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 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 Ph.D students

University Name: University of Baghdad

Faculty/Institute: College of Science

Scientific Department: Biotechnology department.

Academic or Professional Program: Biotechnology

Final Certificate Name: Ph.D 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				
College Requirements	2			English language Research methodology
Department Requirements	1			Biostatistics
Summer Training				
Other				

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
Ph.D. stage				
1st semester 2023-2024		Advanced Genetic engineering		
		Bioprocess technology		
		Gene molecular biology		
		Advanced plant Biotechnology		
		Bioseperation		
		English language		
2nd semester 2023-2024		Immunobiotechnology		
		Advanced Microbial genetics		
		Biostatistics		
		Research methodology		
		Elective 1		
		Elective 2		

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

Year/Level 2023/2024	Course Code	Course Name	Basic or optional	Required program Learning outcomes											
				Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Ph.D. 1st semester		Microbial fermentation technology	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Human genetics	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Advanced pathogenic bacteria	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Advanced plant biotechnology	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		English language	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Ph.D. 2nd semester		Protein engineering and chemistry	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Topics in biotechnology	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Biostatistics	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Research methodology	Basic	√	√	√	√	√	√	√	√	√	√	√	√

		Advanced microbial environment	Elective	√	√	√	√	√	√	√	√	√	√	√	√
		Cancer genetics	Elective	√	√	√	√	√	√	√	√	√	√	√	√
		Bacterial toxins	Elective	√	√	√	√	√	√	√	√	√	√	√	√
		Antibiotics technology	Elective	√	√	√	√	√	√	√	√	√	√	√	√
		Genetic forensics	Elective	√	√	√	√	√	√	√	√	√	√	√	√
		Advanced Immunobiotechnology	Elective	√	√	√	√	√	√	√	√	√	√	√	√
		Advanced biomaterials	Elective	√	√	√	√	√	√	√	√	√	√	√	√
		Medicinal immunogenetics	Elective	√	√	√	√	√	√	√	√	√	√	√	√
		Gene technology	Elective	√	√	√	√	√	√	√	√	√	√	√	√
		Medicinal genetics	Elective	√	√	√	√	√	√	√	√	√	√	√	√

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

Course Description Form

Chemistry and protein engineering

1. Course Name:
Chemistry and protein engineering
2. Course Code:
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 Total number of hours per section = hours Number of units =
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Gazi M. Aziz Assistant Prof. Dr. Ali Jabbar Reshak **Email:** ali.reshak@sc.uobaghdad.edu.iq
8. Course Objectives
This course aims to provide students with a comprehensive understanding of the fundamental concepts, theories, and practical applications within the Chemistry and protein engineering field. Through engaging lectures, interactive discussions, and hands-on activities, students will develop the knowledge, skills, and critical thinking abilities necessary to analyze, evaluate, and solve problems related to Chemistry and protein engineering. Additionally, the course aims to foster a deep appreciation for the importance and relevance of Chemistry and protein engineering in various real-world contexts, encouraging lifelong learning and professional development
9. 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.
10. Course Structure: Theory

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

1st	**2**	- Amino acid. - peptides. - poly peptides - some of amino acid derivatives in proteins. - Aromatic amino acid absorbance	the building blocks of proteins	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2nd	**2**	- determination the amino acid composition of proteins. - separation of amino acid. - amino acid analyzer	Peptide and poly peptides structure and sequence	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3rd	**2**	-steps of amino acid sequence. - peptides hydrolysis - chemical hydrolysis. - enzymatic hydrolysis - determination of C- terminal and N-terminal	Determination of amino acids sequence of protein	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4th	**2**	primary structure- -secondary structure (α-helix and B-pleated sheetز - tertiary structure - quaternary structure	The three dimension of proteins	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5th	**2**	- Hemoglobin-an allosteric-oxygen-binding protein -Hyperbolic reaction. -Allosteric reaction	-Denaturation and renaturation of ribonuclease -Oxygen binding protein		Daily, semester and final exams

