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 academic programs and course descriptions to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a 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 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 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.

University Name: University of Baghdad

Faculty/Institute: AL-Khwarizmi College of Engineering

Scientific Department: Biochemical Engineering

Academic or Professional Program Name: B.Sc.

Final Certificate Name: B.Sc. in Biochemical Engineering

Academic System: Quarterly

Description Preparation Date: 28/3/2024

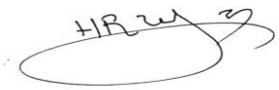
File Completion Date: 28/3/2024

Signature: 

Prof. Dr. Alaa Kareem Mohammed:

Head of Department Name:

Date:

Signature: 

Asst Prof. Dr. Hisham Hassan Jasim

Scientific Associate Name:

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature 

Approval of the Dean

1. Program Vision

The scientific department seeks to present academically, scientifically, and even practically in the local and international arena. The reliability of scientific laboratories is within national standards first and international standards second. Apply advanced studying and teaching systems and keep updated with the latest developments in this field, especially e-learning. Furthermore, studying recent experiences in education and working on applying them in line with the changing standards of scientific and practical requirements. Planning to build postgraduate studies with high standard quality by preparing material requirements from laboratories and others and the scientific needs of researchers, in addition to researchers and supervisors who own a distinguished research line and global scientific publication.

2. Program Mission

The Biochemical academic staff pursues a multifaceted charge at the University of Baghdad. Our mission is to provide exceptional education and research opportunities in the field of Biochemical Engineering. We strive to cultivate a diverse and inclusive learning environment that fosters creativity, critical thinking, and innovation. Through our interdisciplinary approach, we aim to equip students with the knowledge, skills, and ethical values necessary to address the complex challenges of the modern world. As a Biochemical Engineering faculty, we uphold the highest standards of integrity, ethics, and social responsibility. Overall, our mission is to be a global leader in Biochemical Engineering education, research, and innovation, making a positive impact on the world by advancing knowledge, addressing challenges, and improving the quality of life for present and future generations.

3. Program Objectives

1. To optimize the design and operation of biochemical processes to maximize product yield, efficiency, and quality.
2. To prepare students for a wide variety of post-baccalaureate paths, including graduate school, professional training programs, or entry-level jobs in any area of biochemical Engineering.

3. To provide extensive hands-on training in production technology, statistical analysis, laboratory skills, and field techniques.
4. To provide thorough training in written and oral communication of scientific information.
5. To enrich students with opportunities for alternative education in the area of biochemical Engineering through undergraduate research, internships, and study abroad.
6. To design processes that are safe for operators, the environment, and the public.
7. To contribute to the advancement of biotechnology by developing new technologies, tools, and methods for improved bioprocesses.

4. Program Accreditation

N/A

5. Other external influences

N/A

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements				
College Requirements				
Department Requirements				
Summer Training				
Other				

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
٢٠٢٤-٢٠٢٣ / Fouth		Computer Aided Design Using Aspen HYSYS	2	2

8. Expected learning outcomes of the program

Knowledge

Learning Outcomes 1	A1. Apply/develop solutions or to do research in the areas of Design and simulation in Biochemical Engineering. A2. Design and validate technological solutions to defined problems and communicate clearly and effectively for the practical application of their work. A3. Demonstrate the knowledge and understanding of the fundamental concepts, principles and theories underpinning Biochemical Engineering with core knowledge in: engineering analysis, fluid mechanics, thermodynamics; mass & heat transfer; biochemical reactions; materials; process control; safety, health & environment; A4. Operate small and pilot-scale equipment and use it to acquire essential data; A5. Understand process design and use integrated approaches to solve complex, often open-ended process design problems; A6. demonstrate achievement of a specialised knowledge, particularly via project work, of process engineering which is founded on the chemical, biological and physical sciences. A7. Students will develop the ability to apply the concepts and techniques learned in the module to real-world chemical/biochemical engineering problems.
Skills	
Learning Outcomes 2	B1. Use Aspen HYSYS for design and simulation of process flow sheets. B2. Students will have understanding of basic concepts of conceptual process design, technology selection, and integration. B3. Generate ideas, proposals and solutions or arguments independently and/or collaboratively in response to set scenarios and/or self initiated activity; B4. Evaluate whether design solutions integrate social, legal, engineering and technical requirements; B5. Identify appropriate design and governance problems and formulate clear objectives using analytical data and I&CT software as appropriate; B.4 Develop design briefs with clarity graphically and/or in written specifications.
Ethics	
Learning Outcomes 3	C1. Gaining an understanding of the ethical considerations. C2. regulatory requirements associated with working in the field of biochemical engineering, particularly when dealing with bioprocess or conducting human research.

9. **Teaching and Learning Strategies**

The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations.

The second goal is to invite industry professionals or guest speakers who have expertise in process dynamics to deliver lectures or share their experiences. This offers students valuable insights into real-world applications and challenges, bridging the gap between academia and industry

10. Evaluation methods

Quizzes, mid-term exams, assignments, and seminars.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Assistance Professor	Chemical Engineering	Mass Transfer/ Electrochemical			yes	

Professional Development

Mentoring new faculty members

Professional development of faculty members

12. Acceptance Criterion

13. The most important sources of information about the program

1- Textbooks.
2- Internet Sources.
3- Researches, Papers
4- Corresponding international universities

5- Program Development Plan

- By staying updated with the latest developments in the engineering field
- Using modern technologies in teaching has the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4

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

Course Description Form

1. Course Name:	
Computer Aided Design Using Aspen HYSYS	
2. Course Code:	
3. Semester / Year:	
4th Semester / 2024	
4. Description Preparation Date: 30 -3 - 2024	
5. Available Attendance Forms:	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Weekly 4 hours (Total 60 hours)/ 2 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Khalid Waleed Hameed Email: kwhameed@kecbu.uobaghdad.edu.iq	
8. Course Objectives	
Course Objectives	1. Create rigorous steady state and dynamic models for plant design, performance monitoring, troubleshooting, operational improvement, business planning and asset management. 2. To impart fundamental knowledge to students in the latest technological topics on Computer Aided Design, and to prepare them for taking up further research in the areas. 3. To train students in using software to solve design problems. 4. To train student in the evaluate the results using their engineering knowledge in computer aided design projects
9. Teaching and Learning Strategies	
Strategy	The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations. The second goal is to invite industry professionals or guest speakers who have expertis software to deliver lectures or share their experiences. This offers students valuable insig into real-world applications and challenges, bridging the gap between academia industry.
10. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	A1-3	Introduction; Start with HYSYS , Components, Fluid package, Equation of state		
2	3	A1-5, B2, C1	Streams; Material, Energy, Simulation tools,		
3	3	A1, A2, A7, B2	Utilities, boiling point curve, critical properties		
4	3	A1-7, B1-3, C1-2	Pressure change Equipment: Pump, Expander, Compressor		
5	3	A1-7, B1-3, C1-2	Heat transfer Equipment, Heat Exchanger		
6	3	A1-7, B1-3, C1-2	Air cool, Fired heater, Evaporator		
7	3	A1-7, B1-3, C1-2	Pipe Equipment, Pipe Segment		
8	3	A1-7, B1-3, C1-2	Pipesys system		
9	3	A1-7, B1-3, C1-2	Reactors; conversion reactors, Equilibrium reactors		
10	3	A1-7, B1-3, C1-2	CSTR reactor, plug flow reactor, Gibbs reactor		
11	3	A1-7, B1-3, C1-2	Separation Columns, Absorption column		
12	3	A1-7, B1-3, C1-2	Distillation column, Petroleum refinery,		
13	3	A1-7, B1-3, C1-2	Economic evaluation		
14	3	A1-7, B1-3, C1-2	Solid operation, Cyclone Baghouse filter, Rotary drum filter		
15	3	A1-7, B1-3, C1-2	Process Control		

11.Course Evaluation

Quizzes, mid-term exams, assignments and seminar

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	Chemical Process Design and Simulation, Aspen Plus and Aspen HYSYS Applications, Juma Haydar, 2019, Wiley.
Main references (sources)	Process Analysis and Simulation in Chemical Engineering, Iva ´n Darı´o Gil Chaves et al © Springer International Publishing Switzerland 2016

Recommended books and references (scientific journals, reports...)	Computer Methods in Chemical Engineering, Second edition, 2022, CRC Press, Taylor and Francis Group Nayef Ghasem
Electronic References, Websites	https://www.academia.edu/39662911/Chemical_Process_Design_and_Simulation

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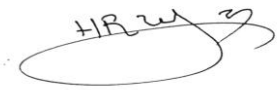
File Completion Date: 28/3/2024

Signature: 

Prof. Dr. Alaa Kareem Mohammed:

Head of Department Name:

Date:



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Asst Prof. Dr. Hisham Hassan Jasim

Scientific Associate Name:

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature 

Approval of the Dean

14.**Program Vision**

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16.**Program Objectives**

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10. To provide extensive hands-on training in production technology, statistical analysis, laboratory skills, and field techniques.
11. To provide thorough training in written and oral communication of scientific information.
12. To enrich students with opportunities for alternative education in the area of biochemical Engineering through undergraduate research, internships, and study abroad.
13. To design processes that are safe for operators, the environment, and the public.
14. To contribute to the advancement of biotechnology by developing new technologies, tools, and methods for improved bioprocesses.

17.**Program Accreditation**

N/A

18.**Other external influences**
N/A

19.**Program Structure**				
Program Structure	**Number of Courses**	**Credit hours**	**Percentage**	**Reviews***
Institution Requirements				
College Requirements				
Department Requirements				
Summer Training				
Other				

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

20. Program Description				
Year/Level	**Course Code**	**Course Name**	**Credit Hours**	
			theoretical	**practical**
٢٠٢٤-٢٠٢٣ / fourth		**Bioseparation processes**	**3**	**2**

21.Expected learning outcomes of the program	
Knowledge	
Learning Outcomes 1	**After studying this course the students will be able to:** **A1.**Understand the separation mechanisms for chromatography. **A2.**Calculate yield and purity for chromatography. **A3.**Understand the basic ideas and transport equations for ultrafiltration. **A4.**Recognize analysis of ultrafiltration. **A5.**Use transport equations of electrophoresis to calculate protein's flux and velocity. **A6.**Overcome the limitations of electrophoresis. **A7.**Work as a team and provide them with a powerful tool for developing practical skills. **A8.**Help students to build confidence in their abilities.

Skills	
Learning Outcomes 2	**B1.** Use problem solving strategies to develop innovative solutions. **B2.** Skills to design and conduct experiments in the area of biochemical engineering training. **B3.** Ability to innovate and improve processes of transformation of matter. **B4.** Ability to work effectively in specialized and/or multidisciplinary terms, in diverse cultural environments. **B5.** Ability to solve biochemical engineering problems using engineering tools available.
Ethics	
Learning Outcomes 3	**C1.** Gaining an understanding of the ethical considerations. **C2.** Regulatory requirements associated with working in the field of biochemical engineering, particularly when dealing with bioprocess or conducting human research.

22. Teaching and Learning Strategies

The basic strategies that will be applied to help students learn and understand this course are **Cooperative Learning and Active Learning** strategies. Using cooperative learning encourages students to work together in small groups to achieve a common goal. It promotes teamwork and communication. In addition, using active learning helps students to participate in the learning process through activities such as discussions.

23. Evaluation methods

Quizzes, Mid-term exams, Assignments, and Lab. reports.

24.Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Lecturer	Chemical Engineering	Biochemical Engineering/Biofuel			yes	

Professional Development

Mentoring new faculty members

Professional development of faculty members

25.Acceptance Criterion

26.The most important sources of information about the program

- Textbooks (Belter, P. A., Cussler, E. L., & Hu, W. (1987). Bioseparations: downstream processing for biotechnology).
- Internet Sources.
- Corresponding international universities.

27.Program Development Plan

- By staying updated with the latest developments in the engineering field.
- Using modern technologies in teaching has the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4

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

Course Description Form

13.Course Name:
Bioseparation processes
14.Course Code:
15.Semester / Year:
4th Semester / 2024
16.Description Preparation Date: 29 -3 - 2024
17.Available Attendance Forms:
18.Number of Credit Hours (Total) / Number of Units (Total)
Weekly 5 hours (Total 75 hours)/ 3 units
19.Course administrator's name (mention all, if more than one name)
Dr. Hassan H. Al-Mohammedawi hasan.h@kecbu.uobaghdad.edu.iq
20.Course Objectives

Course Objectives	The main aim of this course is to develop the students' knowledge of the bioseparation processes. In this course, students will apply the principles learned in the engineering science courses they have had during the last years to make estimates on biochemical processes equipment size and operation conditions using simple models. Thus, this course deals with the following main topics: chromatography, ultrafiltration, electrophoresis and electrodialysis and electrodialysis.

21.Teaching and Learning Strategies

Strategy	The basic strategies that will be applied to help students learn and understand this Course are **Cooperative Learning and Active Learning** strategies. Using cooperative learning encourages students to work together in small groups to achieve a common goal. It promotes teamwork and communication. In addition, using active learning helps students to participate in the learning process through activities such as discussions.

22. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	A1	Introduction to chromatography, chromatography system.		
2	3	A1, B2, C1	Separation mechanisms.		
3	3	A1, A2, B2	Binary chromatography.		
4	3	A2, B1-B3, C1-C2	Yield and purity calculations		
5	3	A1-A2, B1-B3, C1-C2	Yield and purity calculations & Examples		
6	3	A1-A3, B1-B3, C1-C2	Introduction to ultrafiltration, distinctive characteristics of ultrafiltration		
7	3	A1-A4, B1-B3, C1-C2	Basic ideas (osmotic pressure, the side chains of proteins),		
8	3	A1-A5, B1-B3, C1-C2	Transport equations of ultrafiltration		
9	3	A1-A5, B1-B3, C1-C2	Analysis of ultrafiltration		
10	3	A1-A5, B1-B3, C1-C2	Analysis of ultrafiltration & Example		
11	3	A1-A6, B1-B3, C1-C2	Electrically driven purification, introduction to electrophoresis		
12	3	A1-A7, B1-B3, C1-C2	Transport equations of electrophoresis		
13	3	A1-7, B1-C3, C1-C2	limitations of electrophoresis		
14	3	A1-A7, B1-B3, C1-C2	Electrodialysis and isoelectric focusing.		
15	3	A1-A8, B1-B3, C1-C2	Electrodialysis and isoelectric focusing & Examples		

23.Course Evaluation

Quizzes, mid-term exams, assignments and Lab. reports.

24.Learning and Teaching Resources

Required textbooks (curricular books, if any)	Belter, P. A., Cussler, E. L., & Hu, W. (1987). Bioseparations: downstream processing for biotechnology.

Main references (sources)	Ghosh, R. (2006). *Principles of bioseparations engineering*. World Scientific Publishing Company
Recommended books and references (scientific journals, reports...)	-
Electronic References, Websites	

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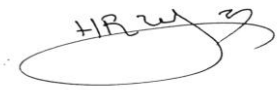
Prof. Dr. Alaa Kareem Mohammed:

Head of Department Name:

Date:



Signature:

Asst Prof. Dr. Hisham Hassan Jasim

Scientific Associate Name:

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature 

Approval of the Dean

28.**Program Vision**

The scientific department seeks to present academically, scientifically, and even practically in the local and international arena. The reliability of scientific laboratories is within national standards first and international standards second. Apply advanced studying and teaching systems and keep updated with the latest developments in this field, especially e-learning. Furthermore, studying recent experiences in education and working on applying them in line with the changing standards of scientific and practical requirements. Planning to build postgraduate studies with high standard quality by preparing material requirements from laboratories and others and the scientific needs of researchers, in addition to researchers and supervisors who own a distinguished research line and global scientific publication.

29.**Program Mission**

The Biochemical academic staff pursues a multifaceted charge at the University of Baghdad. Our mission is to provide exceptional education and research opportunities in the field of Biochemical Engineering. We strive to cultivate a diverse and inclusive learning environment that fosters creativity, critical thinking, and innovation. Through our interdisciplinary approach, we aim to equip students with the knowledge, skills, and ethical values necessary to address the complex challenges of the modern world. As a Biochemical Engineering faculty, we uphold the highest standards of integrity, ethics, and social responsibility. Overall, our mission is to be a global leader in Biochemical Engineering education, research, and innovation, making a positive impact on the world by advancing knowledge, addressing challenges, and improving the quality of life for present and future generations.

30.**Program Objectives**

15. To optimize the design and operation of biochemical processes to maximize product yield, efficiency, and quality.
16. To prepare students for a wide variety of post-baccalaureate paths, including graduate school, professional training programs, or entry-level jobs in any area of biochemical Engineering.
17. To provide extensive hands-on training in production technology, statistical analysis, laboratory skills, and field techniques.
18. To provide thorough training in written and oral communication of scientific information.
19. To enrich students with opportunities for alternative education in the area of biochemical Engineering through undergraduate research, internships, and study abroad.
20. To design processes that are safe for operators, the environment, and the public.
21. To contribute to the advancement of biotechnology by developing new technologies, tools, and methods for improved bioprocesses.

31.**Program Accreditation**

N/A

32.**Other external influences**
N/A

33.**Program Structure**				
Program Structure	**Number of Courses**	**Credit hours**	**Percentage**	**Reviews***
Institution Requirements				
College Requirements				
Department Requirements				
Summer Training				
Other				

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

34. Program Description				
Year/Level	**Course Code**	**Course Name**	**Credit Hours**	
			theoretical	**practical**
٢٠٢٤-٢٠٢٣ / fourth		Unit Operations in Biochemical Processes	**3**	**3**

35.Expected learning outcomes of the program	
Knowledge	
Learning Outcomes 1	**After studying this course the students will be able to:** **A1.** Achieve basic stirred tank design (scale-up of stirred vessels). **A2.** Calculate power required for mixing. **A3.** Understand general theory of filtration. **A4.** Suggest pretreatment method for biological solution which are hard to filter. **A5.** Know how the results of lab. centrifugations can be used to plan large scale centrifugations. **A6.** Recognize different types of equipment for mixing, filtration and centrifugation, **A7.** Work as a team and provide them with a powerful tool for developing practical skills. **A8.** Help students to build confidence in their abilities.

Skills	
Learning Outcomes 2	**B6.** Use problem solving strategies to develop innovative solutions. **B7.** Skills to design and conduct experiments in the area of biochemical engineering training. **B8.** Ability to innovate and improve processes of transformation of matter. **B9.** Ability to work effectively in specialized and/or multidisciplinary terms, in diverse cultural environments. **B10.** Ability to solve biochemical engineering problems using engineering tools available.
Ethics	
Learning Outcomes 3	**C3.** Gaining an understanding of the ethical considerations. **C4.** Regulatory requirements associated with working in the field of biochemical engineering, particularly when dealing with bioprocess or conducting human research.

36. Teaching and Learning Strategies

The basic strategies that will be applied to help students learn and understand this course are **Cooperative Learning and Active Learning** strategies. Using cooperative learning encourages students to work together in small groups to achieve a common goal. It promotes teamwork and communication. In addition, using active learning helps students to participate in the learning process through activities such as discussions.

37. Evaluation methods

Quizzes, Mid-term exams, Assignments, and Lab. reports.

38.Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Lecturer	Chemical Engineering	Biochemical Engineering/Biofuel			Yes	

Professional Development

Mentoring new faculty members

Professional development of faculty members

39.Acceptance Criterion

40.The most important sources of information about the program

- Textbooks (Belter, P. A., Cussler, E. L., & Hu, W. (1987). Bioseparations: downstream processing for biotechnology).
- Internet Sources.
- Corresponding international universities.

41.Program Development Plan

- By staying updated with the latest developments in the engineering field.
- Using modern technologies in teaching has the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4

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

Course Description Form

25.Course Name:
Unit Operation in Biochemical Engineering
26.Course Code:
27.Semester / Year:
4th Semester / 2024
28.Description Preparation Date: **29 -3 - 2024**
29.Available Attendance Forms:
30.Number of Credit Hours (Total) / Number of Units (Total)
Weekly 6 hours (Total 90 hours)/ 3 units
31.Course administrator's name (mention all, if more than one name)
Dr. Hassan H. Al-Mohammedawi hasan.h@kecbu.uobaghdad.edu.iq
32.Course Objectives

Course Objectives	The aim of this module is to develop the students' knowledge of the unit operations. In this module, students will apply the principles learned in the engineering science courses they have had during the last years to study and discuss details related to biochemical processes equipment design. Thus, this course deals with the following main topics: mixing, filtration and centrifugation processes. .

33.Teaching and Learning Strategies

Strategy	The basic strategies that will be applied to help students learn and understand this Course are **Cooperative Learning and Active Learning** strategies. Using cooperative learning encourages students to work together in small groups to achieve a common goal. It promotes teamwork and communication. In addition, using active learning helps students to participate in the learning process through activities such as discussions.

34. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	A1	Introduction to mixing, classification of mixing operations in terms of the phases.		
2	3	A1, B2, C1	Mixing of liquids in stirred tanks, basic stirred tank design.		
3	3	A1, A2, B2	Power required for mixing, Scale-up of mixing systems.		
4	3	A2, B1-B3, C1-C2	Introduction to filtration and microfiltration, Equipment for conventional filtration.		
5	3	A1-A2, B1-B3, C1-C2	Pretreatment for biological solutions.		
6	3	A1-A3, B1-B3, C1-C2	General theory for filtration.		
7	3	A1-A4, B1-B3, C1-C2	Continuous rotary filter.		
8	3	A1-A5, B1-B3, C1-C2	Microfiltration.		
9	3	A1-A5, B1-B3, C1-C2	Introduction to centrifugation, settling of solid particle.		
10	3	A1-A5, B1-B3, C1-C2	The basic type of centrifuges.		
11	3	A1-A6, B1-B3, C1-C2	The analysis of tubular bowl centrifuge.		
12	3	A1-A7, B1-B3, C1-C2	The analysis of disc type centrifuge.		
13	3	A1-7, B1-C3, C1-C2	Scale up of centrifugation.		
14	3	A1-A7, B1-B3, C1-C2	Centrifugal filtration.		
15	3	A1-A8, B1-B3, C1-C2	Centrifugal filtration.		

35.Course Evaluation

Quizzes, mid-term exams, assignments and Lab. reports.

36.Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Belter, P. A., Cussler, E. L., & Hu, W. (1987). Bioseparations: downstream processing for biotechnology.
Main references (sources)	Ghosh, R. (2006). *Principles of bioseparations engineering*. World Scientific Publishing Company
Recommended books and references (scientific journals, reports...)	-
Electronic References, Websites	

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 academic programs and course descriptions to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a 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 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 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.

University Name: University of Baghdad

Faculty/Institute: AL-Khwarizmi College of Engineering

Scientific Department: Biochemical Engineering

Academic or Professional Program Name: B.Sc.

Final Certificate Name: B.Sc. in Biochemical Engineering

Academic System: Quarterly

Description Preparation Date: 28/3/2024

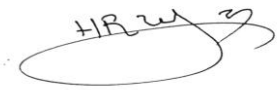
File Completion Date: 28/3/2024

Signature: 

Prof. Dr. Alaa Kareem Mohammed:

Head of Department Name:

Date:

Signature: 

Asst Prof. Dr. Hisham Hassan Jasim

Scientific Associate Name:

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature 

Approval of the Dean

42.**Program Vision**

The scientific department seeks to present academically, scientifically, and even practically in the local and international arena. The reliability of scientific laboratories is within national standards first and international standards second. Apply advanced studying and teaching systems and keep updated with the latest developments in this field, especially e-learning. Furthermore, studying recent experiences in education and working on applying them in line with the changing standards of scientific and practical requirements. Planning to build postgraduate studies with high standard quality by preparing material requirements from laboratories and others and the scientific needs of researchers, in addition to researchers and supervisors who own a distinguished research line and global scientific publication.

43.**Program Mission**

The Biochemical academic staff pursues a multifaceted charge at the University of Baghdad. Our mission is to provide exceptional education and research opportunities in the field of Biochemical Engineering. We strive to cultivate a diverse and inclusive learning environment that fosters creativity, critical thinking, and innovation. Through our interdisciplinary approach, we aim to equip students with the knowledge, skills, and ethical values necessary to address the complex challenges of the modern world. As a Biochemical Engineering faculty, we uphold the highest standards of integrity, ethics, and social responsibility. Overall, our mission is to be a global leader in Biochemical Engineering education, research, and innovation, making a positive impact on the world by advancing knowledge, addressing challenges, and improving the quality of life for present and future generations.

44.**Program Objectives**

22. To optimize the design and operation of biochemical processes to maximize product yield, efficiency, and quality.
23. To prepare students for a wide variety of post-baccalaureate paths, including graduate school, professional training programs, or entry-level jobs in any area of biochemical Engineering.
24. To provide extensive hands-on training in production technology, statistical analysis, laboratory skills, and field techniques.
25. To provide thorough training in written and oral communication of scientific information.
26. To enrich students with opportunities for alternative education in the area of biochemical Engineering through undergraduate research, internships, and study abroad.
27. To design processes that are safe for operators, the environment, and the public.
28. To contribute to the advancement of biotechnology by developing new technologies, tools, and methods for improved bioprocesses.

