> gene - Identification of a gene mutation by nucleic acid sequencing	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Genetic diagnosis for neurofibroma	-TNF gene expression by real time - TNF gene sequencing		
5 th	2	Diagnosis of DMD	Method (multiplex PCR) Preparation of multiplex kit Calculation the PCR reaction Preparation of agarose gel Result analysis	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6 th	2	Diagnosis of cystic fibrosis (CFTR gene)	Q-PCR Quantitative PCR and melt curve. Result analysis	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	Gene detection	genetic factors and polymerase chain reaction	Paper lectures Electronic screen	Daily, semester and final exams

		alzahimer disease		Video lectures via electronic classes	
8 th	2	Nested PCR polymerase chain reaction detection disease	-DNA Extraction -PCR primer for <i>braca1</i> gene -PCR for <i>braca2</i> gene - Gele electrophoreses	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Gene expression real time Schizophrenia disease	Detection sequence mutation in genes		
10 th	2	Multiplex PCR to	DNA Extraction- -specific primers to gene - Identification of a gene mutation by nucleic acid sequencing		
11 th	2	Sequencing	-detection polymorphisms in gene	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12 th	2	Sequencing 2	Detection types mutation in gene		
13 th	2	Tag-man polymerase chain reaction	-prepar Borb specific -DNA extraction	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Statical analysis poly morphisms	-products tag man PCR -program analysis	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15 th	2	exam			

214. Course Evaluation

Overall score out of 100

(Semester grade = 40, including: 25 for theoretical + 15 for practical)

(End-of-semester exam score = 60, including 40 for theory + 20 for practical)

215. Learning and Teaching Resources

Required textbo (curricular books, if any)	"Molecular Biology Authored by Dr. Ghalib Al-Bakri"
Main references (sources)	1-Disease Delusion: by Jeffrey S. Bland (Author), Mark Hyman. 2015 2- Human Genetic Diseases. Edited by Dijana Plaseska-Karanfilska.2011

Recommended books and references (scientific journals, reports...)	Human Genetic Diseases1- • 2- The genetic basis of disease. Essays in Biochemistry 62(5):643-723 DOI: 10.1042/EBC20170053
Electronic Websites	-National human genome research institutes 2- Online Degrees Blog What You Need to Know About 5 Most Common Genetic Disorders

Applications of animal cell culture

216. Course Name:
Applications of animal tissue culture
217. Course Code:
BIOT350
218. Semester / Year:
2 nd semester / 2023-2024
219. Description Preparation Date:
1-10-2023
220. Available Attendance Forms:
Weekly attendance
221. Number of Credit Hours (Total) / Number of Units (Total)
2 Theoretical hours/week, one section * 15 weeks = 30 hours 4 Practical hours/week per section * 15 weeks = 60 hours Total number of hours per section = 90 hours Number of units = 3 units (theoretical 2 + practical 1)
222. Course administrator's name (mention all, if more than one name)
Name: Assistant Prof. Dr. Rasha Talib Abdullah Assistant Prof. Dr. Hala Abdulkareem Rasheed Email: rasha.abdullah@sc.uobaghdad.edu.iq hala.rasheed@sc.uobaghdad.edu.iq
223. Course Objectives
<p>The course aims to provide a comprehensive understanding of the concepts of animal tissue culture, including the techniques used, basic principles, and challenges associated with them.</p> <p>Study of techniques and tools: The course aims to introduce students to a variety of techniques and tools used in animal tissue culture, including cell culture techniques, molecular analysis, imaging techniques, and bioanalysis.</p> <p>Developing practical skills: The course includes practical work periods that allow students to apply the concepts and techniques learned in practical work. Students are encouraged to acquire the skills necessary to grow animal cells and tissues in the laboratory.</p> <p>Study of practical applications: The course aims to review the practical applications of animal tissue culture in fields such as veterinary medicine, human medicine, and other biological sciences. Successes and challenges in these areas are reviewed and potential benefits and future applications are examined</p>

224. Teaching and Learning Strategies

149. Clarification and explanation of the study materials by the academic staff through the whiteboard or using PowerPoint.
150. Providing students with homework.
151. Preparing reports related to academic vocabulary.
152. Visit websites to obtain additional knowledge of academic subjects.
153. Brainstorming during lectures.