		-Protein engineering			
6th	**2**	First examination			
7th	**2**	Historical aspects.- -Specificity. -Induced fit theory.	Enzymes	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8th	**2**	-activation energy. - allosteric modulation - sequential model - concerted model	Mechanisms and thermodynamics	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9th	**2**	-features of active sites -cofactors. - Nomenclature and classification of enzyme -isoenzyme	Active sites of enzyme	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10th	**2**	-the proximity effect - structural flexsibility and enzymes specificity -electrostatic interaction - general acid general base catalysis	Themes of enzymes reaction	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11th	**2**	- Effect of substrate concentration on the enzyme reaction. - michaelis menten kinetics -reaction order of enzyme -firet order , second order and zero order	Enzyme kinetics	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

12th	**2**	-irrevirsible inhibitors -reversible inhibitors -uses of inhibitors	Enzyme inhibition		
13th	**2**	-enzyme production - enzyme can be compartmentalized. -post-translational modification -activation and inhibition of enzyme	Control of enzyme activity	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14th	**2**	Second examination			
15th	**2**	-Cleland reaction - random BiBi reactions -orderd BiBi reactions -ping-pong reactions	Multisubstrate enzyme and kinetic mechanisms	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
16th			Final examination		

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Basic Applied Biotechnology, biochemistry books
Main references (sources)	➢ Lihnenger, A.I., Nelson, D.L., Cox, M.M. Principles of biochemistry, 2nd edition. Worth Publishers. 1993. ➢ Zubay, G.L., Parson, W.W., Vance, D.E. Principles of biochemistry. Wm.c. Brown Publishers.1995.
Recommended books and references (scientific journals, reports...)	Palmer, T . and Bonner, P. (2007). Enzymes, Biochenis Biotechnology,Clinical Chemistry. Second edition. Reprin by Woodhead Publishing Limited,2011.
Electronic References, Websit	Database website (NCBI),Uniprot.Esmble

Course Description Form

Biostatistics

1. Course Name:
Biostatistics
2. Course Code:
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/ 15 weeks = 30 hours Number of units = 2
7. Course administrator's name (mention all, if more than one name)
Name: Assistant Prof. Dr. Fadhaa Othman Sameer **Email:** fadhaa.sameer@sc.uobaghdad.edu.iq
8. Course Objectives
This course aims to provide students with a comprehensive understanding of the fundamental concepts, theories, and practical applications within the [biostatistics] field. Through engaging lectures, interactive discussions, and hands-on activities, students will develop the knowledge, skills, and critical thinking abilities necessary to analyze, evaluate, and solve problems related to [applied statistics]. Additionally, the course aims to foster a deep appreciation for the importance and relevance of [biostatistics] in various real-world contexts, encouraging lifelong learning and professional development
9. Teaching and Learning Strategies
1. Clarifying and explaining the study materials by the academic staff through the whiteboard or 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**	Introduction to the biostatistics	What is statistics 1- Definition of statistics and its benefits	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

			2- Definition of population and sample with		
2nd	**2**	How to obtain data and its types	1- Types of data 2-Data sources 3- Design studies	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3rd	**2**	Types of variables used in the study	1- Types of variables 2- Optimization for each type	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4th	**2**	Methods of representing data	1- Representing data with graphics 2- Methods of representing data with tables	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5th	**2**	Measures of central tendency	1- Average 2- The mode 3- The median 4-weight mean 5-geomatric mean 6- harmonic mean	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6th	**2**	Measures of dispersion and deviation	1-Variance 2-Standard deviation 3- Coefficient of variation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7th	**2**	Statistical distributions	Continuous distributions Discrete distributions.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8th	**2**	Statistical tests	Types of tests (parametric and non-parametric)	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9th	**2**	First Exam	First Exam		
10th	**2**	Probability	Definition of probability and the set of possible possibilities of occurrence	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11th	**2**	Probability of the union and intersection	Learn how to calculate the probability of separate, united, and intersecting sets.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

12th	**2**	Conditional probability	Learn how to calculate conditional probability..	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13th	**2**	Odds ratio	Learn how to calculate the Odds ratio for group and compare the values	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14th	**2**	Logistic regression	Know the logistic regression equation and its applications.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15th	**2**	**Second Exam**	**Second Exam**		