45.**Program Accreditation**

N/A

46.**Other external influences**
N/A

47.**Program Structure**				
Program Structure	**Number of Courses**	**Credit hours**	**Percentage**	**Reviews***
Institution Requirements				
College Requirements				
Department Requirements				
Summer Training				
Other				

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

48. Program Description				
Year/Level	**Course Code**	**Course Name**	**Credit Hours**	
			theoretical	**practical**
٢٠٢٤-٢٠٢٣ / Fouth		**Computer Aided Design Using SuperPro Designer**	**2**	**2**

49.Expected learning outcomes of the program	
Knowledge	
Learning Outcomes 1	A1. Apply/develop solutions or to do research in the areas of Design and simulation in Biochemical Engineering. A2. Design and validate technological solutions to defined problems and communicate clearly and effectively for the practical application of their work. A3. Demonstrate the knowledge and understanding of the fundamental concepts, principles and theories underpinning Biochemical Engineering with core knowledge in: engineering analysis, fluid mechanics, thermodynamics; mass & heat transfer; biochemical reactions; materials; process control; safety, health & environment; A4. Operate small and pilot-scale equipment and use it to acquire essential data; A5. Understand process design and use integrated approaches to solve complex, often open-ended process design problems;

	A6. demonstrate achievement of a specialised knowledge, particularly via project work, of process engineering which is founded on the chemical, biological and physical sciences. A7. Students will develop the ability to apply the concepts and techniques learned in the module to real-world chemical/biochemical engineering problems.
Skills	
Learning Outcomes 2	B6. Use SuperPro Designer for design and simulation of process flow sheets. B7. Students will have understanding of basic concepts of conceptual process design, technology selection, and integration. B8. Generate ideas, proposals and solutions or arguments independently and/or collaboratively in response to set scenarios and/or self initiated activity; B9. Evaluate whether design solutions integrate social, legal, engineering and technical requirements; B10. Identify appropriate design and governance problems and formulate clear objectives using analytical data and I&CT software as appropriate; B.4 Develop design briefs with clarity graphically and/or in written specifications.
Ethics	
Learning Outcomes 3	C1. Gaining an understanding of the ethical considerations. C2. regulatory requirements associated with working in the field of biochemical engineering, particularly when dealing with bioprocess or conducting human research.

50. Teaching and Learning Strategies

The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations.

The second goal is to invite industry professionals or guest speakers who have expertise in process dynamics to deliver lectures or share their experiences. This offers students valuable insights into real-world applications and challenges, bridging the gap between academia and industry

51. Evaluation methods

Quizzes, mid-term exams, assignments, and seminars.

52.Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Assistance Professor	Chemical Engineering	Mass Transfer/ Electrochemical			yes	

Professional Development

Mentoring new faculty members

Professional development of faculty members

53.Acceptance Criterion

54.The most important sources of information about the program

6- Textbooks.
7- Internet Sources.
8- Researches, Papers
9- Corresponding international universities

10- Program Development Plan

- By staying updated with the latest developments in the engineering field
- Using modern technologies in teaching has the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4

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

Course Description Form

37.Course Name:	
Computer Aided Design Using SuperPro Designer	
38.Course Code:	
39.Semester / Year:	
4th Semester / 2024	
40.Description Preparation Date: 30 -3 - 2024	
41.Available Attendance Forms:	
42.Number of Credit Hours (Total) / Number of Units (Total)	
Weekly 4 hours (Total 60 hours)/ 2 units	
43.Course administrator's name (mention all, if more than one name)	
Name: Dr. Khalid Waleed Hameed Email: kwhameed@kecbu.uobaghdad.edu.iq	
44.Course Objectives	
Course Objectives	1. Create rigorous steady state models for plant design, performance monitoring, troubleshooting, operational improvement, business planning and asset management. 2. To impart fundamental knowledge to students in the latest technological topics on Computer Aided Design, and to prepare them for taking up further research in the areas. 3. To train students in using software to solve design problems. 4. To train student in the evaluate the results using their engineering knowledge in computer aided design projects
45.Teaching and Learning Strategies	
Strategy	The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations. The second goal is to invite industry professionals or guest speakers who have expertis software to deliver lectures or share their experiences. This offers students valuable insig into real-world applications and challenges, bridging the gap between academia industry.
46. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	A1-3	**Introduction and starting with SuperPro Designer**		
2	3	A1-5, B2, C1	Continuous Reactor		
3	3	A1, A2, A7, B2	Batch Reactor		
4	3	A1-7, B1-3, C1-2	Semi-Batch Reactor		
5	3	A1-7, B1-3, C1-2	Unit operation: Absorption, Distillation		
6	3	A1-7, B1-3, C1-2	Mixer-settler Extraction, Differential extraction		
7	3	A1-7, B1-3, C1-2	Filtration, evaporation,		
8	3	A1-7, B1-3, C1-2	Spray Drying, cooling tower		
9	3	A1-7, B1-3, C1-2	Reaction and separation process		
10	3	A1-7, B1-3, C1-2	Simple Flowsheet: Reaction, Centrifugation and Batch distillation		
11	3	A1-7, B1-3, C1-2	Simulation of Sewage wastewater treatment		
12	3	A1-7, B1-3, C1-2	Simulation of Dairy Plant		
13	3	A1-7, B1-3, C1-2	Simulation of Monoclonal Antibody		
14	3	A1-7, B1-3, C1-2	Simulation of pharmaceutical tablets plant		
15	3	A1-7, B1-3, C1-2	Simulation of Beta-Galactosidase Plant		

47.Course Evaluation

Quizzes, mid-term exams, assignments and seminar

48.Learning and Teaching Resources

Required textbooks (curricular books, if any)	Computer Methods in Chemical Engineering, Second edition, 2022, CRC Press, Taylor and Francis Group Nayef Ghasem
Main references (sources)	SuperPro Designer®, User Guide, INTELLIGEN, INC.
Recommended books and references (scientific journals, reports...)	

Electronic References, Websites	*www.intelligen.com* https://www.routledge.com/Computer-Methods-in-Chemical-Engineering/Ghasem/p/book/9780367765248

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:

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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 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.

University Name: University of Baghdad

Faculty/Institute: AL-Khwarizmi College of Engineering

Scientific Department: Biochemical Engineering

Academic or Professional Program Name: B.Sc.

Final Certificate Name: B.Sc. in Biochemical Engineering

Academic System: Quarterly

Description Preparation Date: 28/3/2024

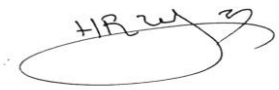
File Completion Date: 28/3/2024

Signature: 

Prof. Dr. Alaa Kareem Mohammed:

Head of Department Name:

Date:



Signature:

Asst Prof. Dr. Hisham Hassan Jasim

Scientific Associate Name:

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature 

Approval of the Dean

55.**Program Vision**

The scientific department seeks to present academically, scientifically, and even practically in the local and international arena. The reliability of scientific laboratories is within national standards first and international standards second. Apply advanced studying and teaching systems and keep updated with the latest developments in this field, especially e-learning. Furthermore, studying recent experiences in education and working on applying them in line with the changing standards of scientific and practical requirements. Planning to build postgraduate studies with high standard quality by preparing material requirements from laboratories and others and the scientific needs of researchers, in addition to researchers and supervisors who own a distinguished research line and global scientific publication.

56.**Program Mission**

The Biochemical academic staff pursues a multifaceted charge at the University of Baghdad. Our mission is to provide exceptional education and research opportunities in the field of Biochemical Engineering. We strive to cultivate a diverse and inclusive learning environment that fosters creativity, critical thinking, and innovation. Through our interdisciplinary approach, we aim to equip students with the knowledge, skills, and ethical values necessary to address the complex challenges of the modern world. As a Biochemical Engineering faculty, we uphold the highest standards of integrity, ethics, and social responsibility. Overall, our mission is to be a global leader in Biochemical Engineering education, research, and innovation, making a positive impact on the world by advancing knowledge, addressing challenges, and improving the quality of life for present and future generations.

57.**Program Objectives**

29. To optimize the design and operation of biochemical processes to maximize product yield, efficiency, and quality.

30. To prepare students for a wide variety of post-baccalaureate paths, including graduate school, professional training programs, or entry-level jobs in any area of biochemical Engineering.
31. To provide extensive hands-on training in production technology, statistical analysis, laboratory skills, and field techniques.
32. To provide thorough training in written and oral communication of scientific information.
33. To enrich students with opportunities for alternative education in the area of biochemical Engineering through undergraduate research, internships, and study abroad.
34. To design processes that are safe for operators, the environment, and the public.
35. To contribute to the advancement of biotechnology by developing new technologies, tools, and methods for improved bioprocesses.

58.Program Accreditation

N/A

59.Other external influences

N/A

60.Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements				
College Requirements				
Department Requirements				
Summer Training				
Other				

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

61. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
٢٠٢٣-٢٠٢٤ / fourth		Process Dynamics	3	N/A

62.Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	A1. Students will develop a solid understanding of the dynamic behavior of chemical processes. A2. Students will be proficient in developing mathematical models that describe the dynamic behavior of chemical processes. A3. Students will learn how to analyze the stability, controllability, and observability of dynamic systems. A4. Students will be able to analyze the time response of chemical processes. A5. Students will gain knowledge and skills in designing control systems for chemical processes. A6. Students will learn techniques for optimizing the performance of chemical processes. A7. Students will develop the ability to apply the concepts and techniques learned in the module to real-world chemical engineering problems.
Skills	
Learning Outcomes 2	B1. Ability to apply mathematics to model and solve biochemical engineering processes. B2. Skills to design and conduct experiments in the area of biochemical engineering training. B3. Ability to innovate and improve processes of transformation of matter. B4. Ability to work effectively in specialized and/or multidisciplinary terms, in diverse cultural environments. B5. Ability to solve biochemical engineering problems using engineering tools available. B6. Responsible behavior in socio-ethical and professional environments.
Ethics	
Learning Outcomes 3	C1. Gaining an understanding of the ethical considerations. C2. regulatory requirements associated with working in the field of biochemical engineering, particularly when dealing with bioprocess or conducting human research.

63. **Teaching and Learning Strategies**

The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations.

The second goal is to invite industry professionals or guest speakers who have expertise in process dynamics to deliver lectures or share their experiences. This offers students valuable

insights into real-world applications and challenges, bridging the gap between academia and industry

64. Evaluation methods

Quizzes, mid-term exams, assignments, and seminars.

65.Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	Chemical Engineering	Chemical Engineering			yes	

Professional Development

Mentoring new faculty members

Professional development of faculty members

66.Acceptance Criterion

67.The most important sources of information about the program

11- Textbooks.
12- Internet Sources.
13- Researches, Papers
14- Corresponding international universities

15- Program Development Plan

- By staying updated with the latest developments in the engineering field
- Using modern technologies in teaching has the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4

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

Course Description Form

49.Course Name:	
Process Dynamics	
50.Course Code:	
51.Semester / Year:	
7 th Semester / 2024	
52.Description Preparation Date: 28 -3 - 2024	
53.Available Attendance Forms:	
54.Number of Credit Hours (Total) / Number of Units (Total)	
Weekly 3 hours (Total 45 hours)/ 3 units	
55.Course administrator's name (mention all, if more than one name)	
Name: Dr. Alaa Kareem Mohammed Email: dr.alaa@kecbu.uobaghdad.edu.iq	
56.Course Objectives	
Course Objectives	1. Students should be able to develop mathematical models that describe the dynamic behavior of chemical processes 2. Students should understand the time response of chemical processes to changes in inputs and disturbances. 3. Students should learn techniques for designing control systems that can regulate and optimize the operation of chemical processes 4. Students should be able to analyze the stability of chemical processes and control systems 5. Students should learn techniques for optimizing the performance of chemical processes.
57.Teaching and Learning Strategies	
Strategy	The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations. The second goal is to invite industry professionals or guest speakers who have exper in process dynamics to deliver lectures or share their experiences. This offers stude

	valuable insights into real-world applications and challenges, bridging the gap betw academia and industry.

58. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	A1-3	Laplace Transform Review		
2	3	A1-5, B2, C1	Basic Element Of Process Control System		
3	3	A1, A2, A7, B2	Forcing Functions		
4	3	A1-7, B1-3, C1-2	Process		
5	3	A1-7, B1-3, C1-2	Heating Tank		
6	3	A1-7, B1-3, C1-2	Response Of First Order System to Input Forces		
7	3	A1-7, B1-3, C1-2	Response to Ramp Force		
8	3	A1-7, B1-3, C1-2	Solved Problems		
9	3	A1-7, B1-3, C1-2	How to Determining The Time Constant for First Order System Experimentally		
10	3	A1-7, B1-3, C1-2	Linearization		
11	3	A1-7, B1-3, C1-2	Capacitance Element		
12	3	A1-7, B1-3, C1-2	System Connected In Series (Non- Interacting Connection)		
13	3	A1-7, B1-3, C1-2	Interacting System		
14	3	A1-7, B1-3, C1-2	Second Order System		
15	3	A1-7, B1-3, C1-2	Response Of Second Order System (Under damped)		

59.Course Evaluation

Quizzes, mid-term exams, and assignments

60.Learning and Teaching Resources

Required textbooks (curricular books, if any)	***Process Dynamics and Control***, 4th Edition, 2016. Dale E. Seborg, Thomas F. Edgar, Duncan A. Millichap.
Main references (sources)	***Fundamental of Process Control in Chemical Engineering,*** 1st edition,2021 Alaa K. Mohammed
Recommended books and references (scientific journals, reports...)	-
Electronic References, Websites	https://www.wiley.com/en-us/Advanced+Chemical+Process+Control%3A+Putting+Theory+into+Practice-p-9783527842483

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 academic programs and course descriptions to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a 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 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 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.

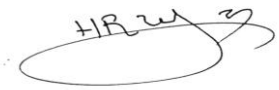
Teaching and learning strategies: They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

University Name: University of Baghdad
Faculty/Institute: AL-Khwarizmi College of Engineering
Scientific Department: Biochemical Engineering
Academic or Professional Program Name: B.Sc.
Final Certificate Name: B.Sc. in Biochemical Engineering
Academic System: Quarterly
Description Preparation Date: 28/3/2024
File Completion Date: 28/3/2024

Signature: 

Prof. Dr. Alaa Kareem Mohammed:
Head of Department Name:

Date:

Signature: 

Asst Prof. Dr. Hisham Hassan Jasim
Scientific Associate Name:

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature 

Approval of the Dean

68.**Program Vision**

The scientific department seeks to present academically, scientifically, and even practically in the local and international arena. The reliability of scientific laboratories is within national standards first and international standards second. Apply advanced studying and teaching systems and keep updated with the latest developments in this field, especially e-learning. Furthermore, studying recent experiences in education and working on applying them in line with the changing standards of scientific and practical requirements. Planning to build postgraduate studies with high standard quality by preparing material requirements from laboratories and others and the scientific needs of researchers, in addition to researchers and supervisors who own a distinguished research line and global scientific publication.

69.**Program Mission**

The Biochemical academic staff pursues a multifaceted charge at the University of Baghdad. Our mission is to provide exceptional education and research opportunities in the field of Biochemical Engineering. We strive to cultivate a diverse and inclusive learning environment that fosters creativity, critical thinking, and innovation. Through our interdisciplinary approach, we aim to equip students with the knowledge, skills, and ethical values necessary to address the complex challenges of the modern world. As a Biochemical Engineering faculty, we uphold the highest standards of integrity, ethics, and social responsibility. Overall, our mission is to be a global leader in Biochemical Engineering education, research, and innovation, making a positive impact on the world by advancing knowledge, addressing challenges, and improving the quality of life for present and future generations.

70.**Program Objectives**

36. To optimize the design and operation of biochemical processes to maximize product yield, efficiency, and quality.
37. To prepare students for a wide variety of post-baccalaureate paths, including graduate school, professional training programs, or entry-level jobs in any area of biochemical Engineering.

38. To provide extensive hands-on training in production technology, statistical analysis, laboratory skills, and field techniques.
39. To provide thorough training in written and oral communication of scientific information.
40. To enrich students with opportunities for alternative education in the area of biochemical Engineering through undergraduate research, internships, and study abroad.
41. To design processes that are safe for operators, the environment, and the public.
42. To contribute to the advancement of biotechnology by developing new technologies, tools, and methods for improved bioprocesses.

71.Program Accreditation

N/A

72.Other external influences

N/A

73.Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements				
College Requirements				
Department Requirements				
Summer Training				
Other				

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

74. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
٢٠٢٣-٢٠٢٤ / fourth		Process Control	3	2

75.Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	A1. Students will develop a solid understanding of the dynamic

	behavior of chemical processes. A2. Students will be proficient in developing mathematical models that describe the dynamic behavior of chemical processes. A3. Students will learn how to analyze the stability, controllability, and observability of dynamic systems. A4. Students will be able to analyze the time response of chemical processes. A5. Students will gain knowledge and skills in designing control systems for chemical processes. A6. Students will learn techniques for optimizing the performance of chemical processes. A7. Students will develop the ability to apply the concepts and techniques learned in the module to real-world chemical engineering problems.
Skills	
Learning Outcomes 2	B1. Ability to apply mathematics to model and solve biochemical engineering processes. B2. Skills to design and conduct experiments in the area of biochemical engineering training. B3. Ability to innovate and improve processes of transformation of matter. B4. Ability to work effectively in specialized and/or multidisciplinary terms, in diverse cultural environments. B5. Ability to solve biochemical engineering problems using engineering tools available. B6. Responsible behavior in socio-ethical and professional environments.
Ethics	
Learning Outcomes 3	C1. Gaining an understanding of the ethical considerations. C2. regulatory requirements associated with working in the field of biochemical engineering, particularly when dealing with bioprocess or conducting human research.

76.**Teaching and Learning Strategies**

The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations.

The second goal is to invite industry professionals or guest speakers who have expertise in process dynamics to deliver lectures or share their experiences. This offers students valuable insights into real-world applications and challenges, bridging the gap between academia and industry

77. Evaluation methods

Quizzes, mid-term exams, and assignments.

78.Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	Chemical Engineering	Chemical Engineering			yes	

Professional Development

Mentoring new faculty members

Professional development of faculty members

79.Acceptance Criterion

80.The most important sources of information about the program

16- Textbooks.
17- Internet Sources.
18- Researches, Papers
19- Corresponding international universities

20- Program Development Plan

- By staying updated with the latest developments in the engineering field
- Using modern technologies in teaching has the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4

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

Course Description Form

61.Course Name:	
Process Control	
62.Course Code:	
63.Semester / Year:	
8th Semester / 2024	
64.Description Preparation Date: 28 -3 - 2024	
65.Available Attendance Forms:	
66.Number of Credit Hours (Total) / Number of Units (Total)	
Weekly 5 hours (Total 75 hours)/ 5 units	
67.Course administrator's name (mention all, if more than one name)	
Name: Dr. Alaa Kareem Mohammed Email: dr.alaa@kecbu.uobaghdad.edu.iq	
68.Course Objectives	
Course Objectives	6. Students should be able to develop mathematical models that describe the dynamic behavior of chemical processes 7. Students should understand the time response of chemical processes to changes in inputs and disturbances. 8. Students should learn techniques for designing control systems that can regulate and optimize the operation of chemical processes 9. Students should be able to analyze the stability of chemical processes and control systems 10. Students should learn techniques for optimizing the performance of chemical processes.
69.Teaching and Learning Strategies	
Strategy	The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations. The second goal is to invite industry professionals or guest speakers who have exper in process dynamics to deliver lectures or share their experiences. This offers stude

	valuable insights into real-world applications and challenges, bridging the gap betw academia and industry.

70. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	A1-3	Closed Loop System		
2	5	A1-5, B2, C1	Examples for Closed Loop System		
3	5	A1, A2, A7, B2	Measurement And Signal Transmitter		
4	5	A1-7, B1-3, C1-2	The Controller		
5	5	A1-7, B1-3, C1-2	Examples		
6	5	A1-7, B1-3, C1-2	Integral Controller		
7	5	A1-7, B1-3, C1-2	Proportional- Integral-Derivative Controller (PID)		
8	5	A1-7, B1-3, C1-2	Control Valve		
9	5	A1-7, B1-3, C1-2	Stability		
10	5	A1-7, B1-3, C1-2	Process Reaction Curve (PRC)		
11	5	A1-7, B1-3, C1-2	Optimum Control System		
12	5	A1-7, B1-3, C1-2	Frequency Response Analysis		
13	5	A1-7, B1-3, C1-2	Bode Diagram		
14	5	A1-7, B1-3, C1-2	Bode Diagram of First Order System and Capacitance in Series		
15	5	A1-7, B1-3, C1-2	Piping and Instrumentation Diagram (P&ID)		

71.Course Evaluation

Quizzes, mid-term exams, and assignments

72.Learning and Teaching Resources

Required textbooks (curricular books, if any)	***Process Dynamics and Control***, 4th Edition, 2016. Dale E. Seborg, Thomas F. Edgar, Duncan A. Millichap.
Main references (sources)	***Fundamental of Process Control in Chemical Engineering,*** 1st edition,2021 Alaa K. Mohammed
Recommended books and references (scientific journals, reports...)	-
Electronic References, Websites	https://www.wiley.com/en-us/Advanced+Chemical+Process+Control%3A+Putting+Theory+into+Practice-p-9783527842483

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

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

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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.

University Name: University of Baghdad

Faculty/Institute: AL-Khwarizmi College of Engineering

Scientific Department: Biochemical Engineering

Academic or Professional Program Name: B.Sc.

Final Certificate Name: B.Sc. in Biochemical Engineering

Academic System: Quarterly

Description Preparation Date: 28/3/2024

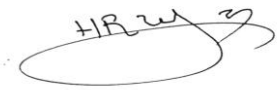
File Completion Date: 28/3/2024

Signature: 

Prof. Dr. Alaa Kareem Mohammed:

Head of Department Name:

Date:



Signature:

Asst Prof. Dr. Hisham Hassan Jasim

Scientific Associate Name:

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature 

Approval of the Dean

81.**Program Vision**

The scientific department seeks to present academically, scientifically, and even practically in the local and international arena. The reliability of scientific laboratories is within national standards first and international standards second. Apply advanced studying and teaching systems and keep updated with the latest developments in this field, especially e-learning. Furthermore, studying recent experiences in education and working on applying them in line with the changing standards of scientific and practical requirements. Planning to build postgraduate studies with high standard quality by preparing material requirements from laboratories and others and the scientific needs of researchers, in addition to researchers and supervisors who own a distinguished research line and global scientific publication.

82.**Program Mission**

The Biochemical academic staff pursues a multifaceted charge at the University of Baghdad. Our mission is to provide exceptional education and research opportunities in the field of Biochemical Engineering. We strive to cultivate a diverse and inclusive learning environment that fosters creativity, critical thinking, and innovation. Through our interdisciplinary approach, we aim to equip students with the knowledge, skills, and ethical values necessary to address the complex challenges of the modern world. As a Biochemical Engineering faculty, we uphold the highest standards of integrity, ethics, and social responsibility. Overall, our mission is to be a global leader in Biochemical Engineering education, research, and innovation, making a positive impact on the world by advancing knowledge, addressing challenges, and improving the quality of life for present and future generations.

83.**Program Objectives**

43. To optimize the design and operation of biochemical processes to maximize product yield, efficiency, and quality.
44. To prepare students for a wide variety of post-baccalaureate paths, including graduate school, professional training programs, or entry-level jobs in any area of biochemical Engineering.
45. To provide extensive hands-on training in production technology, statistical analysis, laboratory skills, and field techniques.
46. To provide thorough training in written and oral communication of scientific information.
47. To enrich students with opportunities for alternative education in the area of biochemical Engineering through undergraduate research, internships, and study abroad.
48. To design processes that are safe for operators, the environment, and the public.

49. To contribute to the advancement of biotechnology by developing new technologies, tools, and methods for improved bioprocesses.

84.Program Accreditation

N/A

85.Other external influences

N/A

86.Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements				
College Requirements				
Department Requirements				
Summer Training				
Other				

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

87. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
٢٠٢٤-٢٠٢٣ / Third		Heat Transfer I	3	N/A

88.Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	A1. Students will develop a solid understanding of the dynamic behavior of chemical processes. A2. Students will be proficient in developing mathematical models that describe the dynamic behavior of chemical processes. A3. Students will learn how to analyze the stability, controllability, and observability of dynamic systems. A4. Students will be able to analyze the time response of chemical

	processes. A5. Students will gain knowledge and skills in designing control systems for chemical processes. A6. Students will learn techniques for optimizing the performance of chemical processes. A7. Students will develop the ability to apply the concepts and techniques learned in the module to real-world chemical engineering problems.
Skills	
Learning Outcomes 2	B1. Ability to apply mathematics to model and solve biochemical engineering processes. B2. Skills to design and conduct experiments in the area of biochemical engineering training. B3. Ability to innovate and improve processes of transformation of matter. B4. Ability to work effectively in specialized and/or multidisciplinary terms, in diverse cultural environments. B5. Ability to solve biochemical engineering problems using engineering tools available. B6. Responsible behavior in socio-ethical and professional environments.
Ethics	
Learning Outcomes 3	C1. Gaining an understanding of the ethical considerations. C2. regulatory requirements associated with working in the field of biochemical engineering, particularly when dealing with bioprocess or conducting human research.