225. Course Structure: Theory

Week	Hour	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Introduction to animal cell culture and its application	-Animal cell culture -Cell Strain -Growth requirement -Growth cycle -Application of cell line	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Model Systems	-Types of animal cell cultures - Cell cultures provide a good model system for studying)I(Basic cell biology and biochemistry , a- Visualizing cell signaling b- Recombinant proteins c - Cell culture models for drug permeability screening in early stages of drug development	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Tissue Repair , Regeneration and Wound healing	-Repair of damaged tissues -Cell and Tissue Regeneration -Connective tissue deposition -Tissue engineering -Tools and Procedures Tissue Engineering -Scaffolds	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Production of β -Interferon	I. Importance of interferon- β II. Industrial Scale Production of β -Interferon III- Growth of Human Fibroblast Cells in Large Scale	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

5 th	2	Cancer Research : Toxicity Testing	<p>Cytotoxicity .</p> <ul style="list-style-type: none"> -Cytotoxicity can lead healthy living cells to three potential cellular fates -Advantages of In vitro cytotoxicity and/or cell viability -How to measure cytotoxicity -Classification of cytotoxicity and cell viability assays -Dye exclusion assays -Colorimetric assays -Fluorometric assays -Luminometric assays 	<p>Paper lectures</p> <p>Electronic screen</p> <p>Video lectures via electronic classes</p>	<p>Daily, semester and final exams</p>
6 th	2	--	first Exam		
7 th	2	MONOCLONAL ANTIBODY PRODUCTION	<p>What are antibodies ?</p> <ul style="list-style-type: none"> -Characters of Monoclonal Antibodies -History of mAb development -Production process -Applications of Monoclonal antibodies 	<p>Paper lectures</p> <p>Electronic screen</p> <p>Video lectures via electronic classes</p>	<p>Daily, semester and final exams</p>
8 th	2	Hybridoma Technology	<ol style="list-style-type: none"> 1-Immunization of specific animal which generate hybridoma cell with spleen cell . 2. Screening of Mice for Antibody Production 3 .Isolation of Antibody producing Spleen cells . 4 .Isolation of myeloma cells . 5 .Fusion between spleen cell and myeloma cell . 6 .Selection of HAT medium . 7 .Isolation of hybridoma cell . 8 .Screening of hybridoma cell. 	<p>Paper lectures</p> <p>Electronic screen</p> <p>Video lectures via electronic classes</p>	<p>Daily, semester and final exams</p>
9 th	2	Vaccine production	<p>Vaccine Production in Cell Culture</p> <p>Types of animal cell substrates</p>	<p>Paper lectures</p> <p>Electronic screen</p> <p>Video lectures via electronic classes</p>	<p>Daily, semester and final exams</p>

			<p>Selecting the Strains for Vaccine Production</p> <p>Batch culture</p> <p>Continuous culture</p> <p>Different Vaccines Produced</p>		
10 th	2	CLONING AND SELECTION	<p>Cell cloning</p> <p>-Uses of cloning</p> <p>-Dilution cloning</p> <p>-Stimulation of plating efficiency</p> <p>-Conditions that improve clonal growth</p> <p>-Suspension cloning</p> <p>-Isolation of clones</p>	<p>Paper lectures</p> <p>Electronic screen</p> <p>Video lectures via electronic classes</p>	<p>Daily, semester and final exams</p>
11 th	2	3-D Technology	<p>Introduction</p> <p>3 - D vs 2D cell culture</p> <p>-Advantages of 3D cell culture</p> <p>-In vitro tumor microenvironment in 3 D system</p> <p>-Mechanism of formation of spheroids</p>	<p>Paper lectures</p> <p>Electronic screen</p> <p>Video lectures via electronic classes</p>	<p>Daily, semester and final exams</p>
12 th	2	--	Seasonal exam		
13 th	2	3-D Technology of tumor cells	<p>3D cell culture techniques for tumor models</p> <p>3 -D in vitro tumor models</p> <p>-commercially available 3D culture</p> <p>-recent development on tumor models</p> <p>-applications of 3D tumor models</p>	<p>Paper lectures</p> <p>Electronic screen</p> <p>Video lectures via electronic classes</p>	<p>Daily, semester and final exams</p>
14 th	2	Recombinant Technology) Plasminogen(<p>PURIFICATION OF NATURAL HUMAN T-PA</p> <p>-MECHANISM OF ACTION OF T-PA</p> <p>-STRUCTURE-FUNCTION RELATIONS IN T-PA</p> <p>-THROMBOLYTIC PROPERTIES OF NATIVE HUMAN T-PA</p> <p>-CLONING AND EXPRESSION OF THE</p>	<p>Paper lectures</p> <p>Electronic screen</p> <p>Video lectures via electronic classes</p>	<p>Daily, semester and final exams</p>