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

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Statistics (muaed Unis)
Main references (sources)	Principles of Biostatictics(Marcello pagano 2018) ➢
Recommended books and references (scientific journals, reports...)	Principles of statictics(M.G.Bulmer) ➢
Electronic References, Websites	Arabian statisticians **Website**

Course Description Form

Advanced Plant biotechnology

1. Course Name:
Advanced Plant biotechnology
2. Course Code:
3. Semester / Year:
1st 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 Total number of hours per section = hours Number of units = 3
7. Course administrator's name (mention all, if more than one name)
Name: Assistant Prof. Dr. Majid Rasheed Majeed and Assistant Professor Dr. Alaa Abdul Husain Al-Bahadili **Email:** majid.majeed @sc.uobaghdad.edu.iq
8. Course Objectives
This course aims to provide students with a comprehensive understanding of the fundamental concepts, theories, and practical applications within the [Advanced Plant biotechnology] field. Through engaging lectures, interactive discussions, and hands-on activities, students will develop the knowledge, skills, and critical thinking abilities necessary to analyze, evaluate, and solve problems related to [plants and agricultural]. Additionally, the course aims to foster a deep appreciation for the importance and relevance of [Medicinal Plant biotechnology] in various real-world contexts, encouraging lifelong learning and professional development
9. 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. Plant biotechnology during lectures.
10. Course Structure: Theory

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

1st	**2**	Introduction	Topics of plant biotechnology and their importance	Paper lectures Electronic screen Video lectures	**Beginning of semester**
2nd	**2**	Concepts and Definitions	Concept of In Vitro Cell Culture	Paper lectures Electronic screen Video lectures	**Quiz**
3rd	**2**	Growth Regulators	Advanced Experiments for Plant Growth Regulators	Paper lectures Electronic screen Video lectures	
4th	**2**	Cell Suspension Culture	New Types of Cell Suspension Culture and Plating Technique	Paper lectures Electronic screen Video lectures	**Quiz**
5th	**2**	Somatic Embryos	Somatic plant cells Hybrid and Somatic Embryos	Paper lectures Electronic screen Video lectures	
6th	**2**		First Midexam		**20% of total degree**
7th	**2**	The Fertilization	Test Tube Fertilization	Paper lectures Electronic screen Video lectures	
8th	**2**	Plant Genetic Engineering	Genetic Engineering Techniques in Plant Biotechnology	Paper lectures Electronic screen Video lectures	**Quiz**
9th	**2**	Transformatio n Techniques	DNA Transformation Techniques in plants	Paper lectures Electronic screen Video lectures	
10th	**2**	Analysis Technique	Restriction Enzyme Digestion and Analysis Technique	Paper lectures Electronic screen Video lectures	
11th	**2**	Genetic Manipulation	Genetic Manipulation in Plant Biotechnology	Paper lectures Electronic screen Video lectures	**Quiz**
12th	**2**	Sequences and Selection Marker	Gene selection , Insertion of Sequences and Selectable Marker	Paper lectures Electronic screen Video lectures	
13th	**2**		Second Midexam		**20% of total degree**
14th	**2**	Enhancement of secondary plant products	Role of biotechnology in enhancement of secondary plant products	Paper lectures Electronic screen Video lectures	
15th	**2**	Screening Methods	Screening Methods of Genomic Library of Plants	Paper lectures Electronic screen Video lectures	**End of semester**
11. Course Evaluation					

Overall score out of 100 (Semester grade = 40) (End-of-semester exam score = 60)	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Advances in Plant Sciences and Biotechnology
Main references (sources)	Modern Applications of Plant Biotechnology
Recommended books and references (scientific journals, reports...)	Plant Biotechnology: Recent Advancements and Developments
Electronic References, Websites	Many websites dealing with advanced plant biotechnology, including Pharmacognosy and Pharmaceuticals websites, Agricultural websites, YouTube, and scientific research

Course Description Form

Antibiotics technology

1. Course Name:
Antibiotics technology
2. Course Code:
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 Total number of hours per section = hours Number of units =
7. Course administrator's name (mention all, if more than one name)
Name Prof. Dr. Khalid Jaber Kadhum **Email:** khalid.kadhum@sc.uobaghdad.edu.iq
8. Course Objectives
This course aims to provide students with a comprehensive understanding of the fundamental concepts, theories, and practical applications within the antibiotic technology field. Through engaging lectures, interactive discussions, and hands-on activities, students will develop the knowledge, skills, and critical thinking abilities necessary to analyze, evaluate, and solve problems related to antibiotics. Additionally, the course aims to foster a deep appreciation for the importance and

relevance of antibiotics in various real-world contexts, encouraging lifelong learning and professional development

9. 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.