89. Teaching and Learning Strategies

The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations.

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90. Evaluation methods

Quizzes, mid-term exams, assignments, and seminars.

91.Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	Chemical Engineering	Chemical Engineering			yes	

Professional Development

Mentoring new faculty members

Professional development of faculty members

92.Acceptance Criterion

93.The most important sources of information about the program

21- Textbooks.
22- Internet Sources.
23- Researches, Papers
24- Corresponding international universities

25- Program Development Plan

- By staying updated with the latest developments in the engineering field
- Using modern technologies in teaching has the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4

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

Course Description Form

73.Course Name:
Heat Transfer I
74.Course Code:
75.Semester / Year:
3rd Semester / 2024
76.Description Preparation Date: 30 -3 - 2024
77.Available Attendance Forms:
78.Number of Credit Hours (Total) / Number of Units (Total)
Weekly 3 hours (Total 45 hours)/ 3 units
79.Course administrator's name (mention all, if more than one name)
Name: Dr. Mohammed A. Atiya Email: atiya@kecbu.uobaghdad.edu.iq
80.Course Objectives

Course Objectives	11. To study Over View of Heat transfer phenomena . 12. Develop a broad understanding of the basic modes of heat transfer (conduction, convection, radiation). 13. Formulate an order of magnitude analysis on governing differential equations for heat transport to determine how variables are related to parameters. 14. Unsteady state of heat transfer.

81.Teaching and Learning Strategies

Strategy	Demonstrate the knowledge and understanding of the fundamental concepts, principles and theories of heat Transfer with core knowledge in heat Transfer equipment.

82. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	A1-2	Introduction to heat transfer (conduction; convection; radiation)	Lecture & Tutorial	Quizzes , Homework & seminar

2	3	B1, C1	Steady state conduction (the plane wall)	Lecture & Tutorial	Quizzes , Homework & seminar
3	3	A1, A2, A7, B2	Insulation and R value radial systems	Lecture & Tutorial	Quizzes , Homework & & seminar
4	3	A1-7, B1-3, C1-2	The overall heat transfer coefficient	Lecture & Tutorial	Quizzes , Homework & & seminar
5	3	A1-7, B1-3, C1-2	Critical thickness of insulation	Lecture & Tutorial	Quizzes , Homework & & seminar
6	3	A1-7, B1-3, C1-2	Heat source system (cylinder with heat sources)	Lecture & Tutorial	Quizzes , Homework & & seminar
7	3	A1-7, B1-3, C1-2	Conduction convection systems (fins)	Lecture & Tutorial	Quizzes , Homework & & seminar
8	3		Mid Exam I		
9	3	A1-7, B1-3, C1-2	Unsteady state conduction (lumped heat capacity)	Lecture & Tutorial	Quizzes , Homework & & seminar
10	3	A1-7, B1-3, C1-2	Transient heat flow in a semi-infinite solid	Lecture & Tutorial	Quizzes , Homework & & seminar
11	3	A1-7, B1-3, C1-2	Convection boundary conditions	Lecture & Tutorial	Quizzes , Homework & & seminar
12	3	A1-7, B1-3, C1-2	Multidimensional system	Lecture & Tutorial	Quizzes , Homework & & seminar
13	3	A1-7, B1-3, C1-2	Principles of convection	Lecture & Tutorial	Quizzes , Homework & & seminar
14	3	A1-7, B1-3, C1-2	Laminar & thermal boundary layer on a flat plate	Lecture & Tutorial	Quizzes , Homework & & seminar
15	3		Mid Exam II		

83.Course Evaluation

Quizzes, mid-term exams, assignments and seminar

84.Learning and Teaching Resources

Required textbooks (curricular books, if any)	"Heat transfer " by J.P. Holman , Sixth Edition (1986).

Main references (sources)	Fundamentals of Heat and Mass transfer, by Frank P. Incropera, 7th edition .
Recommended books and references (scientific journals, reports...)	-
Electronic References, Websites	https://www.amazon.com/Fundamentals-Heat-Transfer-Frank-Incropera/dp/0471457280

Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
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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 academic programs and course descriptions to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a 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 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 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.

University Name: University of Baghdad
Faculty/Institute: AL-Khwarizmi College of Engineering
Scientific Department: Biochemical Engineering
Academic or Professional Program Name: B.Sc.
Final Certificate Name: B.Sc. in Biochemical Engineering
Academic System: Quarterly
Description Preparation Date: 28/3/2024
File Completion Date: 28/3/2024

Signature:

Prof. Dr. Alaa Kareem Mohammed:
Head of Department Name:

Date:

Signature:

Asst Prof. Dr. Hisham Hassan Jasim
Scientific Associate Name:

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature

Approval of the Dean

94.**Program Vision**

The scientific department seeks to present academically, scientifically, and even practically in the local and international arena. The reliability of scientific laboratories is within national standards first and international standards second. Apply advanced studying and teaching systems and keep updated with the latest developments in this field, especially e-learning. Furthermore, studying recent experiences in education and working on applying them in line with the changing standards of scientific and practical requirements. Planning to build postgraduate studies with high standard quality by preparing material requirements from laboratories and others and the scientific needs of researchers, in addition to researchers and supervisors who own a distinguished research line and global scientific publication.

95.**Program Mission**

The Biochemical academic staff pursues a multifaceted charge at the University of Baghdad. Our mission is to provide exceptional education and research opportunities in the field of Biochemical Engineering. We strive to cultivate a diverse and inclusive learning environment that fosters creativity, critical thinking, and innovation. Through our interdisciplinary approach, we aim to equip students with the knowledge, skills, and ethical values necessary to address the complex challenges of the modern world. As a Biochemical Engineering faculty, we uphold the highest standards of integrity, ethics, and social responsibility. Overall, our mission is to be a global leader in Biochemical Engineering education, research, and innovation, making a positive impact on the world by advancing knowledge, addressing challenges, and improving the quality of life for present and future generations.

96.**Program Objectives**

50. To optimize the design and operation of biochemical processes to maximize product yield, efficiency, and quality.
51. To prepare students for a wide variety of post-baccalaureate paths, including graduate school, professional training programs, or entry-level jobs in any area of biochemical Engineering.
52. To provide extensive hands-on training in production technology, statistical analysis, laboratory skills, and field techniques.
53. To provide thorough training in written and oral communication of scientific information.
54. To enrich students with opportunities for alternative education in the area of biochemical Engineering through undergraduate research, internships, and study abroad.

55. To design processes that are safe for operators, the environment, and the public.
56. To contribute to the advancement of biotechnology by developing new technologies, tools, and methods for improved bioprocesses.

97. Program Accreditation

N/A

98. Other external influences

N/A

99. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements				
College Requirements				
Department Requirements				
Summer Training				
Other				

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

100. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
٢٠٢٤-٢٠٢٣ / Third		Heat Transfer II	3	N/A

101. Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	A1. Students will develop a solid understanding of the dynamic behavior of chemical processes. A2. Students will be proficient in developing mathematical models that describe the dynamic behavior of chemical processes. A3. Students will learn how to analyze the stability, controllability, and observability of dynamic systems.

	A4. Students will be able to analyze the time response of chemical processes. A5. Students will gain knowledge and skills in designing control systems for chemical processes. A6. Students will learn techniques for optimizing the performance of chemical processes. A7. Students will develop the ability to apply the concepts and techniques learned in the module to real-world chemical engineering problems.
Skills	
Learning Outcomes 2	B1. Ability to apply mathematics to model and solve biochemical engineering processes. B2. Skills to design and conduct experiments in the area of biochemical engineering training. B3. Ability to innovate and improve processes of transformation of matter. B4. Ability to work effectively in specialized and/or multidisciplinary terms, in diverse cultural environments. B5. Ability to solve biochemical engineering problems using engineering tools available. B6. Responsible behavior in socio-ethical and professional environments.
Ethics	
Learning Outcomes 3	C1. Gaining an understanding of the ethical considerations. C2. regulatory requirements associated with working in the field of biochemical engineering, particularly when dealing with bioprocess or conducting human research.

102. Teaching and Learning Strategies

The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations.

The second goal is to invite industry professionals or guest speakers who have expertise in process dynamics to deliver lectures or share their experiences. This offers students valuable insights into real-world applications and challenges, bridging the gap between academia and industry

103. Evaluation methods

Quizzes, mid-term exams, assignments, and seminars.

104. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	Chemical Engineering	Chemical Engineering			yes	

Professional Development

Mentoring new faculty members

Professional development of faculty members

105. Acceptance Criterion

106. The most important sources of information about the program

26- Textbooks.
27- Internet Sources.
28- Researches, Papers
29- Corresponding international universities

30- Program Development Plan

- By staying updated with the latest developments in the engineering field
- Using modern technologies in teaching has the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4

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

Course Description Form

85.Course Name:
Heat Transfer II
86.Course Code:
87.Semester / Year:
3rd Semester / 2024
88.Description Preparation Date: 30 -3 - 2024
89.Available Attendance Forms:
90.Number of Credit Hours (Total) / Number of Units (Total)
Weekly 3 hours (Total 45 hours)/ 3 units
91.Course administrator's name (mention all, if more than one name)
Name: Dr. Mohammed A. Atiya Email: atiya@kecbu.uobaghdad.edu.iq
92.Course Objectives

Course Objectives	15. Apply basic heat exchanger theory to predict heat exchanger performance for various designs. 16. Full Design of most heat exchangers equipment. 17. Apply basic heat exchanger theory to predict heat exchanger performance for various designs.

93.Teaching and Learning Strategies

Strategy	1. Understand process design and use integrated approaches to solve complex, often open-ended process design problems. 2. Select the appropriate types of heat exchangers 3. demonstrate achievement of a specialized knowledge, particularly via project work, of process engineering which is founded on the chemical, biological and physical sciences.

18. Course Structure

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

1	3	A1-2	The relation between fluid friction and heat transfer	Lecture & Tutorial	Quizzes , Homework & seminar
2	3	B1, C1	Turbulent boundary layer heat transfer	Lecture & Tutorial	Quizzes , Homework & seminar
3	3	A1, A2, A7, B2	Heat transfer in laminar & turbulent tube flow	Lecture & Tutorial	Quizzes , Homework & seminar
4	3	A1-7, B1-3, C1-2	Empirical and practical relations for forced convection	Lecture & Tutorial	Quizzes , Homework & seminar
5	3	A1-7, B1-3, C1-2	Flow across cylinders and spheres	Lecture & Tutorial	Quizzes , Homework & seminar
6	3	A1-7, B1-3, C1-2	Flow across tube banks	Lecture & Tutorial	Quizzes , Homework & seminar
7	3	A1-7, B1-3, C1-2	Internal Flow	Lecture & Tutorial	Quizzes , Homework & seminar
8	3	A1-7, B1-3, C1-2	Free convection	Lecture & Tutorial	Quizzes , Homework & seminar
9	3		Mid Exam I	Lecture & Tutorial	Quizzes , Homework & seminar
10	3	A1-7, B1-3, C1-2	Boiling & condensation	Lecture & Tutorial	Quizzes , Homework & seminar
11	3	A1-7, B1-3, C1-2	Types of heat exchangers	Lecture & Tutorial	Quizzes , Homework & seminar
12	3	A1-7, B1-3, C1-2	The log mean temperature difference method	Lecture & Tutorial	Quizzes , Homework & seminar
13	3	A1-7, B1-3, C1-2	Effectiveness NTU method	Lecture & Tutorial	Quizzes , Homework & seminar
14	3	A1-7, B1-3, C1-2	Radiation heat transfer (physical mechanism)	Lecture & Tutorial	Quizzes , Homework & seminar
15	3	A1-7, B1-3, C1-2	Mid Exam II		
19.Course Evaluation					

Quizzes, mid-term exams, assignments and seminar	
20.Learning and Teaching Resources	
Required textbooks (curricular books, if any)	"Heat transfer " by J.P. Holman , Sixth Edition (1986).
Main references (sources)	Fundamentals of Heat and Mass transfer, by Frank P. Incropera, 7th edition .
Recommended books and references (scientific journals, reports...)	-
Electronic References, Websites	https://www.amazon.com/Fundamentals-Heat-Transfer-Frank-Incropera/dp/0471457280

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:

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University Name: University of Baghdad

Faculty/Institute: AL-Khwarizmi College of Engineering

Scientific Department: Biochemical Engineering

Academic or Professional Program Name: B.Sc.

Final Certificate Name: B.Sc. in Biochemical Engineering

Academic System: Quarterly

Description Preparation Date: 28/3/2024

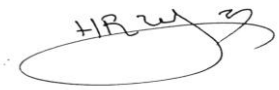
File Completion Date: 28/3/2024

Signature: 

Prof. Dr. Alaa Kareem Mohammed:

Head of Department Name:

Date:



Signature:

Asst Prof. Dr. Hisham Hassan Jasim

Scientific Associate Name:

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature 

Approval of the Dean

107. **Program Vision**

The scientific department seeks to present academically, scientifically, and even practically in the local and international arena. The reliability of scientific laboratories is within national standards first and international standards second. Apply advanced studying and teaching systems and keep updated with the latest developments in this field, especially e-learning. Furthermore, studying recent experiences in education and working on applying them in line with the changing standards of scientific and practical requirements. Planning to build postgraduate studies with high standard quality by preparing material requirements from laboratories and others and the scientific needs of researchers, in addition to researchers and supervisors who own a distinguished research line and global scientific publication.

108. **Program Mission**

The Biochemical academic staff pursues a multifaceted charge at the University of Baghdad. Our mission is to provide exceptional education and research opportunities in the field of Biochemical Engineering. We strive to cultivate a diverse and inclusive learning environment that fosters creativity, critical thinking, and innovation. Through our interdisciplinary approach, we aim to equip students with the knowledge, skills, and ethical values necessary to address the complex challenges of the modern world. As a Biochemical Engineering faculty, we uphold the highest standards of integrity, ethics, and social responsibility. Overall, our mission is to be a global leader in Biochemical Engineering education, research, and innovation, making a positive impact on the world by advancing knowledge, addressing challenges, and improving the quality of life for present and future generations.

109. **Program Objectives**

57. To optimize the design and operation of biochemical processes to maximize product yield, efficiency, and quality.
58. To prepare students for a wide variety of post-baccalaureate paths, including graduate school, professional training programs, or entry-level jobs in any area of biochemical Engineering.
59. To provide extensive hands-on training in production technology, statistical analysis, laboratory skills, and field techniques.

60. To provide thorough training in written and oral communication of scientific information.
61. To enrich students with opportunities for alternative education in the area of biochemical Engineering through undergraduate research, internships, and study abroad.
62. To design processes that are safe for operators, the environment, and the public.
63. To contribute to the advancement of biotechnology by developing new technologies, tools, and methods for improved bioprocesses.

110. Program Accreditation

N/A

111. Other external influences

N/A

112. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements				
College Requirements				
Department Requirements				
Summer Training				
Other				

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

113. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
٢٠٢٤-٢٠٢٣ / Third		Mass Transfer in Chemical and Biochemical Eng. I	4	N/A

114. Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	A1. Demonstrate the knowledge and understanding of the fundamental concepts, principles and theories underpinning Biochemical Engineering

	with core knowledge in: engineering analysis, fluid mechanics, thermodynamics; mass & heat transfer; biochemical reactions; materials; process control; safety, health & environment; A2. Operate small and pilot-scale equipment and use it to acquire essential data; A3. Understand process design and use integrated approaches to solve complex, often open-ended process design problems; A4. demonstrate achievement of a specialised knowledge, particularly via project work, of process engineering which is founded on the chemical, biological and physical sciences. A5. Students will develop the ability to apply the concepts and techniques learned in the module to real-world chemical/biochemical engineering problems.
Skills	
Learning Outcomes 2	B11. Generate ideas, proposals and solutions or arguments independently and/or collaboratively in response to set scenarios and/or self initiated activity; B12. Evaluate whether design solutions integrate social, legal, engineering and technical requirements; B13. Identify appropriate design and governance problems and formulate clear objectives using analytical data and I&CT software as appropriate; B.4 Develop design briefs with clarity graphically and/or in written specifications.
Ethics	
Learning Outcomes 3	C1. Gaining an understanding of the ethical considerations. C2. regulatory requirements associated with working in the field of biochemical engineering, particularly when dealing with bioprocess or conducting human research.

115. Teaching and Learning Strategies

The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations.

The second goal is to invite industry professionals or guest speakers who have expertise in process dynamics to deliver lectures or share their experiences. This offers students valuable insights into real-world applications and challenges, bridging the gap between academia and industry

116. Evaluation methods

Quizzes, mid-term exams, assignments, and seminars.

117. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Assistance Professor	Chemical Engineering	Mass Transfer/ Electrochemical			yes	

Professional Development

Mentoring new faculty members

Professional development of faculty members

118. Acceptance Criterion

119. The most important sources of information about the program

31- Textbooks.
32- Internet Sources.
33- Researches, Papers
34- Corresponding international universities

35- Program Development Plan

- By staying updated with the latest developments in the engineering field

- Using modern technologies in teaching has the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4

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

Course Description Form

94.Course Name:	
Mass Transfer in Chemical and Biochemical Eng. I	
95.Course Code:	
96.Semester / Year:	
3rd Semester / 2024	
97.Description Preparation Date: 30 -3 - 2024	
98.Available Attendance Forms:	
99.Number of Credit Hours (Total) / Number of Units (Total)	
Weekly 4 hours (Total 60 hours)/ 3 units	
100. Course administrator's name (mention all, if more than one name)	
Name: Dr. Khalid Waleed Hameed Email: kwhameed@kecbu.uobaghdad.edu.iq	
101. Course Objectives	
Course Objectives	1. To provide a means to teach undergraduate biochemical engineering students the basic principles of mass transfer and to apply these principles, aided by computational tools, to the design of equipment used in separation processes. 2. How to Separation of products (gases, liquids, solids), Recovery and purification using mass transfer-equipment operation and primary estimation of equipment sizing. 3. To impart the knowledge of separation processes like distillation, Absorption, adsorption, and extraction.
102. Teaching and Learning Strategies	
Strategy	The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations. The second goal is to invite industry professionals or guest speakers who have exper in Mass transfer to deliver lectures or share their experiences. This offers stude valuable insights into real-world applications and challenges, bridging the gap betw academia and industry.
103.Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	A1-3	Diffusion, Counter current diffusion		
2	3	A1-5, B2, C1	Diffusion though stagnant layer		
3	3	A1, A2, A7, B2	Diffusion though membrane mass transfer		
4	3	A1-7, B1-3, C1-2	Gas-liquid, liquid-liquid & solid-liquid mass transfer		
5	3	A1-7, B1-3, C1-2	Mass transfer in bioreactor		
6	3	A1-7, B1-3, C1-2	Absorption, Packed Column		
7	3	A1-7, B1-3, C1-2	Tray column, tray types		
8	3	A1-7, B1-3, C1-2	Diameter of Column		
9	3	A1-7, B1-3, C1-2	Stripping		
10	3	A1-7, B1-3, C1-2	Distillation, simple distillation		
11	3	A1-7, B1-3, C1-2	Flash distillation		
12	3	A1-7, B1-3, C1-2	Continuous Distillation		
13	3	A1-7, B1-3, C1-2	Multi-components distillation, Reflux ratio, Multi-feed distillation		
14	3	A1-7, B1-3, C1-2	Batch distillation		
15	3	A1-7, B1-3, C1-2	Azotropic distillation, Membrane distillation		

104. Course Evaluation

Quizzes, mid-term exams, assignments and seminar

105. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Separation Process Principles, Chemical and Biochemical Operations, by J. D. Seader, Ernest J. Henley, and D. Keith Roper, 2011.
Main references (sources)	Chemical Engineering volumes 1 and 2, by Coulson and Richardson, 2005.
Recommended books and references (scientific journals, reports...)	- Bioseparation Downstream Processing for Biotechnology, Belter, Cussler, and Hu, 1988. - Mass Transfer Operation by Robert E. Treybal, 1980.
Electronic References, Websites	https://edisciplinas.usp.br/pluginfile.php/7989492/mod_folder/content/0/Seader%20Henley%202011%20Chap01.pdf?forcedownload=1

Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
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Academic Program and Course Description Guide

2024

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Academic System: Quarterly

Description Preparation Date: 28/3/2024

File Completion Date: 28/3/2024

Signature:

Prof. Dr. Alaa Kareem Mohammed:

Head of Department Name:

Date:

Signature:

Asst Prof. Dr. Hisham Hassan Jasim

Scientific Associate Name:

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature

Approval of the Dean

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69. To design processes that are safe for operators, the environment, and the public.
70. To contribute to the advancement of biotechnology by developing new technologies, tools, and methods for improved bioprocesses.

123. Program Accreditation

N/A

124. **Other external influences**
N/A

125. **Program Structure**				
Program Structure	**Number of Courses**	**Credit hours**	**Percentage**	**Reviews***
Institution Requirements				
College Requirements				
Department Requirements				
Summer Training				
Other				

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

126. Program Description				
Year/Level	**Course Code**	**Course Name**	**Credit Hours**	
			theoretical	**practical**
٢٠٢٤-٢٠٢٣ / Third		**Mass Transfer in Chemical and Biochemical Eng. II**	**4**	**N/A**

127. Expected learning outcomes of the program	
Knowledge	
Learning Outcomes 1	A1. Demonstrate the knowledge and understanding of the fundamental concepts, principles and theories underpinning Biochemical Engineering with core knowledge in: engineering analysis, fluid mechanics, thermodynamics; mass & heat transfer; biochemical reactions; materials; process control; safety, health & environment; A2. Operate small and pilot-scale equipment and use it to acquire essential data; A3. Understand process design and use integrated approaches to solve complex, often open-ended process design problems; A4. demonstrate achievement of a specialised knowledge, particularly via project work, of process engineering which is founded on the chemical, biological and physical sciences. A5. Students will develop the ability to apply the concepts and techniques learned in the module to real-world chemical/biochemical

	engineering problems.
Skills	
Learning Outcomes 2	B14. Generate ideas, proposals and solutions or arguments independently and/or collaboratively in response to set scenarios and/or self initiated activity; B15. Evaluate whether design solutions integrate social, legal, engineering and technical requirements; B16. Identify appropriate design and governance problems and formulate clear objectives using analytical data and I&CT software as appropriate; B.4 Develop design briefs with clarity graphically and/or in written specifications.
Ethics	
Learning Outcomes 3	C1. Gaining an understanding of the ethical considerations. C2. regulatory requirements associated with working in the field of biochemical engineering, particularly when dealing with bioprocess or conducting human research.

128. Teaching and Learning Strategies

The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations.

The second goal is to invite industry professionals or guest speakers who have expertise in process dynamics to deliver lectures or share their experiences. This offers students valuable insights into real-world applications and challenges, bridging the gap between academia and industry

129. Evaluation methods

Quizzes, mid-term exams, assignments, and seminars.

130. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Assistance Professor	Chemical Engineering	Mass Transfer/ Electrochemical			yes	

Professional Development

Mentoring new faculty members

Professional development of faculty members

131. Acceptance Criterion

132. The most important sources of information about the program

36- Textbooks.
37- Internet Sources.
38- Researches, Papers
39- Corresponding international universities

40- Program Development Plan

- By staying updated with the latest developments in the engineering field
- Using modern technologies in teaching has the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4

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

Course Description Form

106.	Course Name:
	Mass Transfer in Chemical and Biochemical Eng. II
107.	Course Code:
108.	Semester / Year:
	3rd Semester / 2024
109.	Description Preparation Date: 30 -3 - 2024
110.	Available Attendance Forms:
111.	Number of Credit Hours (Total) / Number of Units (Total)
	Weekly 4 hours (Total 60 hours)/ 3 units
112.	Course administrator's name (mention all, if more than one name)
	Name: Dr. Khalid Waleed Hameed Email: kwhameed@kecbu.uobaghdad.edu.iq
113.	Course Objectives
Course Objectives	1. To provide a means to teach undergraduate biochemical engineering students the basic principles of mass transfer and to apply these principles, aided by computational tools, to the design of equipment used in separation processes. 2. How to Separation of products (gases, liquids, solids), Recovery and purification using mass transfer-equipment operation and primary estimation of equipment sizing. 3. To impart the knowledge of separation processes like distillation, Absorption, adsorption, and extraction.
114.	Teaching and Learning Strategies
Strategy	The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations. The second goal is to invite industry professionals or guest speakers who have exper in Mass transfer to deliver lectures or share their experiences. This offers stude valuable insights into real-world applications and challenges, bridging the gap betw academia and industry.
115.	Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	A1-3	Liquid-liquid Extraction, Batch Extraction		
2	3	A1-5, B2, C1	Stage wise extraction, Completely immiscible solvents		
3	3	A1, A2, A7, B2	Partially miscible solvents		
4	3	A1-7, B1-3, C1-2	Packed column, Tray column, Centrifugal Extraction		
5	3	A1-7, B1-3, C1-2	Solved Problems		
6	3	A1-7, B1-3, C1-2	Leaching, batch leaching		
7	3	A1-7, B1-3, C1-2	Continuous leaching		
8	3	A1-7, B1-3, C1-2	Adsorption, Linear Adsorption,		
9	3	A1-7, B1-3, C1-2	Langmuir adsorption, Fruendlich adsorption		
10	3	A1-7, B1-3, C1-2	Breakthrough point, Adsorption Equipment		
11	3	A1-7, B1-3, C1-2	Solved Problems		
12	3	A1-7, B1-3, C1-2	Crystallization		
13	3	A1-7, B1-3, C1-2	Crystallizers		
14	3	A1-7, B1-3, C1-2	Humidification, Humidity-Enthalpy chart		
15	3	A1-7, B1-3, C1-2	Cooling Tower		

116. Course Evaluation

Quizzes, mid-term exams, assignments and seminar

117. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Separation Process Principles, Chemical and Biochemical Operations, by J. D. Seader, Ernest J. Henley, and D. Keith Roper, 2011.
Main references (sources)	Chemical Engineering volumes 1 and 2, by Coulson and Richardson, 2005.
Recommended books and references (scientific journals, reports...)	- Bioseparation Downstream Processing for Biotechnology, Belter, Cussler, and Hu, 1988. - Mass Transfer Operation by Robert E. Treybal, 1980.
Electronic References, Websites	https://edisciplinas.usp.br/pluginfile.php/7989492/mod_folder/content/0/Seader%20Henley%202011%20Chap01.pdf?forcedownload=1

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 academic programs and course descriptions to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a 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 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 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.

University Name: University of Baghdad

Faculty/Institute: AL-Khwarizmi College of Engineering

Scientific Department: Biochemical Engineering

Academic or Professional Program Name: B.Sc.

Final Certificate Name: B.Sc. in Biochemical Engineering

Academic System: Quarterly

Description Preparation Date: 28/3/2024

File Completion Date: 28/3/2024

Signature:

Prof. Dr. Alaa Kareem Mohammed:

Head of Department Name:

Date:

Signature:

Asst Prof. Dr. Hisham Hassan Jasim

Scientific Associate Name:

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature

Approval of the Dean

133. Program Vision

The scientific department seeks to present academically, scientifically, and even practically in the local and international arena. The reliability of scientific laboratories is within national standards first and international standards second. Apply advanced studying and teaching systems and keep updated with the latest developments in this field, especially e-learning. Furthermore, studying recent experiences in education and working on applying them in line with the changing standards of scientific and practical requirements. Planning to build postgraduate studies with high standard quality by preparing material requirements from laboratories and others and the scientific needs of researchers, in addition to researchers and supervisors who own a distinguished research line and global scientific publication.

134. Program Mission

The Biochemical academic staff pursues a multifaceted charge at the University of Baghdad. Our mission is to provide exceptional education and research opportunities in the field of Biochemical Engineering. We strive to cultivate a diverse and inclusive learning environment that fosters creativity, critical thinking, and innovation. Through our interdisciplinary approach, we aim to equip students with the knowledge, skills, and ethical values necessary to address the complex challenges of the modern world. As a Biochemical Engineering faculty, we uphold the highest standards of integrity, ethics, and social responsibility. Overall, our mission is to be a global leader in Biochemical Engineering education, research, and innovation, making a positive impact on the world by advancing knowledge, addressing challenges, and improving the quality of life for present and future generations.

135. Program Objectives

71. To optimize the design and operation of biochemical processes to maximize product yield, efficiency, and quality.
72. To prepare students for a wide variety of post-baccalaureate paths, including graduate school, professional training programs, or entry-level jobs in any area of biochemical Engineering.
73. To provide extensive hands-on training in production technology, statistical analysis, laboratory skills, and field techniques.
74. To provide thorough training in written and oral communication of scientific information.
75. To enrich students with opportunities for alternative education in the area of biochemical Engineering through undergraduate research, internships, and study abroad.
76. To design processes that are safe for operators, the environment, and the public.
77. To contribute to the advancement of biotechnology by developing new technologies, tools, and methods for improved bioprocesses.

136. Program Accreditation

N/A

137. **Other external influences**
N/A

138. **Program Structure**				
Program Structure	**Number of Courses**	**Credit hours**	**Percentage**	**Reviews***
Institution Requirements				
College Requirements				
Department Requirements				
Summer Training				
Other				

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

139. Program Description				
Year/Level	**Course Code**	**Course Name**	**Credit Hours**	
			theoretical	**practical**
٢٠٢٤-٢٠٢٣ / fourth		**Pollution**	**3**	**N/A**

140. Expected learning outcomes of the program	
Knowledge	
Learning Outcomes 1	A1. Students will develop a solid understanding of Pollution processes. A2. Students will be proficient in developing Pollution of biochemical processes. A3. Students will learn how to analyze the stability, controllability, and observability of Pollution principles. A4. Students will be able to analyze Pollution criteria. A5. Students will gain knowledge and skills in Pollution systems for biochemical processes. A6. Students will learn techniques Pollution Assessments. A7. Students will develop the ability to apply the concepts and techniques learned in the Pollution in biochemical engineering
Skills	

Learning Outcomes 2	B1. Ability to Pollution in bio chemical project. B2. Skills to design and conduct experiments in the area of Pollution training. B3. Ability to innovate and improve processes of transformation of matter. B4. Ability to work effectively in specialized and/or multidisciplinary terms, in diverse cultural environments. B5. Ability to solve biochemical engineering problems using engineering tools available. B6. Responsible behavior in socio-ethical and professional environments.
Ethics	
Learning Outcomes 3	C1. Gaining an understanding of the ethical considerations. C2. Regulatory requirements associated with working in the field of biochemical engineering, particularly when dealing with bioprocess or conducting human research.

141. Teaching and Learning Strategies

The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations.

The second goal is to invite industry professionals or guest speakers who have expertise in Engineering management to deliver lectures or share their experiences. This offers students valuable insights into real-world applications and challenges, bridging the gap between academia and industry

142. Evaluation methods

Quizzes, mid-term exams, assignments, and seminars.

143. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Lecture	Chemical Engineering	Bioprocess Engineering			yes	

Professional Development

Mentoring new faculty members

Professional development of faculty members

144. Acceptance Criterion

145. The most important sources of information about the program

41- Textbooks.
42- Internet Sources.
43- Researches, Papers
44- Corresponding international universities

45- Program Development Plan

- By staying updated with the latest developments in the engineering field
- Using modern technologies in teaching has the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4

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

Course Description Form

118.	Course Name:
	Pollution
119.	Course Code:
120.	Semester / Year:
	4th Semester / 2024
121.	Description Preparation Date: 30 -3 - 2024
122.	Available Attendance Forms:
123.	Number of Credit Hours (Total) / Number of Units (Total)
	Weekly 2 hours (Total 30 hours)/ 2 units
124.	Course administrator's name (mention all, if more than one name)
	Name: Lecture : Ramzi Ata Abd Alsaheb Email: ramzi.a@kecbu.uobaghdad.edu.iq
125.	Course Objectives
Course Objectives	21. Students should be able to develop principles that describe the Pollution of biochemical processes 22. Students should understand the time response of Pollution to changes in world. 23. Students should learn techniques for Pollution that can regulate and optimize the operation of biochemical processes
126.	Teaching and Learning Strategies
Strategy	The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations. The second goal is to invite industry professionals or guest speakers who have exper in process dynamics to deliver lectures or share their experiences. This offers stude valuable insights into real-world applications and challenges, bridging the gap betw academia and industry.
127. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	A1-2	Identify the ecosystem, pollution and its types		
2	3	A1-5, B2, C1	Introduction to wastewater, its systems, and waste management and reduction		
3	3	A1, A2, A7, B2	Introduction to wastewater, its systems, and waste management and reduction		
4	3	A1-7, B1-3, C1-2	Waste management and how to reduce it		
5-6	3	A1-7, B1-3, C1-2	Wastewater treatment plant		
7-8	3	A1-7, B1-3, C1-2	Physical, chemical and biological treatment		
9	3	A1-7, B1-3, C1-2	Silt treatment		
10-12	3	A1-7, B1-3, C1-2	air pollution		
13	3	A1-7, B1-3, C1-2	Validation pollution process		
14	3	A1-7, B1-3, C1-2	R& D in Engineering management project		
15	3	A1-7, B1-3, C1-2	solid waste		

128. Course Evaluation

Quizzes, mid-term exams, assignments and seminar

129. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Metcalf & Eddy, Inc. 2003. Wastewater Engineering: Treatment and Reuse. 4th ed. New York: McGraw- Hill *Fundamentals of Air Pollution Engineering. Richard C. Flagan&John H. Seinfeld
Main references (sources)	Environmental Engineering, 6th ed. Water, Wastewater, Soil and Groundwater Treatment and Remediation
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	http://phytosociety.org

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:

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Course Description: Provides a 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.

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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 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.

University Name: University of Baghdad

Faculty/Institute: AL-Khwarizmi College of Engineering

Scientific Department: Biochemical Engineering

Academic or Professional Program Name: B.Sc.

Final Certificate Name: B.Sc. in Biochemical Engineering

Academic System: Quarterly

Description Preparation Date: 28/3/2024

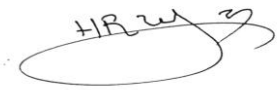
File Completion Date: 28/3/2024

Signature: 

Prof. Dr. Alaa Kareem Mohammed:

Head of Department Name:

Date:

Signature: 

Asst Prof. Dr. Hisham Hassan Jasim

Scientific Associate Name:

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature 

Approval of the Dean

146. Program Vision

The scientific department seeks to present academically, scientifically, and even practically in the local and international arena. The reliability of scientific laboratories is within national standards first and international standards second. Apply advanced studying and teaching systems and keep updated with the latest developments in this field, especially e-learning. Furthermore, studying recent experiences in education and working on applying them in line with the changing standards of scientific and practical requirements. Planning to build postgraduate studies with high standard quality by preparing material requirements from laboratories and others and the scientific needs of researchers, in addition to researchers and supervisors who own a distinguished research line and global scientific publication.

147. Program Mission

The Biochemical academic staff pursues a multifaceted charge at the University of Baghdad. Our mission is to provide exceptional education and research opportunities in the field of Biochemical Engineering. We strive to cultivate a diverse and inclusive learning environment that fosters creativity, critical thinking, and innovation. Through our interdisciplinary approach, we aim to equip students with the knowledge, skills, and ethical values necessary to address the complex challenges of the modern world. As a Biochemical Engineering faculty, we uphold the highest standards of integrity, ethics, and social responsibility. Overall, our mission is to be a global leader in Biochemical Engineering education, research, and innovation, making a positive impact on the world by advancing knowledge, addressing challenges, and improving the quality of life for present and future generations.

148. Program Objectives

78. To optimize the design and operation of biochemical processes to maximize product yield, efficiency, and quality.
79. To prepare students for a wide variety of post-baccalaureate paths, including graduate school, professional training programs, or entry-level jobs in any area of biochemical Engineering.
80. To provide extensive hands-on training in production technology, statistical analysis, laboratory skills, and field techniques.
81. To provide thorough training in written and oral communication of scientific information.
82. To enrich students with opportunities for alternative education in the area of biochemical Engineering through undergraduate research, internships, and study abroad.
83. To design processes that are safe for operators, the environment, and the public.
84. To contribute to the advancement of biotechnology by developing new technologies, tools, and methods for improved bioprocesses.

149. Program Accreditation

N/A

150. **Other external influences**
N/A

151. **Program Structure**				
Program Structure	**Number of Courses**	**Credit hours**	**Percentage**	**Reviews***
Institution Requirements				
College Requirements				
Department Requirements				
Summer Training				
Other				

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

152. Program Description				
Year/Level	**Course Code**	**Course Name**	**Credit Hours**	
			theoretical	**practical**
٢٠٢٤-٢٠٢٣ / Third	**BCE323**	**Pharmaceutical Process Engineering**	**4**	**N/A**

153. Expected learning outcomes of the program	
Knowledge	
Learning Outcomes 1	A1. Students will demonstrate the knowledge and understanding of the fundamental concepts, principles and theories underpinning for pharmaceutical engineering. A2. Students will be proficient in developing calculations that describe the different operations in pharmaceutical industry such as mixing, formulation, tableting, encapsulation, and compression. A3. Students will learn how to operate small and pilot-scale equipment in pharmaceutical industry and use it to acquire essential data. A4. Students will be able to analyze the time required for formulation and granulation in manufacturing process of pharmaceutical materials. A5. Students will gain knowledge and skills in designing the processes in pharmaceutical industry. A6. Students will learn techniques for optimizing the performance of pharmaceutical processes.

	A7. Students will develop the ability to apply the concepts and techniques learned in the module to real-world pharmaceutical engineering problems.
Skills	
Learning Outcomes 2	B1. Ability to apply mathematics to solve problems in pharmaceutical engineering processes. B2. Skills to design and conduct experiments in the area of pharmaceutical industry. B3. Ability to innovate and improve processes of transformation of matter. B4. Ability to work effectively in specialized and/or multidisciplinary terms, in diverse cultural environments. B5. Ability to solve pharmaceutical engineering problems using engineering tools available. B6. Responsible behavior in socio-ethical and professional environments.
Ethics	
Learning Outcomes 3	C1. Gaining an understanding of the ethical considerations. C2. regulatory requirements associated with working in the field of pharmaceutical engineering, particularly when dealing with pharmaceutical materials preparation that conducted by human research. C3 make the required maintenance in pharmaceutical processes

154. Teaching and Learning Strategies

The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations.

The second goal is to invite industry professionals or guest speakers who have expertise in process dynamics to deliver lectures or share their experiences. This offers students valuable insights into real-world applications and challenges, bridging the gap between academia and industry

155. Evaluation methods

Quizzes, mid-term exams, assignments, and seminars.

156. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	Chemical Engineering	Chemical Engineering			yes	

Professional Development

Mentoring new faculty members

Professional development of faculty members

157. Acceptance Criterion

158. The most important sources of information about the program

46- Textbooks.
47- Internet Sources.
48- Researches, Papers
49- Corresponding international universities

50- Program Development Plan

- By staying updated with the latest developments in the engineering field
- Using modern technologies in teaching has the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
٢٠٢٤-٢٠٢٣ / Third	BCE323	Pharmaceutical Process Engineering	basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

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

Course Description Form

130.	Course Name:
	Pharmaceutical Process Engineering
131.	Course Code:
	BCE323
132.	Semester / Year:
	3rd Semester / 2024
133.	Description Preparation Date: 29 -3 - 2024
134.	Available Attendance Forms:
135.	Number of Credit Hours (Total) / Number of Units (Total)
	Weekly 4 hours (Total 60 hours)/ 3 units
136.	Course administrator's name (mention all, if more than one name)
	Name: Prof. Dr. Ali H. Abbar Email: ali.abbar@kecbu.uobaghdad.edu.iq
137.	Course Objectives
Course Objectives	1. Students will have the knowledge related to fundamental concepts, principles and theories underpinning for pharmaceutical engineering. 2. Students will be proficient in learning the calculations that describe different operations in pharmaceutical industry such as mixing, formulation, tableting, and compression. 3. Students will able to operate small and pilot-scale equipment in pharmaceutical industry and use it to acquire essential data. 4. Students will be able to analyze the time required for granulation and compression of pharmaceutical materials. 5. Students will able in designing the processes in pharmaceutical industry.
138.	Teaching and Learning Strategies
Strategy	The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations. The second goal is to invite industry professionals or guest speakers who have exper in process dynamics to deliver lectures or share their experiences. This offers stude

	valuable insights into real-world applications and challenges, bridging the gap betw academia and industry.

139. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	A1-3	Introduction to pharmaceutical products		
2	4	A1-5, B2, C1	Biopharmaceuticals and pharmaceutical biotechnology		
3	4	A1, A2, A7, B2	Source of Drugs		
4	4	A1-7, B1-3, C1-2	Source of Drugs		
5	4	A1-7, B1-3, C1-2	Excipients for Pharmaceutical Dosage Forms		
6	4	A1-7, B1-3, C1-3	Excipients for Pharmaceutical Dosage Forms		
7	4	A1-7, B1-3, C1-2	Formulation of liquid and solid drugs		
8	4	A1-7, B1-3, C1-2	Formulation of liquid and solid drugs		
9	4	A1-7, B1-3, C1-2	International pharmacopoeia		
10	4	A1-7, B1-3, C1-3	Capsule and Tablet technology		
11	4	A1-7, B1-3, C1-2	Capsule and Tablet technology		
12	4	A1-7, B1-3, C1-3	Stabilization		
13	4	A1-7, B1-3, C1-2	Generation of purified water and water for injections (WFI),		
14	4	A1-7, B1-3, C1-2	Water for biopharmaceutical processing		
15	4	A1-7, B1-3, C1-2	Drug safety evaluation		

140. Course Evaluation

Quizzes, mid-term exams, assignments and seminar

141. Learning and Teaching Resources

Required textbooks (curricular books, if any)	***David J. Amende, Chemical Engineering in The Pharmaceutical Industry,2011***
Main references (sources)	***SHAYNE COX GAD, PH.D., D.A.B.T, PHARMACEUTICAL MANUFACTURING HANDBOOK Production and Processes,2008***
Recommended books and references (scientific journals, reports...)	1.Gary Walsh, Pharmaceutical Biotechnology Concepts and Applications,2007 *2.Gary Prager, Livingston, NJ, US, .* Practical Pharmaceutical Engineering,2013

	3.Andrew Sinclair, A Practical Guide to Biopharmaceutical Manufacturing,2006
Electronic References, Websites	https://onlinelibrary.wiley.com/doi/book/10.1002/9781119600800

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 academic programs and course descriptions to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a 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 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 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.

University Name: University of Baghdad

Faculty/Institute: AL-Khwarizmi College of Engineering

Scientific Department: Biochemical Engineering

Academic or Professional Program Name: B.Sc.

Final Certificate Name: B.Sc. in Biochemical Engineering

Academic System: Quarterly

Description Preparation Date: 28/3/2024

File Completion Date: 28/3/2024

Signature:

Prof. Dr. Alaa Kareem Mohammed:

Head of Department Name:

Date:

Signature:

Asst Prof. Dr. Hisham Hassan Jasim

Scientific Associate Name:

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature

Approval of the Dean

159. Program Vision

The scientific department seeks to present academically, scientifically, and even practically in the local and international arena. The reliability of scientific laboratories is within national standards first and international standards second. Apply advanced studying and teaching systems and keep updated with the latest developments in this field, especially e-learning. Furthermore, studying recent experiences in education and working on applying them in line with the changing standards of scientific and practical requirements. Planning to build postgraduate studies with high standard quality by preparing material requirements from laboratories and others and the scientific needs of researchers, in addition to researchers and supervisors who own a distinguished research line and global scientific publication.

160. Program Mission

The Biochemical academic staff pursues a multifaceted charge at the University of Baghdad. Our mission is to provide exceptional education and research opportunities in the field of Biochemical Engineering. We strive to cultivate a diverse and inclusive learning environment that fosters creativity, critical thinking, and innovation. Through our interdisciplinary approach, we aim to equip students with the knowledge, skills, and ethical values necessary to address the complex challenges of the modern world. As a Biochemical Engineering faculty, we uphold the highest standards of integrity, ethics, and social responsibility. Overall, our mission is to be a global leader in Biochemical Engineering education, research, and innovation, making a positive impact on the world by advancing knowledge, addressing challenges, and improving the quality of life for present and future generations.

161. Program Objectives

85. To optimize the design and operation of biochemical processes to maximize product yield, efficiency, and quality.
86. To prepare students for a wide variety of post-baccalaureate paths, including graduate school, professional training programs, or entry-level jobs in any area of biochemical Engineering.
87. To provide extensive hands-on training in production technology, statistical analysis, laboratory skills, and field techniques.
88. To provide thorough training in written and oral communication of scientific information.

89. To enrich students with opportunities for alternative education in the area of biochemical Engineering through undergraduate research, internships, and study abroad.
90. To design processes that are safe for operators, the environment, and the public.
91. To contribute to the advancement of biotechnology by developing new technologies, tools, and methods for improved bioprocesses.

162. Program Accreditation

N/A

163. Other external influences

N/A

164. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements				
College Requirements				
Department Requirements				
Summer Training				
Other				

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

165. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
٢٠٢٣-٢٠٢٤ / Third	BCE313	Food Process Engineering	4	N/A

166. Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	A1. Students will demonstrate the knowledge and understanding of the fundamental concepts, principles and theories underpinning for food engineering. A2. Students will be proficient in developing calculations that

	describe the different operations in food industry such as mixing, evaporation, drying, and sterilization. A3. Students will learn how to operate small and pilot-scale equipment in food industry and use it to acquire essential data. A4. Students will be able to analyze the time required for freezing and thermal treatment of foods. A5. Students will gain knowledge and skills in designing the processes in food industry. A6. Students will learn techniques for optimizing the performance of food processes. A7. Students will develop the ability to apply the concepts and techniques learned in the module to real-world food engineering problems.
Skills	
Learning Outcomes 2	B1. Ability to apply mathematics to solve problems in food engineering processes. B2. Skills to design and conduct experiments in the area of food industry. B3. Ability to innovate and improve processes of transformation of matter. B4. Ability to work effectively in specialized and/or multidisciplinary terms, in diverse cultural environments. B5. Ability to solve food engineering problems using engineering tools available. B6. Responsible behavior in socio-ethical and professional environments.
Ethics	
Learning Outcomes 3	C1. Gaining an understanding of the ethical considerations. C2. regulatory requirements associated with working in the field of food engineering, particularly when dealing with food preparation that conducted by human research.

167. Teaching and Learning Strategies

The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations.

The second goal is to invite industry professionals or guest speakers who have expertise in process dynamics to deliver lectures or share their experiences. This offers students valuable insights into real-world applications and challenges, bridging the gap between academia and industry

168. Evaluation methods

Quizzes, mid-term exams, assignments, and seminars.

169. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	Chemical Engineering	Chemical Engineering			yes	

Professional Development

Mentoring new faculty members

Professional development of faculty members

170. Acceptance Criterion

171. The most important sources of information about the program

51- Textbooks.
52- Internet Sources.
53- Researches, Papers
54- Corresponding international universities

55- Program Development Plan

- By staying updated with the latest developments in the engineering field
- Using modern technologies in teaching has the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
٢٠٢٤-٢٠٢٣ / Third	BCE313	Food Process Engineering	basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

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

Course Description Form

142.	Course Name:
	Food Process Engineering
143.	Course Code:
	BCE313
144.	Semester / Year:
	3rd Semester / 2024
145.	Description Preparation Date: 29 -3 - 2024
146.	Available Attendance Forms:
147.	Number of Credit Hours (Total) / Number of Units (Total)
	Weekly 4 hours (Total 60 hours)/ 3 units
148.	Course administrator's name (mention all, if more than one name)
	Name: Prof. Dr. Ali H. Abbar Email: ali.abbar@kecbu.uobaghdad.edu.iq
149.	Course Objectives
Course Objectives	1. Students will have the knowledge related to fundamental concepts, principles and theories underpinning for food engineering. 2. Students will be proficient in learning the calculations that describe different operations in food industry such as mixing, evaporation, drying, and sterilization. 3. Students will able to operate small and pilot-scale equipment in food industry and use it to acquire essential data. 4. Students will be able to analyze the time required for freezing and thermal treatment of foods. 5. Students will able in designing the processes in food industry.
150.	Teaching and Learning Strategies
Strategy	The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations. The second goal is to invite industry professionals or guest speakers who have exper in process dynamics to deliver lectures or share their experiences. This offers stude

	valuable insights into real-world applications and challenges, bridging the gap betw academia and industry.

151. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	A1-3	Raw material preparation		
2	4	A1-5, B2, C1	Size reduction		
3	4	A1, A2, A7, B2	Mixing and forming		
4	4	A1-7, B1-3, C1-2	Mixing and forming		
5	4	A1-7, B1-3, C1-2	Dehydration		
6	4	A1-7, B1-3, C1-2	Evaporation		
7	4	A1-7, B1-3, C1-2	Evaporation		
8	4	A1-7, B1-3, C1-2	Filtration		
9	4	A1-7, B1-3, C1-2	Drying		
10	4	A1-7, B1-3, C1-2	Drying		
11	4	A1-7, B1-3, C1-2	Thermal treatment/preservation		
12	4	A1-7, B1-3, C1-2	Thermal treatment/preservation		
13	4	A1-7, B1-3, C1-2	Thermal treatment/Pasteurization		
14	4	A1-7, B1-3, C1-2	Freezing		
15	4	A1-7, B1-3, C1-2	Food packing		

152. Course Evaluation

Quizzes, mid-term exams, assignments and seminar

153. Learning and Teaching Resources

Required textbooks (curricular books, if any)	***FOOD PROCESSING TECHNOLOGY (Principles and Practice), Second Edition 2000 P. Fellows***
Main references (sources)	***Food Science and Technology, Second Edition Vol. 1,2,3,4,Frederick J. Francis***
Recommended books and references (scientific journals, reports...)	1-Food Biochemistry And Food Processing, Y.H. Hui, Wai-Kit Nip, Leo M.L. Nollet PhD, GopinadhanPaliyath Ph.D., Benjamin K. Simpson 1st edition 2006 2-Transport Phenomena in Food Processing (Food Preservation Technology, Jorge Welti-Chanes, Jorge F. Velez-Ruiz1st edition 2002
Electronic References, Websites	https://www.sciencedirect.com/book/9781845692162/food-processing-technology

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

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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.

University Name: University of Baghdad

Faculty/Institute: AL-Khwarizmi College of Engineering

Scientific Department: Biochemical Engineering

Academic or Professional Program Name: B.Sc.

Final Certificate Name: B.Sc. in Biochemical Engineering

Academic System: Quarterly

Description Preparation Date: 28/3/2024

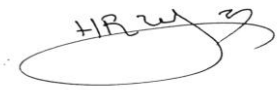
File Completion Date: 28/3/2024

Signature: 

Prof. Dr. Alaa Kareem Mohammed:

Head of Department Name:

Date:

Signature: 

Asst Prof. Dr. Hisham Hassan Jasim

Scientific Associate Name:

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature 

Approval of the Dean

172. **Program Vision**

The scientific department seeks to present academically, scientifically, and even practically in the local and international arena. The reliability of scientific laboratories is within national standards first and international standards second. Apply advanced studying and teaching systems and keep updated with the latest developments in this field, especially e-learning. Furthermore, studying recent experiences in education and working on applying them in line with the changing standards of scientific and practical requirements. Planning to build postgraduate studies with high standard quality by preparing material requirements from laboratories and others and the scientific needs of researchers, in addition to researchers and supervisors who own a distinguished research line and global scientific publication.

173. **Program Mission**

The Biochemical academic staff pursues a multifaceted charge at the University of Baghdad. Our mission is to provide exceptional education and research opportunities in the field of Biochemical Engineering. We strive to cultivate a diverse and inclusive learning environment that fosters creativity, critical thinking, and innovation. Through our interdisciplinary approach, we aim to equip students with the knowledge, skills, and ethical values necessary to address the complex challenges of the modern world. As a Biochemical Engineering faculty, we uphold the highest standards of integrity, ethics, and social responsibility. Overall, our mission is to be a global leader in Biochemical Engineering education, research, and innovation, making a positive impact on the world by advancing knowledge, addressing challenges, and improving the quality of life for present and future generations.

174. **Program Objectives**

92. To optimize the design and operation of biochemical processes to maximize product yield, efficiency, and quality.

93. To prepare students for a wide variety of post-baccalaureate paths, including graduate school, professional training programs, or entry-level jobs in any area of biochemical Engineering.
94. To provide extensive hands-on training in production technology, statistical analysis, laboratory skills, and field techniques.
95. To provide thorough training in written and oral communication of scientific information.
96. To enrich students with opportunities for alternative education in the area of biochemical Engineering through undergraduate research, internships, and study abroad.
97. To design processes that are safe for operators, the environment, and the public.
98. To contribute to the advancement of biotechnology by developing new technologies, tools, and methods for improved bioprocesses.

175. Program Accreditation

N/A

176. Other external influences

N/A

177. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements				
College Requirements				
Department Requirements				
Summer Training				
Other				

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

178. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
٢٠٢٤-٢٠٢٣ / Third		Computer Applications in Biochemical using MATLAB/ SMULINK	1	2

179. Expected learning outcomes of the program	
Knowledge	
Learning Outcomes 1	A1. Understand the fundamental concepts and features of Simulink. A2. Familiarize with the Simulink environment, including the layout and tools. A3. Learn how to create and simulate basic Simulink models. A4. Explore different types of blocks and their functionalities in Simulink. A5. Gain proficiency in connecting blocks and creating signal paths in Simulink. A6. Understand how to use Simulink for modeling dynamic systems. A7. Learn how to incorporate MATLAB functions and scripts within Simulink models. A8. Explore techniques for parameterizing and configuring Simulink models. A9. Understand how to analyze simulation results and interpret model behavior. A10. Learn how to create and customize visualizations and plots in Simulink. A11. Explore advanced simulation techniques, including solver settings and model optimization. A12. Understand the use of Simulink for control system design and analysis. A13. Learn how to interface Simulink with external hardware and software. A14. Apply Simulink for real-time simulation and hardware-in-the-loop (HIL) testing. A15. Design and implement complex algorithms and systems using Simulink for practical applications.
Skills	
Learning Outcomes 2	B1. Understand the fundamental concepts and features of Simulink. B2. Execute basic tasks and commands within the Simulink environment. B3. Utilize Simulink to perform basic modeling and simulation tasks. B4. Navigate the Simulink interface and environment effectively.

	B5. Apply mathematical functions and operations within Simulink models. B6. Manipulate and manage signals, blocks, and subsystems in Simulink. B7. Create and customize visualizations and plots to analyze simulation results. B8. Implement control logic and conditional statements within Simulink models. B9. Utilize advanced Simulink features such as Stateflow and Simscape for modeling complex systems. B10. Implement data logging and visualization techniques to analyze simulation data. B11. Demonstrate proficiency in error handling and debugging techniques within Simulink. B12. Apply Simulink for dynamic system modeling and analysis. B13. Create simulations and models in Simulink for real-world engineering applications. B14. Collaborate effectively with a team to develop and integrate Simulink-based solutions. B15. Apply Simulink skills to solve practical problems in various engineering domains. B16. Design and implement efficient algorithms and control strategies using Simulink.
Ethics	
Learning Outcomes 3	C1. Gaining an understanding of the ethical considerations. C2. regulatory requirements associated with working in the field of biochemical engineering, particularly when dealing with bioprocess or conducting human research.

180. Teaching and Learning Strategies

In this course, various learning and teaching strategies can be employed to ensure an effective and engaging learning experience. Here are some these strategies:

- Lectures: Traditional lectures can be used to introduce key concepts, theories, and MATLAB functionalities relevant to biochemical engineering applications. Lectures can be enhanced with multimedia presentations, demonstrations, and real-life examples to make the content more accessible and relatable.

- Hands-on MATLAB Sessions: Practical sessions in computer labs or virtual environments provide students with opportunities to actively engage with MATLAB software. Students can work on MATLAB exercises and assignments related to biochemical engineering problems, allowing them to gain hands-on experience in applying MATLAB tools and techniques.
- Case Studies and Problem-Solving: Incorporating case studies and problem-solving exercises into the course helps students connect theoretical knowledge with real-world applications. By presenting them with biochemical engineering scenarios or challenges, students can analyze and solve problems using MATLAB, developing critical thinking and problem-solving skills.
- Group Projects: Collaborative group projects encourage teamwork, communication, and peer learning. Students can work in groups to tackle complex problems or develop MATLAB-based solutions for biochemical engineering problems. This approach promotes collaboration, fosters creativity, and exposes students to different perspectives.
- Online Resources and Support: Providing access to online resources, tutorials, and documentation on MATLAB tools specific to biochemical engineering can enhance students' learning experience. Online discussion forums and platforms can facilitate peer-to-peer support and knowledge sharing.
- Assessment and Feedback: Regular formative and summative assessments should be implemented to gauge students' understanding and progress. Assignments, quizzes, and exams can be designed to assess both theoretical knowledge and practical skills in using MATLAB for biochemical engineering applications. Timely feedback on students' work is crucial to guide their learning and help them improve.
- Continuous Evaluation: Continuous evaluation methods such as class participation, in-class exercises, HomeWorks and quizzes can be used to monitor students' progress throughout the course. This allows for early identification of any knowledge gaps or areas where students may need additional support.
- Integration of MATLAB in Biochemical Engineering Curriculum: Where appropriate, the use of MATLAB can be integrated into other biochemical engineering courses, allowing students to apply MATLAB tools in various domains such as process control, optimization,

and data analysis. This interdisciplinary approach reinforces the relevance and importance of MATLAB in the field of biochemical engineering.

181. Evaluation methods

Quizzes, mid-term exams, and assignments.

182. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Lecturer	Chemical Engineering	Chemical Engineering			Yes	Yes

Professional Development

Mentoring new faculty members

Professional development of faculty members

183. Acceptance Criterion

184. The most important sources of information about the program

1- Problem Solving in Chemical and Biochemical Engineering with POLYMATH, Excel, and MATLAB 2nd Edition, by Michael B. Cutlip

2- Al-Malah, Kamal I. M. 2014. MATLAB Numerical Methods with Chemical Engineering Applications. 1st ed. New York: McGraw-Hill Education.

56- Program Development Plan

- By staying updated with the latest developments in the engineering field

- Using modern technologies in teaching has the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4

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

Course Description Form

154.	Course Name:
	Computer Applications in Biochemical using MATLAB
155.	Course Code:
156.	Semester / Year:
	3rd / 2024
157.	Description Preparation Date: 28 -03- 2024
158.	Available Attendance Forms:
159.	Number of Credit Hours (Total) / Number of Units (Total)
	Weekly 3 hours (Total 45 hours)/ 3 units
160.	Course administrator's name (mention all, if more than one name)
	Name: Dr. Ameel Mohammed Al-Mayah Email: drameel@kecbu.uobaghdad.edu.iq
161.	Course Objectives
Course Objectives	A1. Understand the fundamental concepts and features of Simulink. A2. Familiarize with the Simulink environment, including the layout and tools. A3. Learn how to create and simulate basic Simulink models. A4. Explore different types of blocks and their functionalities in Simulink. A5. Gain proficiency in connecting blocks and creating signal paths in Simulink. A6. Understand how to use Simulink for modeling dynamic systems. A7. Learn how to incorporate MATLAB functions and scripts within Simulink models. A8. Explore techniques for parameterizing and configuring Simulink models. A9. Understand how to analyze simulation results and interpret model behavior. A10. Learn how to create and customize visualizations and plots in Simulink. A11. Explore advanced simulation techniques, including solver settings and model optimization. A12. Understand the use of Simulink for control system design and analysis.

	A13. Learn how to interface Simulink with external hardware and software. A14. Apply Simulink for real-time simulation and hardware-in-the-loop (HIL) testing. A15. Design and implement complex algorithms and systems using Simulink for practical applications.

162. Teaching and Learning Strategies

Strategy

In this course, various learning and teaching strategies can be employed to ensure an effective and engaging learning experience. Here are some these strategies:

- Lectures: Traditional lectures can be used to introduce key concepts, theories, and MATLAB functionalities relevant to biochemical engineering applications. Lectures can be enhanced with multimedia presentations, demonstrations, and real-life examples to make the content more accessible and relatable.
- Hands-on MATLAB Sessions: Practical sessions in computer labs or virtual environments provide students with opportunities to actively engage with MATLAB software. Students can work on MATLAB exercises and assignments related to biochemical engineering problems, allowing them to gain hands-on experience in applying MATLAB tools and techniques.
- Case Studies and Problem-Solving: Incorporating case studies and problem-solving exercises into the course helps students connect theoretical knowledge with real-world applications. By presenting them with biochemical engineering scenarios or challenges, students can analyze and solve problems using MATLAB, developing critical thinking and problem-solving skills.
- Group Projects: Collaborative group projects encourage teamwork, communication, and peer learning. Students can work in groups to tackle complex problems or develop MATLAB-based solutions for biochemical engineering problems. This approach promotes collaboration, fosters creativity, and exposes students to different perspectives.
- Online Resources and Support: Providing access to online resources, tutorials, and documentation on MATLAB tools specific to biochemical engineering can enhance students' learning experience. Online discussion

forums and platforms can facilitate peer-to-peer support and knowledge sharing.

- Assessment and Feedback: Regular formative and summative assessments should be implemented to gauge students' understanding and progress. Assignments, quizzes, and exams can be designed to assess both theoretical knowledge and practical skills in using MATLAB for biochemical engineering applications. Timely feedback on students' work is crucial to guide their learning and help them improve.
- Continuous Evaluation: Continuous evaluation methods such as class participation, in-class exercises, HomeWorks and quizzes can be used to monitor students' progress throughout the course. This allows for early identification of any knowledge gaps or areas where students may need additional support.
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-

163. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	A1-3, B1-3	**Introduction to MATLAB** • MATLAB environment and basic operations • Variables, arrays, and matrices in MATLAB • MATLAB functions and scripts File input/output in MATLAB/SIMULINK		

			Lab 1: • MATLAB environment and basic operations • Variables, arrays, and matrices in MATLAB/SIMULINK • MATLAB/SIMULINK functions and scripts File input/output in MATLAB		
2	3	A1-3, B1-3, C1	**Data Analysis and Visualization** • Importing and manipulating data in MATLAB/SIMULINK • Data visualization techniques (plotting, histograms, etc.) • Statistical analysis and hypothesis testing Advanced data visualization tools (2D and 3D plots) **Lab 2:** • Importing and manipulating data in MATLAB/SIMULINK • Data visualization techniques in MATLAB/SIMULINK		

			• Statistical analysis and hypothesis testing Advanced data visualization tools in MATLAB/SIMULINK		
3	3	A1-3, B1-3, C1	**Solution to Systems of Linear and Non-Linear Equations** • Solving systems of linear equations using MATLAB/SIMULINK • Non-linear equation solving techniques (Newton's method, Bisection method, etc.) • Optimization using MATLAB/SIMULINK 's optimization toolbox Applications in chemical engineering systems **Lab 3:** • Solution to Systems of Linear and Non-Linear Equations • Solving systems of linear equations using MATLAB/SIMULINK • Non-linear equation solving techniques in MATLAB/SIMULINK		

			• Optimization using MATLAB/SIMULINK 's optimization toolbox Applications in chemical engineering systems		
4	3	A1-4, B1-4, C1-2	**Numerical Solution of Differential Equations (ODEs)** • MATLAB/SIMULINK 's built-in ODE solvers • Numerical methods for ODEs (Euler's method, **Lab 4:** MATLAB's built-in ODE solvers Numerical methods for ODEs in MATLAB Modeling and simulating ODEs in Simulink		
5	3	A1-5, B1-5, C1-2	**Relational Operators, Conditional Statements & Loops** • Input/output operations in MATLAB/SIMULINK • Relational and logical operators in MATLAB • Conditional statements (if-else, switch-case) and loops (for, while) in MATLAB/SIMULINK Application of control flow structures in chemical engineering simulations		

			Lab 5: • Input/output operations in MATLAB/SIMULINK • Relational and logical operators in MATLAB/SIMULINK • Conditional statements and loops in MATLAB Application of control flow structures in chemical engineering simulations		
6	3	A1-6, B1-6, C1-2	**Numerical Solution of Partial Differential Equations** • Introduction to partial differential equations (PDEs) Simulating PDE-based phenomena in Simulink **Lab 6:** Simulating PDE-based phenomena in Simulink		
7	3	A1-6, B1-6, C1-2	**Solution of Nonlinear Equations** • Newton-Raphson method and other iterative techniques for nonlinear equations • MATLAB/SIMULINK 's symbolic toolbox for solving nonlinear equations		

			• Applications of nonlinear equation solving in chemical engineering Case studies and examples **Lab 7:** Newton-Raphson method for solving nonlinear equations Iterative techniques for solving nonlinear equations in MATLAB/SIMULINK MATLAB/SIMULINK's Applications of nonlinear equation solving in chemical engineering		
8	3	A1-8, B1-8, C1-2	**Interpolation, Differentiation, and Integration** • Interpolation techniques in MATLAB/SIMULINK (linear, polynomial, spline) • Numerical differentiation and integration methods • MATLAB/SIMULINK 's symbolic toolbox Applications in chemical engineering calculations **Lab 8:** Symbolic differentiation and integration in MATLAB/SIMULINK		
9	3	A1-9, B1-9, C1-3	**Simulink for Chemical Engineering Applications**		

			• Model parameterization, simulation, and analysis Control system design and implementation in Simulink **Lab 9:** • Simulink modeling techniques for chemical engineering systems Model parameterization, simulation, and analysis in Simulink		
10	3	A1-10, B1-10, C1-3	**Simulink for Chemical Engineering Applications** continue **Lab 10:** continue		
11	3	A1-11, B1-11, C1-4	**Simulink for Chemical Engineering Applications** Heat and mass transfer modeling using Simulink **Lab 11:** Heat and mass transfer modeling using Simulink		
12	3	A1-12, B1-12, C1-4	**Simulink for Chemical Engineering Applications** Reaction engineering simulations in Simulink **Lab 12:** Control system design and implementation in Simulink		
13	3	A1-13, B1-13, C1-4	**Simulink for Chemical Engineering Applications**		

			Process optimization using Simulink **Lab 13:** • Process optimization using Simulink Reaction engineering simulations in Simulink		
14	3	A1-14, B1-14, C1-4	**Simulink for Chemical Engineering Applications** Real-time simulation and control in Simulink **Lab 14:** Real-time simulation and control in Simulink		
15	3	A1-15, B1-15, C1-4	**Simulink for Chemical Engineering Applications** Project work and presentations incorporating Simulink **Lab 15:** Project work and presentations incorporating Simulink		

164. Course Evaluation

Quizzes, mid-term exams, and assignments

165. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Problem Solving in Chemical and Biochemical Engineering with POLYMATH, Excel, and MATLAB 2nd Edition, by Michael B. Cutlip
Main references (sources)	Al-Malah, Kamal I. M. 2014. MATLAB Numerical Methods with Chemical Engineering Applications. 1st ed. New York: McGraw-Hill Education.

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

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 academic programs and course descriptions to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a 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 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 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.

University Name: University of Baghdad

Faculty/Institute: AL-Khwarizmi College of Engineering

Scientific Department: Biochemical Engineering

Academic or Professional Program Name: B.Sc.

Final Certificate Name: B.Sc. in Biochemical Engineering

Academic System: Quarterly

Description Preparation Date: 28/3/2024

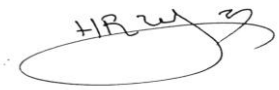
File Completion Date: 28/3/2024

Signature: 

Prof. Dr. Alaa Kareem Mohammed:

Head of Department Name:

Date:

Signature: 

Asst Prof. Dr. Hisham Hassan Jasim

Scientific Associate Name:

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature 

Approval of the Dean

185. **Program Vision**

The scientific department seeks to present academically, scientifically, and even practically in the local and international arena. The reliability of scientific laboratories is within national standards first and international standards second. Apply advanced studying and teaching systems and keep updated with the latest developments in this field, especially e-learning. Furthermore, studying recent experiences in education and working on applying them in line with the changing standards of scientific and practical requirements. Planning to build postgraduate studies with high standard quality by preparing material requirements from laboratories and others and the scientific needs of researchers, in addition to researchers and supervisors who own a distinguished research line and global scientific publication.

186. **Program Mission**

The Biochemical academic staff pursues a multifaceted charge at the University of Baghdad. Our mission is to provide exceptional education and research opportunities in the field of Biochemical Engineering. We strive to cultivate a diverse and inclusive learning environment that fosters creativity, critical thinking, and innovation. Through our interdisciplinary approach, we aim to equip students with the knowledge, skills, and ethical values necessary to address the complex challenges of the modern world. As a Biochemical Engineering faculty, we uphold the highest standards of integrity, ethics, and social responsibility. Overall, our mission is to be a global leader in Biochemical Engineering education, research, and innovation, making a positive impact on the world by advancing knowledge, addressing challenges, and improving the quality of life for present and future generations.

187. **Program Objectives**

99. To optimize the design and operation of biochemical processes to maximize product yield, efficiency, and quality.
100. To prepare students for a wide variety of post-baccalaureate paths, including graduate school, professional training programs, or entry-level jobs in any area of biochemical Engineering.
101. To provide extensive hands-on training in production technology, statistical analysis, laboratory skills, and field techniques.
102. To provide thorough training in written and oral communication of scientific information.
103. To enrich students with opportunities for alternative education in the area of biochemical Engineering through undergraduate research, internships, and study abroad.
104. To design processes that are safe for operators, the environment, and the public.

105. To contribute to the advancement of biotechnology by developing new technologies, tools, and methods for improved bioprocesses.

188. Program Accreditation

N/A

189. Other external influences

N/A

190. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements				
College Requirements				
Department Requirements				
Summer Training				
Other				

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

191. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
٢٠٢٣-٢٠٢٤ / fourth		Engineering management	3	N/A

192. Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	A1. Students will develop a solid understanding of the Engineering management processes. A2. Students will be proficient in developing Engineering management of biochemical processes. A3. Students will learn how to analyze the stability, controllability, and observability of Engineering management principles. A4. Students will be able to analyze Engineering management criteria.

	A5. Students will gain knowledge and skills in Engineering management systems for biochemical processes. A6. Students will learn techniques Engineering management Cost Assessments. A7. Students will develop the ability to apply the concepts and techniques learned in the Engineering management biochemical engineering problems (Cost Assessments).
Skills	
Learning Outcomes 2	B1. Ability to Engineering management in bio chemical project design. B2. Skills to design and conduct experiments in the area of Engineering Management training. B3. Ability to innovate and improve processes of transformation of matter. B4. Ability to work effectively in specialized and/or multidisciplinary terms, in diverse cultural environments. B5. Ability to solve biochemical engineering problems using engineering tools available. B6. Responsible behavior in socio-ethical and professional environments.
Ethics	
Learning Outcomes 3	C1. Gaining an understanding of the ethical considerations. C2. Regulatory requirements associated with working in the field of biochemical engineering, particularly when dealing with bioprocess or conducting human research.

193. Teaching and Learning Strategies

The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations.

The second goal is to invite industry professionals or guest speakers who have expertise in Engineering management to deliver lectures or share their experiences. This offers students valuable insights into real-world applications and challenges, bridging the gap between academia and industry

194. Evaluation methods

Quizzes, mid-term exams, assignments, and seminars.

195. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Lecture	Chemical Engineering	Bioprocess Engineering			yes	

Professional Development

Mentoring new faculty members

Professional development of faculty members

196. Acceptance Criterion

197. The most important sources of information about the program

57- Textbooks.
58- Internet Sources.
59- Researches, Papers
60- Corresponding international universities

61- Program Development Plan

- By staying updated with the latest developments in the engineering field
- Using modern technologies in teaching has the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4

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

Course Description Form

166.	Course Name:
	Engineering management
167.	Course Code:
168.	Semester / Year:
	4th Semester / 2024
169.	Description Preparation Date: 30 -3 - 2024
170.	Available Attendance Forms:
171.	Number of Credit Hours (Total) / Number of Units (Total)
	Weekly 2 hours (Total 30 hours)/ 2 units
172.	Course administrator's name (mention all, if more than one name)
	Name: Lecture : Ramzi Ata Abd Alsaheb Email: ramzi.a@kecbu.uobaghdad.edu.iq
173.	Course Objectives
Course Objectives	24. Students should be able to develop principles that describe the Engineering management of biochemical processes 25. Students should understand the time response of engineering management to changes in inputs and disturbances in world markets. 26. Students should learn techniques for Engineering management that can regulate and optimize the operation of biochemical processes
174.	Teaching and Learning Strategies
Strategy	The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations. The second goal is to invite industry professionals or guest speakers who have exper in process dynamics to deliver lectures or share their experiences. This offers stude valuable insights into real-world applications and challenges, bridging the gap betw academia and industry.
175. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	A1-2	Engineering management concept		
2	3	A1-5, B2, C1	Defining project scope: step by step guide		
3	3	A1, A2, A7, B2	Engineering management project		
4	3	A1-7, B1-3, C1-2	Engineering management cost		
5	3	A1-7, B1-3, C1-2	Cost Process		
6	3	A1-7, B1-3, C1-2	How to develop a project plan, including scoping, sequencing tasks, and determining a critical path		
7	3	A1-7, B1-3, C1-2	Cost assessment		
8	3	A1-7, B1-3, C1-2	Feasibility		
9	3	A1-7, B1-3, C1-2	Validation project process		
10	3	A1-7, B1-3, C1-2	R& D in Engineering management project		
11	3	A1-7, B1-3, C1-2	Modular concept design project		
12	3	A1-7, B1-3, C1-2	Biohazard in biochemical project		
13	3	A1-7, B1-3, C1-2	The Difference between Risks and Issues in Project Management		
14	3	A1-7, B1-3, C1-2	the ability and skill to prepare and review a project charter before the start of a project		
15	3	A1-7, B1-3, C1-2	Marketing		

176. Course Evaluation

Quizzes, mid-term exams, assignments and seminar

177. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Fundamentals of Engineering Management, A K Gupta,2014
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	https://www.careers360.com/courses/engineering-management-course

Ministry of Higher Education and Scientific Research
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Accreditation Department

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2024

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University Name: University of Baghdad

Faculty/Institute: AL-Khwarizmi College of Engineering

Scientific Department: Biochemical Engineering

Academic or Professional Program Name: B.Sc.