			HUMAN T-PA GENE -THROMBOLYTIC PROPERTIES OF RECOMBINANT T- PA		
15 th	2	Tests for genetic diseases	Amniocentesis, a diagnostic technique that enables doctors to remove and culture fetal cells from pregnant women for the early diagnosis of fetal disorders . 2.Examples of early detection of diseases	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
Course Structure: Practical					
Week	Hour	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1 st	2	Equipment's used in Animal cell culture	Equipment required for animal cell culture Cell culture media Cell Culture Environment	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2 nd	2	Culture of animal cells subculturing	-Confluency -Cell viability -Protocol for Passaging or Subculturing -Protocol subculture on adherent cells Protocol subculture of suspension cells	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3 rd	2	Tissue Engineering	Goals of Tissue Engineering Why Tissue Engineering is Important STEPS: TISSUE ENGINEERING	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4 th	2	Cytotoxicity Testing For adherent cells	-Principle Outline of MTT assays Materials Procedure -Plating out cells -Drug addition -Estimation of surviving cell numbers	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5 th	2	Cytotoxicity For suspension cells Testing	Principle Outline of MTT assays Materials Procedure -Plating out cells -Drug addition -Estimation of surviving cell numbers	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

6 th	2	Preliminary -Determination of Colony-Forming Efficiency materials and procedure -Isolation of Clonal Populations Using Cloning Rings	Cloning Animal Cells adherent cells	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7 th	2	First exam		Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8 th	2	Cloning Animal Cells For suspension cells	Cloning Procedure with the Limiting -Dilution Assay material and procedure -Semi-solid Media Cloning material and procedure	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9 th	2	Generation of Hybridoma and isolate the Monoclonal Antibodies	Background Information Purification of antigen - Preparation of Immunogen - In-Vivo Immunization of mice - Determination of Antibody	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10 th	2	Isolation the Monoclonal Antibodies	-Preparation of Spleen cells - -Fusion of spleen and myeloma cells - -Selection of hybridoma cells -Hybridoma Molecular Mechanism of Hybridoma selection -Screening of hybridoma supernatant for presence of antibody - -Harvesting of monoclonal antibody-		
11 th	2	Methods for Production of Vaccines	Types of Vaccines -How does vaccine works ? -Vaccine manufacturing -General method for	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			vaccine production		
12 th	2	Three dimensional cell culture	What is 3D Cell Culture ? 2-D vs 3D Cell Cultures 3-D Cell Culture Techniques		
13 th	2	Three dimensional cell culture	Applications of 3D cell culture	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14 th	2	Second exam		Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
226. Course Evaluation					
Overall score out of 100 (Semester grade = 40, including: 25 for theoretical + 15 for practical) (End-of-semester exam score = 60, including 40 for theory + 20 for practical)					
227. Learning and Teaching Resources					
Required textbooks (curricular books, if any)		Practical Tissue Culture Applications 1979			
Main references (sources)		<ul style="list-style-type: none"> ● Culture of animal cells a manual of basic technique and specialized applications ● □ Sixth Edition 2010 □ Animal Cell Biotechnology 2015 			
Recommended books and references (scientific journals, reports...)		Searching in medical search engines for applications of animal tissue transplantation, such as Google Scholar and PUBMed Searching in medical search engines for applications of animal tissue transplantation, such as Google Scholar and PUBMed			
Electronic Websites		There are many websites concerned with animal tissue culture applications Including medical websites, YouTube, and scientific research			