10. Course Structure: Theory

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1st	2	An introduction to antibiotics: History, classification and basic concepts	An introduction	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2nd	2	Why antibiotics are produced?	The Role of antibiotics in the physiology of organisms producing them	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3rd	2	Do antibiotics produced for purposes other than antagonism?	The Role of antibiotics in the physiology of organisms producing them	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4th	2	why do we need new antibiotics?	The Search for New Bioactive Microbial Metabolites:	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

5th	**2**	The classical method of searching for new antibiotics	The Search for New Bioactive Microbial Metabolites		
6th	**2**	Development of search strategies for new antibiotics	strategies for new antibiotics		Daily, semester and final exams
7th	**2**	Combating resistance and expanding the effectiveness of existing antibiotics	antibiotics resistance	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8th	**2**	Strategies for accessing new antibiotics from silent biosynthetic pathways	silent biosynthetic pathways	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9th	**2**	Biosynthetic Reactions and Pathways, Regulation and control of antibiotic biosynthesis: Feedback Regulation Regulation by Nutrient Concentration, Autoregulators and Pleiotropic Effectors	Biosynthesis and Regulation of antibiotics	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10th	**2**	Strain Improvement for over production of antibiotics	Strain Improvement	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11th	**2**	Improving antibiotics production by metabolic engineering	metabolic engineering	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

12th	**2**	Bacteriocins: definition, classification and the biology of bacteriocin	Bacteriocins		
13th	**2**	Bacteriocins: The dual role of bacteriocins as anti- and probiotics	Bacteriocins:	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14th	**2**	The Manufacturing Process of antibiotics production	Process of antibiotics production	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15th	**2**		**امتحان فصلي**	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
Overall score out of 100 (Semester grade = 40) (End-of-semester exam score = 60)					

11. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Bioprocess Engineering: Basic concepts
Main references (sources)	Fermentation Microbiology and Biotechnology
Recommended books and references (scientific journals, reports...)	Manual of Industrial Microbiology and Biotechnology
Electronic References, Websites	

Course Description Form

Forensic genetics

1. Course Name:
Forensic genetics
2. Course Code:
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 Total number of hours per section = hours Number of units =
7. Course administrator's name (mention all, if more than one name)
Name: Assistant Prof. Dr. Reema Mohammed Abed **Email:** reema.abed@sc.uobaghdad.edu.iq
8. Course Objectives
• In this course we will learn and discuss how advances in genetic profiling have affected forensic science. Although DNA analysis has had an enormous impact on forensic science over the past 25 years, by determining whether or not a person matches biological evidence associated with a crime, the use of genetic information in ancestry testing goes back as far as It is much further than that. These activities, along with the identification of remains and the resolution of migration disputes, are based on the principles of genetics and statistics. There is parallel activity in wildlife forensics and PVP. With the development of genomic technology, Increased likelihood that a person or their relatives will be implicated or excluded in a crime. This increases the need for care in interpreting results and raises privacy issues. The course will develop students' ability to perform calculations to match genetic traits, or to profiles from groups of putative relatives. We will take care to draft legitimate genetic reports to avoid common fallacies. We will enhance the course with readings and discussions of noteworthy cases.
9. Teaching and Learning Strategies
1. Clarification and explanation of the study materials by the academic staff through th 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	Introduction and history of forensic science	Introduction and history of forensic science	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2nd	2	Development of forensic science	Development of forensic science	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3rd	2	Forensic Science: Basics, Ethics, Rules, Laws, Procedures	Forensic Science: Basics, Ethics, Rules, Laws, Procedures	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4th	2	Types of forensic science	Types of forensic science	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5th	2	Inspection of Scene of Crimes and the Collection of Evidence (Handling and Packing). part I	Inspection of Scene of Crimes and the Collection of Evidence (Handling and Packing). part I	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6th	2	Biological material – collection, characterization and storage in forensic science part II	Biological material – collection, characterization and storage in forensic science part II	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7th	2	Mid-term examination	Mid-term examination	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8th	2	Analysis of Evidence: The Microscope and Forensic identification of Hair and Fibers, Toxicology, Forensic	Analysis of Evidence: The Microscope and Forensic identification of Hair and Fibers, Toxicology, Forensic Medicine and Serology.	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