Final Certificate Name: B.Sc. in Biochemical Engineering

Academic System: Quarterly

Description Preparation Date: 28/3/2024

File Completion Date: 28/3/2024

Signature: 

Prof. Dr. Alaa Kareem Mohammed:

Head of Department Name:

Date:

Signature:

Asst Prof. Dr. Hisham Hassan Jasim

Scientific Associate Name:

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature 

Approval of the Dean

198. **Program Vision**

The scientific department seeks to present academically, scientifically, and even practically in the local and international arena. The reliability of scientific laboratories is within national standards first and international standards second. Apply advanced studying and teaching systems and keep updated with the latest developments in this field, especially e-learning. Furthermore, studying recent experiences in education and working on applying them in line with the changing standards of scientific and practical requirements. Planning to build postgraduate studies with high standard quality by preparing material requirements from laboratories and others and the scientific needs of researchers, in addition to researchers and supervisors who own a distinguished research line and global scientific publication.

199. **Program Mission**

The Biochemical academic staff pursues a multifaceted charge at the University of Baghdad. Our mission is to provide exceptional education and research opportunities in the field of Biochemical Engineering. We strive to cultivate a diverse and inclusive learning environment that fosters creativity, critical thinking, and innovation. Through our interdisciplinary approach, we aim to equip students with the knowledge, skills, and ethical values necessary to address the complex challenges of the modern world. As a Biochemical Engineering faculty, we uphold the highest standards of integrity, ethics, and social responsibility. Overall, our mission is to be a global leader in Biochemical Engineering education, research, and innovation, making a positive impact on the world by advancing knowledge, addressing challenges, and improving the quality of life for present and future generations.

200. **Program Objectives**

106. To optimize the design and operation of biochemical processes to maximize product yield, efficiency, and quality.
107. To prepare students for a wide variety of post-baccalaureate paths, including graduate school, professional training programs, or entry-level jobs in any area of biochemical Engineering.
108. To provide extensive hands-on training in production technology, statistical analysis, laboratory skills, and field techniques.
109. To provide thorough training in written and oral communication of scientific information.
110. To enrich students with opportunities for alternative education in the area of biochemical Engineering through undergraduate research, internships, and study abroad.
111. To design processes that are safe for operators, the environment, and the public.
112. To contribute to the advancement of biotechnology by developing new technologies, tools, and methods for improved bioprocesses.

201. **Program Accreditation**

N/A

202. **Other external influences**
N/A

203. **Program Structure**

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements				
College Requirements				
Department Requirements				
Summer Training				
Other				

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

204. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
٢٠٢٤-٢٠٢٣ / Second		Fluid Flow I	3	N/A

205. Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	A1. Students will develop a solid understanding of the dynamic behavior of chemical processes. A2. Students will be proficient in developing mathematical models that describe the dynamic behavior of chemical processes. A3. Students will learn how to analyze the stability, controllability, and observability of dynamic systems. A4. Students will be able to analyze the time response of chemical processes. A5. Students will gain knowledge and skills in designing control systems for chemical processes. A6. Students will learn techniques for optimizing the performance of chemical processes.

	A7. Students will develop the ability to apply the concepts and techniques learned in the module to real-world chemical engineering problems.
Skills	
Learning Outcomes 2	B1. Ability to apply mathematics to model and solve biochemical engineering processes. B2. Skills to design and conduct experiments in the area of biochemical engineering training. B3. Ability to innovate and improve processes of transformation of matter. B4. Ability to work effectively in specialized and/or multidisciplinary terms, in diverse cultural environments. B5. Ability to solve biochemical engineering problems using engineering tools available. B6. Responsible behavior in socio-ethical and professional environments.
Ethics	
Learning Outcomes 3	C1. Gaining an understanding of the ethical considerations. C2. regulatory requirements associated with working in the field of biochemical engineering, particularly when dealing with bioprocess or conducting human research.

206. Teaching and Learning Strategies

The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations.

The second goal is to invite industry professionals or guest speakers who have expertise in process dynamics to deliver lectures or share their experiences. This offers students valuable insights into real-world applications and challenges, bridging the gap between academia and industry

207. Evaluation methods

Quizzes, mid-term exams, assignments, and seminars.

208. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	Chemical Engineering	Chemical Engineering			yes	

Professional Development

Mentoring new faculty members

Professional development of faculty members

209. Acceptance Criterion

210. The most important sources of information about the program

62- Textbooks.
63- Internet Sources.
64- Researches, Papers
65- Corresponding international universities

66- Program Development Plan

- By staying updated with the latest developments in the engineering field
- Using modern technologies in teaching has the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4

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

Course Description Form

178.	Course Name:
	Fluid Flow I
179.	Course Code:
180.	Semester / Year:
	2nd Semester / 2024
181.	Description Preparation Date: 30 -3 - 2024
182.	Available Attendance Forms:
183.	Number of Credit Hours (Total) / Number of Units (Total)
	Weekly 3 hours (Total 45 hours)/ 3 units
184.	Course administrator's name (mention all, if more than one name)
	Name: Dr. Mohammed A. Atiya Email: atiya@kecbu.uobaghdad.edu.iq
185.	Course Objectives
Course Objectives	27. The study of fluid dynamics encompasses a spectrum of fundamental principles crucial for understanding the behavior of liquids and gases. 28. It delves into the intricate mechanics governing the movement and flow of fluids, shedding light on both static and dynamic states 29. the foundational properties of fluids, learners navigate through the nuances of fluid behavior at rest and in motion, exploring the forces at play between fluids and their surrounding surfaces. 30. How to formulate the parameters in Fluid flow in empirical relations.
186.	Teaching and Learning Strategies
Strategy	• Demonstrate the knowledge and understanding of the fundamental concepts, principles and theories of heat Transfer with core knowledge in fluid flow. • The ability to logically describe the algorithm necessary to solve fluid flow problems. • The ability to determine the size of pumps and pipe diameters according to the amount of fluid transported. • The ability to solve in different conditions of pressure and flow rate.

187. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	A1-2	Introduction	Lecture & Tutorial	Quizzes , Homework & seminar
2	3	B1, C1	Physical properties (density ,viscosity ect.)	Lecture & Tutorial	Quizzes , Homework & seminar
3	3	A1, A2, A7, B2	Static Pressure	Lecture & Tutorial	Quizzes , Homework & seminar
4	3	A1-7, B1-3, C1-2	Types of flow	Lecture & Tutorial	Quizzes , Homework & seminar
5	3	A1-7, B1-3, C1-2	Velocity Distribution in laminar flow	Lecture & Tutorial	Quizzes , Homework & seminar
6	3	A1-7, B1-3, C1-2	Velocity Distribution in Turbulent flow	Lecture & Tutorial	Quizzes , Homework & seminar
7	3	A1-7, B1-3, C1-2	Flow device measurements	Lecture & Tutorial	Quizzes , Homework & seminar
8	3	A1-7, B1-3, C1-2	Dimensional Analysis	Lecture & Tutorial	Quizzes , Homework & seminar
9	3		Mid Exam 1		
10	3	A1-7, B1-3, C1-2	Dimensional Analysis	Lecture & Tutorial	Quizzes , Homework & seminar
11	3	A1-7, B1-3, C1-2	Bernoulli Equation	Lecture & Tutorial	Quizzes , Homework & seminar
12	3	A1-7, B1-3, C1-2	Bernoulli Equation	Lecture & Tutorial	Quizzes , Homework & seminar
13	3	A1-7, B1-3, C1-2	Modified Bernoulli Equation	Lecture & Tutorial	Quizzes , Homework & seminar
14	3	A1-7, B1-3, C1-2	Modified Bernoulli Equation	Lecture & Tutorial	Quizzes , Homework & seminar
15	3		Mid Exam 2		

188. Course Evaluation

Quizzes, mid-term exams, assignments and seminar

189. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Fluid Flow for Chemical Engineers Second edition Professor F. A. Holland,1995.

Main references (sources)	R. W. Fox and A. T. McDonald, "Introduction to fluid mechanics", 5th. Ed., John Wiley & Sons, 1998.
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	https://www.academia.edu/38013125/Pritchard_Fox_McDonalds

Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
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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 academic programs and course descriptions to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a 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 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 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.

University Name: University of Baghdad
Faculty/Institute: AL-Khwarizmi College of Engineering
Scientific Department: Biochemical Engineering
Academic or Professional Program Name: B.Sc.
Final Certificate Name: B.Sc. in Biochemical Engineering
Academic System: Quarterly
Description Preparation Date: 28/3/2024
File Completion Date: 28/3/2024

Signature:

Prof. Dr. Alaa Kareem Mohammed:
Head of Department Name:

Date:

Signature:

Asst Prof. Dr. Hisham Hassan Jasim
Scientific Associate Name:

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature

Approval of the Dean

211. **Program Vision**

The scientific department seeks to present academically, scientifically, and even practically in the local and international arena. The reliability of scientific laboratories is within national standards first and international standards second. Apply advanced studying and teaching systems and keep updated with the latest developments in this field, especially e-learning. Furthermore, studying recent experiences in education and working on applying them in line with the changing standards of scientific and practical requirements. Planning to build postgraduate studies with high standard quality by preparing material requirements from laboratories and others and the scientific needs of researchers, in addition to researchers and supervisors who own a distinguished research line and global scientific publication.

212. **Program Mission**

The Biochemical academic staff pursues a multifaceted charge at the University of Baghdad. Our mission is to provide exceptional education and research opportunities in the field of Biochemical Engineering. We strive to cultivate a diverse and inclusive learning environment that fosters creativity, critical thinking, and innovation. Through our interdisciplinary approach, we aim to equip students with the knowledge, skills, and ethical values necessary to address the complex challenges of the modern world. As a Biochemical Engineering faculty, we uphold the highest standards of integrity, ethics, and social responsibility. Overall, our mission is to be a global leader in Biochemical Engineering education, research, and innovation, making a positive impact on the world by advancing knowledge, addressing challenges, and improving the quality of life for present and future generations.

213. **Program Objectives**

113. To optimize the design and operation of biochemical processes to maximize product yield, efficiency, and quality.
114. To prepare students for a wide variety of post-baccalaureate paths, including graduate school, professional training programs, or entry-level jobs in any area of biochemical Engineering.
115. To provide extensive hands-on training in production technology, statistical analysis, laboratory skills, and field techniques.
116. To provide thorough training in written and oral communication of scientific information.
117. To enrich students with opportunities for alternative education in the area of biochemical Engineering through undergraduate research, internships, and study abroad.
118. To design processes that are safe for operators, the environment, and the public.

119. To contribute to the advancement of biotechnology by developing new technologies, tools, and methods for improved bioprocesses.

214. Program Accreditation

N/A

215. Other external influences

N/A

216. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements				
College Requirements				
Department Requirements				
Summer Training				
Other				

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

217. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
٢٠٢٤-٢٠٢٣ / Second		Fluid Flow II	3	N/A

218. Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	A1. Students will develop a solid understanding of the dynamic behavior of chemical processes. A2. Students will be proficient in developing mathematical models that describe the dynamic behavior of chemical processes. A3. Students will learn how to analyze the stability, controllability, and observability of dynamic systems. A4. Students will be able to analyze the time response of chemical

	processes. A5. Students will gain knowledge and skills in designing control systems for chemical processes. A6. Students will learn techniques for optimizing the performance of chemical processes. A7. Students will develop the ability to apply the concepts and techniques learned in the module to real-world chemical engineering problems.
Skills	
Learning Outcomes 2	B1. Ability to apply mathematics to model and solve biochemical engineering processes. B2. Skills to design and conduct experiments in the area of biochemical engineering training. B3. Ability to innovate and improve processes of transformation of matter. B4. Ability to work effectively in specialized and/or multidisciplinary terms, in diverse cultural environments. B5. Ability to solve biochemical engineering problems using engineering tools available. B6. Responsible behavior in socio-ethical and professional environments.
Ethics	
Learning Outcomes 3	C1. Gaining an understanding of the ethical considerations. C2. regulatory requirements associated with working in the field of biochemical engineering, particularly when dealing with bioprocess or conducting human research.

219. Teaching and Learning Strategies

The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations.

The second goal is to invite industry professionals or guest speakers who have expertise in process dynamics to deliver lectures or share their experiences. This offers students valuable insights into real-world applications and challenges, bridging the gap between academia and industry

220. Evaluation methods

Quizzes, mid-term exams, assignments, and seminars.

221. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	Chemical Engineering	Chemical Engineering			yes	

Professional Development

Mentoring new faculty members

Professional development of faculty members

222. Acceptance Criterion

223. The most important sources of information about the program

67- Textbooks.
68- Internet Sources.
69- Researches, Papers
70- Corresponding international universities

71- Program Development Plan

- By staying updated with the latest developments in the engineering field
- Using modern technologies in teaching has the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4

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

Course Description Form

190.	Course Name:
	Fluid Flow II
191.	Course Code:
192.	Semester / Year:
	2nd Semester / 2024
193.	Description Preparation Date: 30 -3 - 2024
194.	Available Attendance Forms:
195.	Number of Credit Hours (Total) / Number of Units (Total)
	Weekly 3 hours (Total 45 hours)/ 3 units
196.	Course administrator's name (mention all, if more than one name)
	Name: Dr. Mohammed A. Atiya Email: atiya@kecbu.uobaghdad.edu.iq
197.	Course Objectives
Course Objectives	31. the curriculum ventures into compressible flow principles, equipping students with the knowledge to engineer nozzles and comprehend their diverse functionalities. 32. Furthermore, a comprehensive understanding of fluid mixing principles is imparted, enabling students to discern the characteristics of fluid mixtures with precision. 33. Pipe network 34. Types & selection the appropriate pumps in industrial. 35. Design most of the pumps in the biochemical engineering. 36. Design most of the mixing tanks in the biochemical engineering
198.	Teaching and Learning Strategies
Strategy	• students are introduced to the intricacies of designing pipe networks, from the intricacies of pumping systems to the intricacies of connecting pipes and their various components. The ability to logically describe the algorithm necessary to solve fluid flow problems. • The ability to determine the size of pumps and pipe diameters according to the amount of fluid transported.

	• The ability to design the pumps & mixing tanks in different conditions of pressure and flow rate.

199. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	A1-2	Introduction	Lecture & Tutorial	Quizzes , Homework & seminar
2	3	B1, C1	Types of pumps	Lecture & Tutorial	Quizzes , Homework & seminar
3	3	A1, A2, A7, B2	Centrifugal Pump	Lecture & Tutorial	Quizzes , Homework & seminar
4	3	A1-7, B1-3, C1-2	Types of pipe and valves	Lecture & Tutorial	Quizzes , Homework & seminar
5	3	A1-7, B1-3, C1-2	Modified Bernoulli Equation	Lecture & Tutorial	Quizzes , Homework & seminar
6	3	A1-7, B1-3, C1-2	Pumps in Series	Lecture & Tutorial	Quizzes , Homework & seminar
7	3	A1-7, B1-3, C1-2	Pumps in parallel	Lecture & Tutorial	Quizzes , Homework & seminar
8	3	A1-7, B1-3, C1-2	Operating system curves	Lecture & Tutorial	Quizzes , Homework & seminar
9	3		Mid Exam 1		
10	3	A1-7, B1-3, C1-2	Introduction to the mixing	Lecture & Tutorial	Quizzes , Homework & seminar
11	3	A1-7, B1-3, C1-2	Types of Mixing	Lecture & Tutorial	Quizzes , Homework & seminar
12	3	A1-7, B1-3, C1-2	Selection of mixing type	Lecture & Tutorial	Quizzes , Homework & seminar
13	3	A1-7, B1-3, C1-2	Power of mixing	Lecture & Tutorial	Quizzes , Homework & seminar
14	3	A1-7, B1-3, C1-2	Mixing tank design	Lecture & Tutorial	Quizzes , Homework & seminar
15	3		Mid Exam 2		

200. Course Evaluation

Quizzes, mid-term exams, assignments and seminar

201. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Fluid Flow for Chemical Engineers Second edition Professor F. A. Holland,1995.
Main references (sources)	R. W. Fox and A. T. McDonald, "Introduction to fluid mechanics", 5th. Ed., John Wiley & Sons, 1998.
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	https://www.academia.edu/38013125/Pritchard_Fox_McDonalds

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

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Scientific Department: Biochemical Engineering

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Final Certificate Name: B.Sc. in Biochemical Engineering

Academic System: Quarterly

Description Preparation Date: 28/3/2024

File Completion Date: 28/3/2024

Signature:

Prof. Dr. Alaa Kareem Mohammed:

Head of Department Name:

Date:

Signature:

Asst Prof. Dr. Hisham Hassan Jasim

Scientific Associate Name:

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature

Approval of the Dean

224. Program Vision

The program vision would strive to create graduates who are not just well-versed in the intricate details of biochemistry, but who can also creatively apply their knowledge to solve critical problems at the interface of biochemistry and technology, fostering a future of innovation and improvement of the technologies in the field of Biochemical Engineering that have a positive impact on the world. The scientific department also seeks to present academically, scientifically, and even practically in the local and international arena. All that done by applying advanced studying and teaching systems and keep updated with the latest developments in this field also planning to build postgraduate studies with high standard quality. Furthermore, studying recent experiences in education and working on applying them in line with the changing standards of scientific and practical requirements.

225. Program Mission

The Biochemical academic staff pursues a multifaceted charge by providing exceptional education and research opportunities in the field of Biochemical Engineering. We strive to cultivate a diverse and inclusive learning environment that fosters creativity, critical thinking, and innovation. Through our interdisciplinary approach, we aim to equip students with the knowledge, skills, and ethical values necessary to address the complex challenges of the modern world. As a Biochemical Engineering faculty, we uphold the highest standards of integrity, ethics, and social responsibility. Overall, the mission statement is clear, concise, and action-oriented, reflecting the program's intent to produce graduates who can make a positive impact on the real world by making advancing knowledge, addressing challenges, merging the power of biochemistry with engineering principles, and improving the quality of life for present and future generations. Our mission is to be a leader in Biochemical Engineering education, research, and innovation.

226. Program Objectives

120. To optimize the design and operation of biochemical processes to maximize product yield, efficiency, and quality.
121. To prepare students for a wide variety of post-baccalaureate paths, including graduate school, professional training programs, or entry-level jobs in any area of biochemical Engineering.
122. To provide extensive hands-on training in production technology, statistical analysis, laboratory skills, and field techniques.
123. To provide thorough training in written and oral communication of scientific information.
124. To enrich students with opportunities for alternative education in the area of biochemical Engineering through undergraduate research, internships, and study abroad.
125. To design processes that are safe for operators, the environment, and the public.
7. To contribute to the advancement of biotechnology by developing new technologies, tools, and methods for improved bioprocesses.

227. **Program Accreditation**
N/A
228. **Other external influences**
N/A

229. **Program Structure**				
Program Structure	**Number of Courses**	**Credit hours**	**Percentage**	**Reviews***
Institution Requirements				
College Requirements				
Department Requirements				
Summer Training				
Other				

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

230. **Program Description**				
Year/Level	**Course Code**	**Course Name**	**Credit Hours**	
			theoretical	**practical**
٢٠٢٤-٢٠٢٣ / Second	**302BCBC**	**Biochemistry**	**4**	**2**

231. **Expected learning outcomes of the program**	
Knowledge	
Learning Outcomes 1	A1. Students would learn the fundamental principles of biochemistry and equip them with engineering skills to design, develop, and implement processes that utilize biological systems for beneficial applications. A2. **Basic Recognition:** The student will be able to identify the four major biomolecule classes (carbohydrates, proteins, lipids, nucleic acids) and know the reaction for every class. A3. **Distinguishing Features:** The student would learn to differentiate between The four classes based on broad characteristics like struct., function & etc. A4. **Building Blocks:** The student will be able to build a comprehensive understanding of the building blocks of biochemistry and their significance in living organisms for each biomolecule class (monosaccharides, amino acids, fatty acid, nucleotides) and its reactions.

	A5. Students will be proficient in developing three dimension models that describe the sequences of amino acid in proteins. A6. **Structure-Function Relationship:** The student can recognize the basic principle that the arrangement of atoms and functional groups within a molecule that influences its shape and function and can explain how they contribute to the overall properties of biomolecules. A7. **Impact of Modifications:** The student understands how modifications to a biomolecule's structure can alter its function.
Skills	
Learning Outcomes 2	B1. Ability to understand the basics of Biochemistry, which includes classifications, functions, reactions, equations, chemical calculations, isomers, derivatives, shapes and structures of each type. B2. A special focus on developing skills in actual independent work in the laboratory. B3. Developing self-possession through the numerous exams for the subjects of the course. B4. Ability to apply mathematics to solve problems in Biochemistry. B5. Ability to Interpret data from various sources like chromatography or spectroscopy to identify and characterize biomolecules B6. Ability to work effectively in specialized and/or multidisciplinary terms, in diverse cultural environments. B7. Ability to practice visualizing how different biomolecules might interact based on their shapes and functional groups. This could involve lipids forming bilayers in membranes.
Ethics	
Learning Outcomes 3	C1. Gaining an understanding of the ethical considerations. C2. regulatory requirements associated with working in the field of biochemical engineering, particularly when dealing with bioprocess or conducting human research.

232. Teaching and Learning Strategies

The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations.

The second goal is to invite industry professionals or guest speakers who have expertise in process dynamics to deliver lectures or share their experiences. This offers students valuable insights into real-world applications and challenges, bridging the gap between academia and industry

233. Evaluation methods

Quizzes, mid-term exams, homework, laboratory reports ,assignments, and seminars.

234. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Lecture	General Chemistry	Analytical Chemistry			Yes	

Professional Development

Mentoring new faculty members

Professional development of faculty members

235. Acceptance Criterion

236. The most important sources of information about the program

72- Textbooks.
73- Internet Sources.
74- Researches, Papers
75- Corresponding international universities.
76- video lectures

237. Program Development Plan

- By staying updated with the latest developments in the engineering field
- Using modern technologies in teaching has the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
٢٠٢٤-٢٠٢٣ / Second	302BCBC	Biochemistry	basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

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

Course Description Form

202. Course Name:	
Biochemistry	
203. Course Code:	
302BCBC	
204. Semester / Year:	
2nd Semester / 2024	
205. Description Preparation Date:	
28 /3 /2024	
206. Available Attendance Forms:	
207. Number of Credit Hours (Total) / Number of Units (Total)	
Weekly 6 hours (Total 90 hours)/ 3 units	
208. Course administrator's name (mention all, if more than one name)	
Name: Salwa Shamran Jasim Email: salua@kecbu.uobaghdad.edu.iq	
209. Course Objectives	
Course Objectives	• Gain a solid understanding of the four major biomolecules. This includes their structures, functions, and how they interact with each other. • Students will be proficient in learning the calculations that describe different operations in Biochemistry. • Refine laboratory skills through practical exercises involving techniques like protein purification, and spectroscopy. • Enhance scientific communication by effectively presenting and interpreting biochemical data through written reports and presentations. • Explore the latest advancements in biochemical research techniques and their applications • Understand how biochemical knowledge is applied in fields like medicine, biotechnology, and nutrition.
210. Teaching and Learning Strategies	
Strategy	The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations. The second goal is to invite industry professionals or guest speakers who have expertise in process dynamics to deliver lectures or share their experiences.