		Medicine and Serology.			
9th	**2**	Forensic Examination and identification of Fingerprints: Past, Present, and Future	Forensic Examination and identification of Fingerprints: Past, Present, and Future	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
10th	**2**	The genome and forensic genetic	The genome and forensic genetic	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11th	**2**	Forensic genetic and crime	Forensic genetic and crime	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12th	**2**	Collection, characterization and storage of biological evidence	Collection, characterization and storage of biological evidence	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
13th	**2**	Analyzing DNA for crime	Analyzing DNA for crime	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14th	**2**	How is a DNA Profile Created?	How is a DNA Profile Created?	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15th	**2**	امتحان فصلي	امتحان فصلي	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
	2				

11. Course Evaluation	
Overall score out of 100 (Semester grade = 40) (End-of-semester exam score = 60)	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	-
Main references (sources)	William, G., Adrian, L. and Sibte, H. (2007). An Introduction to Forensic Genetics.Wiley and sons.UK.

Recommended books and references (scientific journals, reports...)	-
Electronic References, Website	www.wileyeurope.com or www.wiley.com

Course Description Form

Adv. Immunobiotechnology

1. Course Name:
Adv. Immunobiotechnology
2. Course Code:
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 Total number of hours per section = hours Number of units =
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Mouruj A. Alaubydi **Email:** mouruj.najeeb @sc.uobaghdad.edu.iq
8. 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.
9. 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.
10. Course Structure: Theory

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1st	2	Antigens and Receptors	Types of antigens and their relation with different types of receptors	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
2nd	2	Generation of Immune Diversity: Lymphocyte Antigen Receptors.	Molecular diversity of humoral immune system, and the specifity generation against the specific antigen	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3rd	2	Lymphocyte development	Explain the types of lymphocytes and their generation and development through positive and negative selection	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4th	2	Lymphocyte activation	Explain how lymphocytes are become activated and the routes of activation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5th	2	Immune pharmacotherapy	Types of Immune pharmacotherapy, and the mode of Immune pharmacotherapy action		
6th	2	Examination	**Examination**		Daily, semester and final exams
7th	2	Immune tests	Explain different types of immune tests and their mechanism of actions	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8th	2	Monoclonal antibody preparation (1)	preparation and purification of antigen	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9th	2	Monoclonal antibody preparation (2)	Preparation of B cell monoclonal antibodies	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

10th	**2**	Monoclonal antibody applications	Study different examples related with monoclonal antibodies	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11th	**2**	Vaccine immunity	The effect of different types of vaccine in stimulation of immune responses	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12th	**2**	Vaccine technology	Types of vaccine, and differentiate among each others		
13th	**2**	Vaccine ingredients	Study different ingredients used to complete the vaccine formula	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14th	**2**	Vaccine preparation	How antigens are prepared and the types of antigens preparation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15th	**2**	Examination		Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	• Immunology, 2013 (3ed edition) Clinical immunology and serology,2010 (3ed edition)
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	Immunology website and YouTube films

Course Description Form

Gene technology

1. Course Name:
Gene technology
2. Course Code:
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 Total number of hours per section = hours Number of units =
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Rana Kadhim Mohammed **Email:** rana.mohammed@sc.uobaghdad.edu.iq
8. Course Objectives
This course aims to give students a comprehensive understanding of the fundamental concepts, theories, and practical applications within the Gene technology field. Through engaging lectures, interactive discussions, and hands-on activities, students will develop the knowledge, skills, and critical thinking abilities necessary to analyze, evaluate, and solve problems related to Gene technology. Additionally, the course aims to foster a deep appreciation for the importance and relevance of Gene technology in various real-world contexts, encouraging lifelong learning and professional development
9. Teaching and Learning Strategies
1. Clarifying and explaining the study materials by the academic staff through the whiteboard or 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**	The eukaryotic cell cycle The molecular basis of cell cycle regulation	The Cell Cycle	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