	This offers students valuable insights into real-world applications and challenges, bridging the gap between academia and industry

211. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	6	A1, B1, B2	1- Theoretical: Introduction to biochemistry 2. Practical: Molish test		
2	6	A1-3, B1,B2, C1	1- monosaccharides & cyclic sugars 2 - Tromer test		
3	6	A1-3, B2	1- Mutarotation of carbohydrate & Stereoisomers 2- Picric acid test		
4	6	A3, A4, B1-4, C1-2	1- reactions of sugars + Solved Problems of carbohydrate 2- Iodide test		
5	6	A4-7, B1-3, C1-2	1- Important sugars& polysaccharides 2- Biuret test		
6	6	A1-7, B1-3, C1-2	1- proteins functions &amino acids 2- Protein precipitation test		
7	6	A1-4, B1-3, C1-2	1- Stereoisomers of Proteins & Titration of amino acids 2- Alkali labile sulpher test		
8	6	A4-7, B1-3, C1-2	1- sequences of amino acids in Proteins & nonstandard amino acids 2- lipid test		
9	6	A1-7, B1-4, C1-2	1- Three-dimension structure of Proteins & its conformation + Solved Problems of Proteins 2. Iodine test		
10	6	A1-4, B1-5, C1-2	1- Fibrous and Globular Proteins & formation of peptide chain 2- Spectrophotometer of amino acid		
11	6	A2, B1-5, C1-2	1- Denaturation & Chemical reactions of peptides 2- Copper acetate test		
12	6	A4-6, B1-3, B7,C1-2	1- Fatty acid & Fat classification 2- Salkoviski test		
13	6	A1-7, B1-4, B7,C1-2	1- Chemical reaction and physical properties of fatty acids 2- Lieberman test		

14	6	A1-7, B1-4, B7,C1-2	1- Isomerism of F.A +- Simple Lipids + Solved Problems of lipid 2- lipid extraction		
15	6	A1-4, B1-7, C1-2	1- Compound & Derived lipids 2- Mid exam		

1. Course Evaluation

Quizzes, mid-term exams, assignments and seminar

2. Learning and Teaching Resources

Required textbooks (curricular books, if any)	❖ ***Owen McDougal, Volume II; 27 December 2023. Richard Steiner, Chris Saunders. Essentials of Chemistry: General, Organic, and Biochemistry.***
Main references (sources)	❖ ***Tapeshwar Yadav, Raksha Rimal ; 1st Edition; May 2021; Essential Textbook of Biochemistry and Microbiology.*** ❖ ***Rodney F. Boyer; 2nd Edition; Jul 31; 2015;*** • ***Biochemistry Laboratory - Modern Theory and Techniques.*** •
Recommended books and references (scientific journals, reports...)	• ***Thirunahari Ugandhar, Uppu Anitha Devi, Vasam srinivas,Mallaram Aruna; September 2023; Fundamentals of Bio chemistry***
Electronic References, Websites	❖ https://youtu.be/JxK5rZxbyQY ❖ https://youtu.be/TDFbtEwbmz0

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Scientific Associate Name:

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The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature

Approval of the Dean

238. **Program Vision**

The scientific department seeks to present academically, scientifically, and even practically in the local and international arena. The reliability of scientific laboratories is within national standards first and international standards second. Apply advanced studying and teaching systems and keep updated with the latest developments in this field, especially e-learning. Furthermore, studying recent experiences in education and working on applying them in line with the changing standards of scientific and practical requirements. Planning to build postgraduate studies with high standard quality by preparing material requirements from laboratories and others and the scientific needs of researchers, in addition to researchers and supervisors who own a distinguished research line and global scientific publication.

239. **Program Mission**

The Biochemical academic staff pursues a multifaceted charge at the University of Baghdad. Our mission is to provide exceptional education and research opportunities in the field of Biochemical Engineering. We strive to cultivate a diverse and inclusive learning environment that fosters creativity, critical thinking, and innovation. Through our interdisciplinary approach, we aim to equip students with the knowledge, skills, and ethical values necessary to address the complex challenges of the modern world. As a Biochemical Engineering faculty, we uphold the highest standards of integrity, ethics, and social responsibility. Overall, our mission is to be a global leader in Biochemical Engineering education, research, and innovation, making a positive impact on the world by advancing knowledge, addressing challenges, and improving the quality of life for present and future generations.

240. **Program Objectives**

126. To optimize the design and operation of biochemical processes to maximize product yield, efficiency, and quality.
127. To prepare students for a wide variety of post-baccalaureate paths, including graduate school, professional training programs, or entry-level jobs in any area of biochemical Engineering.
128. To provide extensive hands-on training in production technology, statistical analysis, laboratory skills, and field techniques.
129. To provide thorough training in written and oral communication of scientific information.
130. To enrich students with opportunities for alternative education in the area of biochemical Engineering through undergraduate research, internships, and study abroad.
131. To design processes that are safe for operators, the environment, and the public.

132.To contribute to the advancement of biotechnology by developing new technologies, tools, and methods for improved bioprocesses.

241. Program Accreditation

N/A

242. Other external influences

N/A

243. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements				
College Requirements				
Department Requirements				
Summer Training				
Other				

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

244. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	Practical
٢٠٢٤-٢٠٢٣ / Second		Principles of Biochemical engineering	3	N/A

245. Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	A1. Understanding of fundamental principles: Students will gain knowledge of key concepts in biochemical engineering, including microbial metabolism, enzyme kinetics, and bioreactor design. A2. Application of theoretical principles: Students will be able to apply theoretical knowledge to analyze and design bioprocesses for the production of biochemicals, pharmaceuticals, and biofuels.

	A3. Proficiency in laboratory techniques: Students will develop practical skills in laboratory techniques commonly used in biochemical engineering, such as cell culture, fermentation, and downstream processing. A4. Problem-solving skills: Students will learn to identify and solve engineering problems related to bioprocess design, optimization, and troubleshooting. A5. Knowledge of industry practices: Students will acquire an understanding of current industry practices and regulatory requirements in biochemical engineering, preparing them for careers in biotechnology and pharmaceutical industries. A6. Critical thinking and evaluation: Students will develop the ability to critically evaluate scientific literature, experimental data, and bioprocess models to make informed decisions in biochemical engineering projects. A7. Students will develop the ability to apply the concepts and techniques learned in the module to real-world chemical engineering problems.
Skills	
Learning Outcomes 2	B1. Experimental design and execution: Students will develop skills in designing and conducting experiments to investigate biochemical processes, analyze data, and draw conclusions. B2. Bioreactor operation and optimization: Students will gain proficiency in operating bioreactors, monitoring key process parameters, and optimizing conditions for maximal product yield and quality. B3. Data analysis and interpretation: Students will learn to analyze experimental data using statistical methods and interpret results to draw meaningful conclusions about bioprocess performance. B4. Computer modeling and simulation: Students will acquire skills in using computational tools and software to model and simulate bioprocesses, allowing for virtual experimentation and process optimization. B5. Communication and teamwork: Students will enhance their ability to communicate scientific findings effectively through written reports, oral presentations, and collaborative projects, fostering teamwork and professional communication skills. B6. Problem-solving and decision-making: Students will develop problem-solving skills to identify challenges in biochemical engineering processes, propose creative solutions, and make informed decisions to address engineering problems effectively.
Ethics	
Learning Outcomes 3	C1. Ethical considerations in research: Students will recognize the importance of ethical conduct in biochemical engineering research,

	including issues related to data integrity, plagiarism, and proper attribution of sources. C2. Social responsibility: Students will explore the ethical implications of biochemical engineering practices on society and the environment, considering factors such as sustainability, resource conservation, and social justice in the design and implementation of bioprocesses.

246. Teaching and Learning Strategies

The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations.

The second goal is to invite industry professionals or guest speakers who have expertise in process dynamics to deliver lectures or share their experiences. This offers students valuable insights into real-world applications and challenges, bridging the gap between academia and industry

247. Evaluation methods

Quizzes, mid-term exams, assignments, and seminars.

248. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Lecturer	Biochemical Engineering	Biochemical Engineering			yes	

Professional Development

Mentoring new faculty members

Professional development of faculty members

249. Acceptance Criterion

250. The most important sources of information about the program

77- Textbooks.
78- Internet Sources.
79- Researches, Papers
80- Corresponding international universities

81- Program Development Plan

- By staying updated with the latest developments in the engineering field
- Using modern technologies in teaching has the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4

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

Course Description Form

212.	Course Name:
Principles of Biochemical engineering	
213.	Course Code:
214.	Semester / Year:
1st Semester / 2024	
215.	Description Preparation Date: 30 -3 – 2024
216.	Available Attendance Forms:
217.	Number of Credit Hours (Total) / Number of Units (Total)
Weekly 3 hours (Total 45 hours)/ 3 units	
218.	Course administrator's name (mention all, if more than one name)
Name: Dr. Rawa Ghassan Yousuf Email: rawa.g@kecbu.uobaghdad.edu.iq	
219.	Course Objectives
Course Objectives	37. Understand Fundamentals: Gain a comprehensive understanding of the fundamental principles underlying biochemical engineering, including concepts from biology, chemistry, and engineering. 38. Learn Bioprocess Fundamentals: Acquire knowledge about the basic principles of bioprocess engineering, including fermentation, enzyme kinetics, bioreactor design, and downstream processing. 39. Explore Industrial Applications: Explore real-world applications of biochemical engineering principles in various industries such as pharmaceuticals, biotechnology, food processing, and environmental engineering. 40. Develop Problem-Solving Skills: Enhance problem-solving skills by applying engineering principles to analyze and solve challenges related to biochemical processes and bioreactor design. 41. Promote Critical Thinking: Foster critical thinking skills by evaluating and synthesizing information from scientific literature, case studies, and experimental data to propose innovative solutions to biochemical engineering problems.
220.	Teaching and Learning Strategies

Strategy	In Principles of Biochemical Engineering, teaching and learning strategies focus on foster active engagement and practical application of concepts. Interactive lectures encourage stud participation and discussion, while hands-on laboratory work allows students to ap theoretical knowledge to real-world experiments. Case studies and problem-based learn activities challenge students to analyze complex problems and develop innovative solutic Simulation and modeling exercises help students develop computational skills and gain insig into bioprocess optimization. Additionally, guest lectures and industry visits provide valua insights into current trends and applications in biochemical engineering. Together, th strategies create a dynamic learning environment that cultivates critical thinking, proble solving abilities, and practical expertise in biochemical engineering.

221. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	A1-3	Introduction: Basic concepts in Bioprocess and fermentation		
2	3	A1-5, B2, C1	Inoculum preparation in fermentation process		
3	3	A1, A2, A7, B2	Media design for fermentation process		
4	3	A1-7, B1-3, C1-2	Factor affecting the specific growth rate		
5	3	A1-7, B1-3, C1-2	Accelerated growth phase, stationary phase, death phase		
6	3	A1-7, B1-3, C1-2	Fermenter: introduction and basic concepts, Types of fermenters Fermenter design and construction aspect		
7	3	A1-7, B1-3, C1-2	Control and monitoring of fermenter		
8	3	A1-7, B1-3, C1-2	Fermentation types and ssf), plastics production,		
9	3	A1-7, B1-3, C1-2	Mode of fermenter operation: batch culture		
10	3	A1-7, B1-3, C1-2	Scale Up and Scale Down of bioprocesses and fermentation		
11	3	A1-7, B1-3, C1-2	Control and monitoring of fermenter		
12	3	A1-7, B1-3, C1-2	Introduction to cell kinetics		

13	3	A1-7, B1-3, C1-2	Calculation Monod kinetic parameters		
14	3	A1-7, B1-3, C1-2	Material balance in biochemical engineer		
15	3	A1-7, B1-3, C1-2	Energy balance in biochemical engineer		

222. Course Evaluation

Quizzes, mid-term exams, assignments and seminar

223. Learning and Teaching Resources

Required textbooks	***Biochemical Engineering - 2nd Edition – 2018- Douglas S. Clark - Harvey W. B.***
Main references (sources)	***Advanced in biochemical engineering***
Recommended books and references (scientific journals, reports...)	***Industrial microbiology***
Electronic References, Websites	https://www.google.com/search?q=biochemical+engineering+principles+2nd+edition _ &biw=1519&bih=730#imgrc=ulBs0AUyz9EdYM

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 academic programs and course descriptions to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a 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 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 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.

University Name: University of Baghdad
Faculty/Institute: AL-Khwarizmi College of Engineering
Scientific Department: Biochemical Engineering
Academic or Professional Program Name: B.Sc.
Final Certificate Name: B.Sc. in Biochemical Engineering
Academic System: Quarterly
Description Preparation Date: 28/3/2024
File Completion Date: 28/3/2024

Signature:

Prof. Dr. Alaa Kareem Mohammed:
Head of Department Name:

Date:

Signature:

Asst Prof. Dr. Hisham Hassan Jasim
Scientific Associate Name:

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature

Approval of the Dean

251. **Program Vision**

The scientific department seeks to present academically, scientifically, and even practically in the local and international arena. The reliability of scientific laboratories is within national standards first and international standards second. Apply advanced studying and teaching systems and keep updated with the latest developments in this field, especially e-learning. Furthermore, studying recent experiences in education and working on applying them in line with the changing standards of scientific and practical requirements. Planning to build postgraduate studies with high standard quality by preparing material requirements from laboratories and others and the scientific needs of researchers, in addition to researchers and supervisors who own a distinguished research line and global scientific publication.

252. **Program Mission**

The Biochemical academic staff pursues a multifaceted charge at the University of Baghdad. Our mission is to provide exceptional education and research opportunities in the field of Biochemical Engineering. We strive to cultivate a diverse and inclusive learning environment that fosters creativity, critical thinking, and innovation. Through our interdisciplinary approach, we aim to equip students with the knowledge, skills, and ethical values necessary to address the complex challenges of the modern world. As a Biochemical Engineering faculty, we uphold the highest standards of integrity, ethics, and social responsibility. Overall, our mission is to be a global leader in Biochemical Engineering education, research, and innovation, making a positive impact on the world by advancing knowledge, addressing challenges, and improving the quality of life for present and future generations.

253. **Program Objectives**

133. To optimize the design and operation of biochemical processes to maximize product yield, efficiency, and quality.
134. To prepare students for a wide variety of post-baccalaureate paths, including graduate school, professional training programs, or entry-level jobs in any area of biochemical Engineering.
135. To provide extensive hands-on training in production technology, statistical analysis, laboratory skills, and field techniques.
136. To provide thorough training in written and oral communication of scientific information.
137. To enrich students with opportunities for alternative education in the area of biochemical Engineering through undergraduate research, internships, and study abroad.

138. To design processes that are safe for operators, the environment, and the public. 139. To contribute to the advancement of biotechnology by developing new technologies, tools, and methods for improved bioprocesses.

254. Program Accreditation

N/A

255. Other external influences

N/A

256. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements				
College Requirements				
Department Requirements				
Summer Training				
Other				

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

257. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
٢٠٢٤-٢٠٢٣ / Second		Principles of Biochemical engineering	3	N/A

258. Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	A1. Understanding of fundamental principles: Students will gain knowledge of key concepts in biochemical engineering, including microbial metabolism, enzyme kinetics, and bioreactor design. A2. Application of theoretical principles: Students will be able to apply theoretical knowledge to analyze and design bioprocesses for

	the production of biochemicals, pharmaceuticals, and biofuels. A3. Proficiency in laboratory techniques: Students will develop practical skills in laboratory techniques commonly used in biochemical engineering, such as cell culture, fermentation, and downstream processing. A4. Problem-solving skills: Students will learn to identify and solve engineering problems related to bioprocess design, optimization, and troubleshooting. A5. Knowledge of industry practices: Students will acquire an understanding of current industry practices and regulatory requirements in biochemical engineering, preparing them for careers in biotechnology and pharmaceutical industries. A6. Critical thinking and evaluation: Students will develop the ability to critically evaluate scientific literature, experimental data, and bioprocess models to make informed decisions in biochemical engineering projects. A7. Students will develop the ability to apply the concepts and techniques learned in the module to real-world chemical engineering problems.
Skills	
Learning Outcomes 2	B1. Experimental design and execution: Students will develop skills in designing and conducting experiments to investigate biochemical processes, analyze data, and draw conclusions. B2. Bioreactor operation and optimization: Students will gain proficiency in operating bioreactors, monitoring key process parameters, and optimizing conditions for maximal product yield and quality. B3. Data analysis and interpretation: Students will learn to analyze experimental data using statistical methods and interpret results to draw meaningful conclusions about bioprocess performance. B4. Computer modeling and simulation: Students will acquire skills in using computational tools and software to model and simulate bioprocesses, allowing for virtual experimentation and process optimization. B5. Communication and teamwork: Students will enhance their ability to communicate scientific findings effectively through written reports, oral presentations, and collaborative projects, fostering teamwork and professional communication skills. B6. Problem-solving and decision-making: Students will develop problem-solving skills to identify challenges in biochemical engineering processes, propose creative solutions, and make informed decisions to address engineering problems effectively.
Ethics	

Learning Outcomes 3	C1. Ethical considerations in research: Students will recognize the importance of ethical conduct in biochemical engineering research, including issues related to data integrity, plagiarism, and proper attribution of sources. C2. Social responsibility: Students will explore the ethical implications of biochemical engineering practices on society and the environment, considering factors such as sustainability, resource conservation, and social justice in the design and implementation of bioprocesses.

259. Teaching and Learning Strategies

The primary approach taken to present this topic will be to encourage active student interaction through interactive teaching techniques. Promote conversations, teamwork, and problem-solving sessions. Encourage students to work together and share their understanding of subjects through peer-to-peer learning. To make the learning process more engaging and participatory, incorporate demonstrations, experiments, and class presentations.

The second goal is to invite industry professionals or guest speakers who have expertise in process dynamics to deliver lectures or share their experiences. This offers students valuable insights into real-world applications and challenges, bridging the gap between academia and industry

260. Evaluation methods

Quizzes, mid-term exams, assignments, and seminars.

261. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Lecturer	Biochemical	Biochemical			yes	

	Engineering	Engineering				

Professional Development
Mentoring new faculty members
Professional development of faculty members

262. Acceptance Criterion

263. The most important sources of information about the program

82- Textbooks.
83- Internet Sources.
84- Researches, Papers
85- Corresponding international universities

86- Program Development Plan

- By staying updated with the latest developments in the engineering field
- Using modern technologies in teaching has the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4

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

Course Description Form

224.	Course Name:
Principles of Biochemical engineering	
225.	Course Code:
226.	Semester / Year:
2nd Semester / 2024	
227.	Description Preparation Date: 30 -3 - 2024
228.	Available Attendance Forms:
229.	Number of Credit Hours (Total) / Number of Units (Total)
Weekly 3 hours (Total 45 hours)/ 3 units	
230.	Course administrator's name (mention all, if more than one name)
Name: Dr. Rawa Ghassan Yousuf Email: rawa.g@kecbu.uobaghdad.edu.iq	
231.	Course Objectives
Course Objectives	42. Understand Fundamentals: Gain a comprehensive understanding of the fundamental principles underlying biochemical engineering, including concepts from biology, chemistry, and engineering. 43. Learn Bioprocess Fundamentals: Acquire knowledge about the basic principles of bioprocess engineering, including fermentation, enzyme kinetics, bioreactor design, and downstream processing. 44. Explore Industrial Applications: Explore real-world applications of biochemical engineering principles in various industries such as pharmaceuticals, biotechnology, food processing, and environmental engineering. 45. Develop Problem-Solving Skills: Enhance problem-solving skills by applying engineering principles to analyze and solve challenges related to biochemical processes and bioreactor design. 46. Promote Critical Thinking: Foster critical thinking skills by evaluating and synthesizing information from scientific literature, case studies, and experimental data to propose innovative solutions to biochemical engineering problems.
232.	Teaching and Learning Strategies
Strategy	In Principles of Biochemical Engineering, teaching and learning strategies focus on fos er active engagement and practical application of concepts. Interactive lectures encourage s ud participation and discussion, while hands-on laboratory work allows students to ap theoretical knowledge to real-world experiments. Case studies and problem-based le rn

	activities challenge students to analyze complex problems and develop innovative solutio Simulation and modeling exercises help students develop computational skills and gain insig into bioprocess optimization. Additionally, guest lectures and industry visits provide valua insights into current trends and applications in biochemical engineering. Together, th strategies create a dynamic learning environment that cultivates critical thinking, proble solving abilities, and practical expertise in biochemical engineering.

233. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	A1-3	Introduction: Basic concepts in Sterilization process		
2	3	A1-5, B2, C1	Sterilization process type: batch		
3	3	A1, A2, A7, B2	Sterilization process type: continuous		
4	3	A1-7, B1-3, C1-2	Factor affecting the specific growth rate		
5	3	A1-7, B1-3, C1-2	Introduction: Basic concepts in filtration process		
6	3	A1-7, B1-3, C1-2	Sterilization process type: batch		
7	3	A1-7, B1-3, C1-2	Sterilization process type: continuous		
8	3	A1-7, B1-3, C1-2	Filter types		
9	3	A1-7, B1-3, C1-2	Application: Industrial filters		
10	3	A1-7, B1-3, C1-2	Genetic engineers		
11	3	A1-7, B1-3, C1-2	Introduction to enzyme		
12	3	A1-7, B1-3, C1-2	Enzyme theories		
13	3	A1-7, B1-3, C1-2	Introduction: Basic concepts in centrifugation process		
14	3	A1-7, B1-3, C1-2	Centrifugation process theories		
15	3	A1-7, B1-3, C1-2	Downstream process		

234. Course Evaluation

Quizzes, mid-term exams, assignments and seminar

235. Learning and Teaching Resources	
Required textbooks	***Biochemical Engineering - 2nd Edition – 2018- Douglas S. Clark - Harvey W. B.***
Main references (sources)	***Advanced in biochemical engineering***
Recommended books and references (scientific journals, reports...)	***Industrial microbiology***
Electronic References, Websites	https://www.google.com/search?q=biochemical+engineering+principles+2nd+edition _ &biw=1519&bih=730#imgrc=ulBs0AUyz9EdYM

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics I**			**Module Delivery**	
Module Type	**Basic learning activities**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**BCE112**				
ECTS Credits	٥				
SWL (hr/sem)	١٢٥				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	**Rawa Ghassan Yousuf**		**e-mail**	Rawa.g@kecbu.uobaghdad.edu.iq	
Module Leader's Acad. Title	lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Yussur Dhafeer		**e-mail**	yossr.zafer1105a@kecbu.uobaghdad.edu.iq	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives	

أهداف المادة الدراسية	1. Introduce basic definitions and introductory concepts of the Mathematic including the basic understanding of Functions and their Domain and Range 2. To become familiar with parts of the theoretical framework that is appropriate at this level. 3. To understand the integral and its relation to the derivative. 4. To master techniques of integration for simple integrals. 5. To develop students' mathematical thinking, understanding, competence and confidence in the application of mathematics, their creativity, enjoyment and appreciation of the subject.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Basic mathematic subjects 2. Relationship between variables and responses. 3. Demonstrate the knowledge and understanding of the fundamental concepts, principles and theories underpinning Biochemical Engineering with core knowledge in: engineering analysis 4. Generate ideas, proposals and solutions or arguments independently and/or collaboratively in response to set scenarios and/or self initiated activity; 5. Develop design briefs with clarity graphically and/or in written specifications 6. Skills in solving problems.
Indicative Contents المحتويات الإرشادية	Real numbers, Intervals (4hr) Inequalities (4hr) Functions and Their Graphs (4hr) Trigonometric Functions (4hr) Combining Functions (4hr) Shifting of Function (4hr) Inverse function (8 hr) Limits.(4hr) Continuity. (4hr) infinite limits (8hr) horizontal and vertical asymptotes (6hr) Equation of line in plane (4hr)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	٧٨	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	٤٧	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	1(hr)/10	20% (20)	During the semester	LO #1, #2 and #5, #6
	Assignments	1(hr)/10	10% (10)	During the semester	LO #3, #4 and #5, #3
	Projects / Lab.				
	Report	1(hr)/5	5%(5)	During the semester	LO #1, #2
Summative assessment	**Midterm Exam**		10% (10)	7	LO #1 - #6
	Final Exam	3hr	50% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Real numbers, Intervals,
Week 2	Functions and Their Graphs
Week 3	Functions and Their Graphs
Week 4	Inquires

Week 5	Inquires
Week 6	Trigonometric Functions
Week 7	Trigonometric Functions
Week 8	Inverse function
Week 9	Inverse function
Week 10	Limits.
Week 11	Limits.
Week 12	Continuity.
Week 13	infinite limits
Week 14	horizontal and vertical asymptotes
Week 15	Equation of line in plane
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Finney and Thomas	Yes
Recommended Texts	Engineering Mathematics: 7th Edition	No
Websites	https://mathway.com/	

Grading Scheme

مخطط الدرجات

Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Biology**			**Module Delivery**	
Module Type	**Basic learning activities**			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**BCE113**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	1		**Semester of Delivery**	١	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Duaa Khalid Mezeal		**e-mail**	duaa.khalid@kecbu.uobaghdad.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- Understand Biological Fundamentals: Gain a solid understanding of basic biological concepts, including cell biology, genetics, molecular biology, and microbiology, as they relate to biochemical engineering.