		Progress through the cell cycle Special cell cycle systems in animals			
2nd	**2**	Nudeosomes Higher order chromatin organization Chromatin and chromosome function	Chromatin	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3rd	**2**	Organelle genetics Organelle genomes	Organelle Genomes	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
4th	**2**	Differentiation Pattern formation and positional information The environment in development	Development, Molecular Aspects	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5th	**2**	Epigenetic gene regulation by DNA methylation in mammals	DNA Methylation and Epigenetic Regulation		
6th	**2**	Gene expression Gene regulation Gene expression in eukaryotes	Gene Expression and Regulation		Daily, semester and final exams
7th	**2**	Genomes, ploidy and chromosome number Physico-chemical properties of the genome Genome size and sequence components Gene structure and higher-order genome organization	Genomes and Mapping	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8th	**2**	Repetitive DNA Isochore organization of the mammalian genome Gene mapping Genetic mapping Physical mapping	Genomes and Mapping	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9th	**2**	Mechanisms of transposition Consequences of transposition Transposons	Mobile Genetic Elements	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

10th	**2**	Molecular aspects of protein-nucleic acid binding Sequence-specific binding Techniques for the study of protein-nucleic acid interactions	Nucleic Acid-Binding Properties	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
11th	**2**	Oncogenes Tumor-suppressor genes	Oncogenes and Cancer	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12th	**2**	Homologous recombination Homologous recombination and genetic mapping	Recombination		
13th	**2**	Random and programmed nonreciprocal recombination Site specific recombination Illegitimate recombination	Recombination	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14th	**2**	EXAMINATION	EXAMINATION	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15th	**2**	FINAL EXAMINATION	FINAL EXAMINATION	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
Course Structure: Practical					
Week	**Hours**	**Organelle genetics Organelle genomes**	**Organelle Genomes**	**Learning method**	**Evaluation method**
1st	**2**	The eukaryotic cell cycle The molecular basis of cell cycle regulation Progress through the cell cycle Special cell cycle systems in animals	The Cell Cycle	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

2nd	**2**	Nudeosomes Higher order chromatin organization Chromatin and chromosome function	Chromatin	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
3rd	**2**	Organelle genetics Organelle genomes	Organelle Genomes	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester, and final exams
4th	**2**	Differentiation Pattern formation and positional information The environment in development	Development, Molecular Aspects	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
5th	**2**	Epigenetic gene regulation by DNA methylation in mammals	DNA Methylation and Epigenetic Regulation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
6th	**2**	Gene expression Gene regulation Gene expression in eukaryotes	Gene Expression and Regulation	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
7th	**2**	Genomes, ploidy and chromosome number Physico-chemical properties of the genome Genome size and sequence components Gene structure and higher-order genome organization	Genomes and Mapping	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
8th	**2**	Repetitive DNA Isochore organization of the mammalian genome Gene mapping Genetic mapping Physical mapping	Genomes and Mapping	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
9th	**2**	Mechanisms of transposition Consequences of transposition Transposons	Mobile Genetic Elements	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams

10th	**2**	Molecular aspects of protein-nucleic acid binding Sequence-specific binding Techniques for the study of protein-nucleic acid interactions	Nucleic Acid-Binding Properties		
11th	**2**	Oncogenes Tumor-suppressor genes	Oncogenes and Cancer	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
12th	**2**	Homologous recombination Homologous recombination and genetic mapping	Recombination		
13th	**2**	Random and programmed nonreciprocal recombination Site-specific recombination Illegitimate recombination	Recombination	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
14th	**2**	EXAMINATION	EXAMINATION	Paper lectures Electronic screen Video lectures via electronic classes	Daily, semester and final exams
15th	**2**	FINAL EXAMINATION	FINAL EXAMINATION		

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricula books, if any)	Advance molecular Biology book
Main references (sources)	Gene technology
Recommended books and references (scientific journals, reports...)	
Electronic References, Websit	Database website (NCBI), Uniprot.Ensemble