	2- Understand Microbial Bioprocessing: Learn about the cultivation and manipulation of microorganisms (bacteria, yeast, fungi, etc.) for the production of biochemical products. Understand the principles of microbial growth kinetics, metabolism, and genetic engineering for strain improvement. This includes learning about key biochemical reactions, such as glycolysis, Krebs cycle, and oxidative phosphorylation. 3-Understand Microbial Structure and Function This objective focuses on studying the structure, organization, and function of microorganisms and learn about different nutritional categories, such as autotrophs and heterotrophs, and the specific nutrients essential for microbial growth, including fermentation and respiration. 4- Students will learn about environmental factors, such as temperature, pH, and oxygen availability that affect microbial growth. They will also study various methods of microbial control, including physical, chemical, and biological approaches. 5- Students will gain an overview of industrial microbiology and its applications in various sectors. They will learn about the use of microorganisms in industrial processes such as bioremediation, food production, pharmaceuticals, and biofuel production. They will also understand the principles and techniques used in industrial microbiology. 6- Students will learn about the production of various substances by microorganisms, including enzymes, antibiotics, biofuels, and organic acids. They will understand the processes involved in their production and their industrial significance. 7-Students will learn about the selection and optimization of nutrient sources, pH regulation, and other factors necessary for efficient microbial growth and product formation in fermentation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Demonstrate a comprehensive understanding of fundamental biological concepts, including cell biology, genetics, and microbiology. 2- Apply biological principles to the analysis and design of biochemical engineering processes. 3-Relate ecological concepts to bioprocessing, including the impact of bioprocesses on the environment and sustainability. 4- Display knowledge of the fundamental concepts and principles related to microbial structure and function. 5- Understand the fundamental concepts and principles of industrial microbiology. 6- Explain the applications and significance of industrial microbiology in various industries. 7- Demonstrate knowledge of different types of microorganisms used in industrial processes and their specific roles. 8- Apply techniques for microbial isolation, cultivation, and maintenance in industrial settings. 9- Understand and apply fermentation processes for the production of valuable products. 10- Analyze and optimize microbial growth conditions for industrial applications.
Indicative Contents المحتويات الإرشادية	**Part 1: Biological Fundamentals in Biochemical Engineering (25-30) hrs** Cell Biology (Cell structure and function, Cell organelles, Cell membrane and transport processes, Cell genetic, Cell division and the cell cycle). Metabolism and Bioenergetics (Metabolic pathways (e.g., glycolysis, Krebs cycle ,: Energy production (ATP synthesis) ; Biochemical reactions and thermodynamics and Metabolic regulation) Cell Transport (uptake and Secretion of Substrates and Products; Transport of Gases ; Nutrient Transport and Waste Product Removal) **Part2: Basics of Microbiology (20-25) hrs** Classification of Microorganism Classification of Bacteria Microbial Physiology and Nutrition Energy Generating Pathways: Fermentations and Respiration **Part 3: Microbial Growth, Control, and Industrial Applications(20-25) hrs** Microbial Growth and Control Culture Preservation Concepts of Industrial Microbiology

	Microbial Products of Industrial Use **Part 4: Genetic Manipulations and Fermentation Processes(15-20) hrs** Strain Improvement by Genetic Manipulations Screening of Microbes Fermenter and Fermentation Process Fermentation Medium

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Lectures, Discussions, Inquiry-Based Learning, Collaborative Learning, Active Learning, Technology Integration and Flipped Classroom. In Lab Demonstration, Hands-on Experiments , Case Studies , Problem-Based Learning , Virtual Simulations, Group Discussions , Frequent formative assessments , Peer Teaching and Learning.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	٣٢	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	٢
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	1 hr(total) / 8	15% (15)	2,4,6,8,10 and 12	LO #1, #2, #3, #4, #5 and #6
	Assignments	1 hr (total)/ 3	10% (10)	3,7 and 11	LO #1, #2, #3, #4, #5 , #6 and #9
	Projects / Lab.	1hr / 1	10% (10)	5	LO #7, #8 and #10
	Report	1 hr (total) /10	10% (10)	3,5,7,9,10,11,13 and 14	LO #7, #8 and #10
Summative assessment	**Midterm Exam**	2hr(total) /2	10% (10)	4 and 10	LO #1 -10
	Final Exam	3hr/1	50% (50)	16	All
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Cell Biology : Cell structure and function, Cell organelles
Week 2	Cell genetic, Cell division and the cell cycle
Week 3	Metabolism and Bioenergetics (Metabolic pathways (glycolysis, Krebs cycle)
Week 4	Biochemical reactions and thermodynamics and Metabolic regulation
Week 5	Cell Transport : transport type , uptake and Secretion of Substrates and Products
Week 6	Cell Transport of Gases , Nutrient Transport and Waste Product Removal
Week 7	Microorganism classification
Week 8	Bacteria structure
Week 9	Microbial Nutrition and Metabolism
Week 10	Energy Generating Pathways: Fermentations and Respiration
Week 11	Microbial Growth, and Control
Week 12	Concepts of Industrial Microbiology
Week 13	Microbial Products of Industrial Use
Week 14	Screening of Microbes and Strain improvement by genetic manipulations
Week 15	Fermenter , Fermentation Process and fermentation medium
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	General safety rulls / Equipment apparatus used in biology laboratory
Week 2	Distinguish between animal and plant cells
Week 3	Sterile technique
Week 4	Culture Media Preparation
Week 5	Pour-Plate and Subculture Techniques
Week 6	Method of culture
Week 7	Streaking Technique
Week 8	Isolation of pure cultures
Week 9	Simple Stains Acid - fast stain Gram stains
Week 10	Bacteria Identification
Week 11	Inoculation and growth of microorganisms in batch culture
Week 12	Cultivation of enzyme-producing microorganisms
Week 13	Physical Antimicrobial Agents
Week 14	Chemical Antimicrobial Agents
Week 15	Culturing Microorganisms from the Environment

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- Microbiology 5th Edition ,Lansing M. Prescott ، 2- Essential Microbiology , Stuart Hogg, The Universityof Glamorgan, U K 3- Microbiological Application s ,A Laboratory Manual,in General Microbiology 8th Edition .Harold J. Benson	Yes
Recommended Texts		
Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Analytical chemistry**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	BCE114				
ECTS Credits	**5**				
SWL (hr./sem)	**125**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Salwa Shamran Jasim		**e-mail**	salua@kecbu.uobaghdad.edu.iq	
Module Leader's Acad. Title	Lecture		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Maryam Qais		**e-mail**	maryam.q@kecbu.uobaghdad.edu.iq	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	7/11/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Engineering requires applied science, and chemistry is the center of all science. The more chemistry an engineer understands, the more beneficial it is. In the future, global problems and issues will require an in-depth understanding of chemistry to have a global solution.

	2. The study of Chemistry aims to provide deep understanding of fundamental principles that govern the nature of chemical reactions and facilitate challenges to design and create fine chemicals that benefit society. 3. Biochemical engineers employ chemistry concepts to address problems with the manufacture or usage of chemicals, pharmaceuticals, food, and a variety of other items. 4. Chemistry is an important fundamental topic for engineers, in understanding the properties of materials and solutions and the reaction of materials with the environment (corrosion of metals, durability). 5. Encourage Students through practical experience and academic courses to learn how to design and create environmentally friendly chemical processes involved in water treatment. 6. Master basic mathematical skills like stoichiometry and fundamental chemical concepts.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Study The fundamental of analytical chemistry. 2. Acquire knowledge about the quantitative analysis. 3. Study the reaction in aqueous solutions and physical properties of it. 4. Develop practical experience in volumetric & gravimetric analysis. 5. Learn to master the ability to manipulate basic mathematical and critical thinking skills to analyze chemical problems and devise a logical approach to solve the problem, also analyze and interpret graphs as they apply to chemical problems. 6. Be able to determine limiting reactants, theoretical and percentage yields and solution stoichiometry. 7. Solve stoichiometric problems in Solutions: Acid-Base Titrations.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Analytical chemistry. Part A: Chemical Composition of Solutions, concentration and properties Volumetric methods of analysis [8 hrs] Part B: Titration curve for complex acid and base system, Precipitation reaction Oxidation – Redaction titration [7 hrs] Part C: Stoichiometry reaction, Gravimetric analysis, Colloidal Precipitates [10 hrs] Part D: Solubility and equilibrium, Spectrophotometric analysis [5 hrs] Part E - Practical Experience [2 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	To provide students with a theoretical back ground in chemical principles that is essential to practice chemical analysis. It enables students to understand the importance of judging the accuracy and precision of experimental data and techniques of quantitative analysis, and also to show that theory frequently serves as a useful guide to the solution of analytical problems.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem)	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7

الحمل الدراسي المنتظم للطالب خلال الفصل			
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	1h /3	18% (18)	4 ,7 and 12	LO #3, #5, #6 and #7
	Assignments	1h /3	6% (6)	2, 5 and 9	LO #1, #2, #3, #7
	Projects / Lab.	2h /7	14% (14)	Continuous	All
	Report	1h /1	2% (2)	13	LO #4
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to analytical chemistry + Scientific measurements
Week 2	Chemical Composition of Solutions , concentration and properties
Week 3	Volumetric methods of analysis
Week 4	Titration curve for complex acid and base system
Week 5	Precipitation reaction
Week 6	Oxidation – Redaction titration
Week 7	Mid exam
Week 8	Stoichiometry of reaction in solutions and Chemical equations
Week 9	Practical matters in reaction stoichiometry
Week 10	Applications of Gravimetric analysis
Week 11	Colloidal Precipitates

Week 12	Mid exam + chromatography
Week 13	General concepts of chemical equilibrium
Week 14	Solubility and complex – ion equilibrium
Week 15	Spectrophotometric analysis
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction to Analytical chemistry lab and Lab. Safety rule
Week 2	Lab 2: Volumetric measurement glassware and Laboratory Apparatus
Week 3	Lab 3: Preparation and Standardization of acid and base solution
Week 4	Lab 4: Titration of strong acid with strong base
Week 5	Lab 5: Titration of strong acid with weak base
Week 6	Lab 6: Acid-Base titration by double indicator method
Week 7	Lab 7: Determination of w/v % of acetic acid in vinegar
Week 8	Lab8: Analysis by redox titration
Week 9	Lab 9: determination chloride ion concentration by titration
Week 10	Lab 10: Preparation & standardization of $KMnO_4$
Week 11	Lab11: Determination of ferrous ion in ferrous ammonium sulphate
Week 12	Lab 12: Hardness of water
Week 13	Lab 13: Determination of Vitamin C "Iodometric titration"
Week 14	Lab14: thin layer chromatography mid exam
Week 15	exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	➢ Analytical Chemistry: Principles and Practice by Vic Soffiantini, Walter de Gruyter GmbH, 1st edition (October 25, 2021) ➢ Fundamentals of Analytical Chemistry by Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch 10th ed.; 2021	No
Recommended Texts	General Chemistry: Principles and Modern Applications by Petrucci, Herring, Madura, Bissonnette, 11th edition (2017)	yes
Websites	https://chemistrydocs.com/college-university-exams/comprehensive-chemistry-jee-advanced/	

Grading Scheme
مخطط الدرجات

Group	**Grade**	التقدير	**Marks %**	**Definition**

Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Physical Chemistry I			**Module Delivery**	
Module Type	Basic learning activities			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	BCE115				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	**Type Dept. Code**		**College**	Type College Code	
Module Leader	Dr. Hassan H. Al-Mohammedawi		**e-mail**	hasan.h@kechbu.uobaghdad.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Noor Ehsan		**e-mail**	noor.e@kechbu.uobaghdad.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The aim of this module is to develop the students' knowledge of the physical chemistry. In this module, students will the study of the underlying physical

	principles that govern the properties and behavior of chemical systems to use these principles to design separation equipment such as fractional distillation. Thus, this course deals with the following main topics: Gas laws, First law of thermodynamics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**After studying this course the students will be able to:** **A9.** Apply knowledge of physical chemistry to predict the equilibrium composition of reaction mixtures. **A10.** Recognize the first law of thermodynamics and calculate enthalpy. **A11.** Design different equipment used in biochemical engineering. **A12.** Work as a team and provide them with a powerful tool for developing practical skills. **A13.** Help students to build confidence in their abilities.
Indicative Contents المحتويات الإرشادية	**Part A-** Gas laws, ideal gas law and real gases (deviations from ideal behavior) [28 hrs.] **Part B**- First law of thermodynamics, thermodynamic systems and surroundings, internal energy, enthalpy and thermochemistry [35 hrs.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The basic strategies that will be applied to help students learn and understand this module are **Cooperative Learning and Active Learning** strategies. Using cooperative learning encourages students to work together in small groups to achieve a common goal. It promotes teamwork and communication. In addition, using active learning helps students to participate in the learning process through activities such as discussions.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem)	37	**Unstructured SWL (h/w)**	3

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	1hr/6	20% (20)	2,5,8 and 11	LO #1, #2 , #3and #
	Assignments	1(hr)/5	5% (5)	3 and 9	LO #1, #4
	Projects / Lab.	….	…	…	
	Report	1(hr)/5	5% (5)	3 and 9	LO #1, #2 , #3and #
Summative assessment	**Midterm Exam**	2hr	10% (10)	5,10,14	LO #1 - #4
	Final Exam	3hr	0% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Characteristics of Gases , Gas laws
Week 2	Ideal gas law
Week 3	Mixtures of gases
Week 4	Examples
Week 5	Real gases (deviations from ideal behavior)
Week 6	Examples
Week 7	First law of thermodynamics, thermodynamic systems and surroundings,
Week 8	Internal energy
Week 9	Examples
Week 10	Enthalpy
Week 11	Examples
Week 12	Thermochemistry
Week 13	Examples
Week 14	Effect of temperature on standard enthalpy change
Week 15	Examples
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	▪ Alberty, R. A., Robert J.S. and Moungi G. B., (2004). Physical Chemistry. 4th ed, John Wiley and Sons. ▪ Atkins, P. and De Paula, J., 2018. Physical Chemistry. Oxford: Oxford University Press.	Yes
Recommended Texts	▪ Levine, I., 2009. Physical Chemistry. Boston: McGraw-Hill.	Yes
Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
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MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Chemical Engineering Principles I**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**BCE117**				
ECTS Credits	**5**				
SWL (hr/sem)	١25				
Module Level	UGI11		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Prof Dr. Alaa Kareem Mohammed		**e-mail**	dr.alaa@kecbu.uobaghdad.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Israa M, Rashid		**e-mail**	israa_msc2018@kecbu.uobaghdad.edu.iq	
Peer Reviewer Name	Dr. Ziad Tarik		**e-mail**	ziadtarak@kecbu.uobaghdad.edu.iq	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	6. Unit Conversions: Students should be able to convert between different units commonly used in chemical engineering, such as mass, volume, temperature, pressure, and concentration.

	7. Mass balance: Students should understand the concept of mass balances and be able to apply them to chemical processes. 8. Stoichiometry: Students should be proficient in performing stoichiometric calculations, including determining reactant and product quantities, calculating theoretical yields, and understanding limiting reagents. 9. Ideal Gas Laws: Students should be familiar with the basic principles of ideal gases, including the ideal gas law equation (PV = nRT) and its applications in calculations involving temperature, pressure, volume, and molar quantities
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	7. Applying the fundamental principles of chemical engineering, including mass and energy balances to solve engineering problems. 8. performing calculations related to chemical engineering, such as unit conversions, stoichiometry, ideal gas laws, vapor. 9. Demonstrate the knowledge and understanding of the fundamental concepts, principles and theories underpinning Biochemical Engineering with core knowledge in: engineering analysis. 10. Generate ideas, proposals and solutions or arguments independently and/or collaboratively in response to set scenarios and/or self-initiated activity. 11. Analyzing and interpret data obtained from chemical engineering processes 12. Skills in solving problems.
Indicative Contents المحتويات الإرشادية	**Part A - Units and Dimensions** Fundamental units and conversion factors, Dimensional analysis and unit consistency, stoichiometry of equations, Conservation of mass. Concentration and compositions representation. [25 hrs]. Revision problem classes [6 hrs]. **Part B – stoichiometry** Chemical equations and reactions, Calculation of reactant and product quantities, Limiting reagents and theoretical yields, Percent yield and excess reactants [25 hr]. Revision problem classes [6 hrs]. **Part C – Mass balance** Conservation of mass, Material balance equations for physical process, Calculation of input and output flows, Solving balance equations for single and multiple units [36 hr]. Revision problem classes [6 hrs]. **Part D- Gas calculations** Ideal Gas Laws and Gas Calculations, Boyle's law, Charles's law, and Avogadro's law Ideal gas law equation (PV = nRT), Calculation of pressure, volume, temperature, and molar quantities [40 hr]. Revision problem classes [6 hrs].
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Chemical Engineering Principles is a field of engineering that applies principles of chemistry, physics, and mathematics to design, develop, and optimize processes that convert raw materials into useful products, while ensuring safety, cost-effectiveness, and sustainability. It involves the design and operation of chemical plants and equipment, as well as the development and improvement of processes for making chemicals, fuels, and materials. In summary, Chemical Engineering Principles is a multifaceted field that involves the application of engineering principles to the design and development of

	processes and products that have a wide range of applications in various industries like energy, pharmaceuticals, food processing, and many others.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2hr(total)/6	25% (25)	3,5,7,9,10and 12	LO #1, #2 and #5
	Assignments	4hr (total)/2	15% (15)	2,4,6,8 and 13	LO #3, #4 and #6
	Projects / Lab.	-	-	-	-
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2hr/2	10% (10)	7	LO #1 - #3
	Final Exam	3hr/1	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Unit and dimensions
Week 2	Temp. - Pressure- compassion
Week 3	Density, specific volume, and specific gravity
Week 4	Weight, Force, Energy
Week 5	dimensional consistency

Week 6	Conversion of Equation
Week 7	Flowrate
Week 8	Mole and Molecular weight
Week 9	Average Molecular weight
Week 10	Mole percent and Weight percent
Week 11	Concentration
Week 12	Basis
Week 13	Material-balance
Week 14	Mass balance without chemical reaction
Week 15	Mass balance without chemical reaction
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"***Basic Principles and calculations Engineering***".5th edition By David M. Himmelblau	Yes
Recommended Texts	"Chemical Process Calculations" by D.C. Sikdar,2013	yes
Websites	https://visimix.com/what-is-chemical-process-calculation/	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics II**			**Module Delivery**	
Module Type	**Basic learning activities**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**BCE123**				
ECTS Credits	٥				
SWL (hr/sem)	١٢٥				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	**Rawa Ghassan Yousuf**		**e-mail**	**Rawa.g@kecbu.uobaghdad.edu.iq**	
Module Leader's Acad. Title	Doctor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Yossur Dhafer		**e-mail**	yossr.zafer1105a@kecbu.uobaghdad.edu.iq	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	BCE113	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	10. To become familiar with parts of the theoretical framework that is appropriate at this level.

	11. To understand the integral and its relation to the derivative. 12. To master techniques of integration for simple integrals. 13. To develop students' mathematical thinking, understanding, competence and confidence in the application of mathematics, their creativity, enjoyment and appreciation of the subject.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	13. Basic mathematic subjects 14. Application of derivative and integral in engineering science 15. Demonstrate the knowledge and understanding of the fundamental concepts, principles and theories underpinning Biochemical Engineering with core knowledge in: engineering analysis 16. Generate ideas, proposals and solutions or arguments independently and/or collaboratively in response to set scenarios and/or self initiated activity; 17. Develop design briefs with clarity graphically and/or in written specifications 18. Skills in solving problems.
Indicative Contents المحتويات الإرشادية	Differentiation Rules (4hr) The Chain Rule with Powers of a Function (4hr) Implicit Differentiation (4hr) Derivatives of Higher Order (4hr) Rational Powers of Differentiable Functions (4hr) Linearization and Differentials (4hr) Derivatives of Exponential and Logarithm Functions (4hr) APPLICATIONS OF DERIVATIVES (4hr) Integration (4hr) Substitution and Area Between Curves (4hr) Integration By Parts (2hr) Integration of Rational Functions by Partial Fractions (4hr) Trigonometric Integrals (4hr) Polar Coordinates (4hr) Circles in Polar Coordinate (4hr)

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	٧٨	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	٤٧	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20% (20)	5 and 10	LO #1, #2 and #10, #11
	Assignments	4	20% (20)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam		10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Differentiation Rules
Week 2	The Chain Rule with Powers of a Function
Week 3	Implicit Differentiation
Week 4	Derivatives of Higher Order
Week 5	Rational Powers of Differentiable Functions
Week 6	Linearization and Differentials
Week 7	Derivatives of Exponential and Logarithm Functions
Week 8	APPLICATIONS OF DERIVATIVES
Week 9	Integration
Week 10	Substitution and Area Between Curves
Week 11	Integration By Parts
Week 12	Integration of Rational Functions by Partial Fractions
Week 13	Trigonometric Integrals
Week 14	Polar Coordinates
Week 15	Circles in Polar Coordinate
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Finney and Thomas	Yes

Recommended Texts	Engineering Mathematics: 7th Edition	No
Websites	https://mathway.com/	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Organic Chemistry**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	BCE125				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Salwa Shamran Jasim		**e-mail**	salua@kecbu.uobaghdad.edu.iq	
Module Leader's Acad. Title	Lecture		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	7. Engineering requires applied organic chemistry to get more benefit of it.

	8. The study of organic chemistry aims to provide deep understanding of fundamental principles that govern the nature of chemical reactions and facilitate challenges to design and create fine chemicals that benefit society. 9. Biochemical engineers employ chemistry concepts to address problems with the manufacture or usage of chemicals, pharmaceuticals, food, and a variety of other items. 10. Organic chemistry is an important fundamental topic for engineers, in understanding the properties of materials and solutions and the reaction of materials with the environment. 11. Encourage Students through practical experience and academic courses to learn how to design and create environmentally friendly chemical processes involved in water treatment.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 8. Recognize the relationship between molecular structure and chemical and physical properties. 9. Students will be able to understand and predict the outcome of organic reactions, including reaction mechanisms, stereochemistry, and reactivity. 10. Understand the basic concepts of organic chemistry, including the structure and bonding of organic molecules, functional groups. 11. Use the rules of nomenclature to name chemical compounds. 12. Gain knowledge of most important organic compound (polymers). 13. Students will be able to apply their knowledge of organic chemistry to solve problems, such as predicting the products of a reaction, identifying the starting material needed to synthesize a desired product, and interpreting spectroscopic data. 14. Teaching laboratory skills that will give students confidence in their ability to obtain high-quality data to qualify them to work in industry, chemical analysis and laboratories by develop practical experience in solvent extraction, distillation & gravimetric analysis.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Organic Chemistry</u> <u>Part A -</u> Basic Principles of Organic Chemistry, Preparation, Properties and Reactions of Alkanes, alkenes and alkynes [8 hrs] <u>Part B -</u> Preparation, Properties and Reactions of Alcohols, Phenols, ester & Ethers [8 hrs.] <u>Part C -</u> Preparation, Properties and Reactions of Aldehydes, Ketones & Amines[8hrs] <u>Part D -</u> Properties and uses of some important polymers, Reaction of heterocyclic Compounds + substitution on aromatic compounds. [6 hrs] <u>Part E - Practical Experience:</u> Experiment of organic chemistry lab. [75 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	1h/3	10% (30)	3,6 and 10	LO 2,3,4,5,6 and 7
	Assignments	1h/3	10% (30)	2 ,4 and 9	LO 1,2,3,4, and 7
	Projects / Lab.	1h/2	10% (15)	Continuous	All
	Report	1h/10	10% (3)	13	LO 4 and 5
Summative assessment	**Midterm Exam**	2hr/2	10% (10)	7	all
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Organic Chemistry

Week 2	Chemical Bonding theory and hybridization of Compounds
Week 3	Classification of Alkane and its stereochemistry
Week 4	Petroleum distillation and cracking
Week 5	Explain the properties, preparation and chemical reaction of alkane
Week 6	Introduction to IR Spectroscopy
Week 7	Mid exam
Week 8	Explain the properties, preparation and chemical reaction of alkene & alkyne
Week 9	Polymers & polymerization reactions
Week 10	Preparation, uses & Reaction of Alcohol
Week 11	Preparation, uses & Reaction of Phenols, Ether and Ester
Week 12	Preparation, uses & Reaction of Aldehydes and Ketones
Week 13	Preparation, uses & Reaction of carboxylic acids &their derivatives
Week 14	Mid exam + Reaction of Amides
Week 15	Reaction of heterocyclic Compounds + substitution on aromatic compounds

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Safety rule + Volumetric measurement glassware
Week 2	Lab 2: Experiment of boiling point determination.
Week 3	Lab 3: Experiment of melting point determination
Week 4	Lab 4: Experiment of mixed melting point
Week 5	Lab 5: Experiment of Recrystallization
Week 6	Lab 6: Experiment of Sublimation
Week 7	Lab 7: Experiment of Extraction
Week 8	Lab 8: Experiment of Simple Distillation
Week 9	Lab9: Experiment of Fractional distillation
Week 10	Lab 10: preparation of acetic acid
Week 11	Lab11: mid exam
Week 12	Lab 12: preparation of aspirin
Week 13	Lab13: Qualitative Tests for Carbonyls
Week 14	Lab 14: Qualitative test for Alcohol
Week 15	Lab 15: IR Spectroscopy for phenol

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	➢ Prentice Hall, Ralph H. Petrucci, William S. Harwood & Geoffrey Herring; General Chemistry (Principles & Modern Application); Upper Saddle River, New Jersey, 2002. ➢ Timothy M. Dwyer; Katherine J. Denniston; General Organic &Biochemistry; McGraw- Hill; New York; 5th addition ;2007.	Yes
Recommended Texts	General Chemistry: Principles and Modern Applications by Petrucci, Herring, Madura, Bissonnette, 10th edition (2011, ISBN 9780132064521) or 11th edition (2017, ISBN 9780132931281)	No
Websites	https://chemistrydocs.com/college-university-exams/comprehensive-chemistry-jee-advanced/	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Drawing**			**Module Delivery**	
Module Type	**Basic learning activities**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**BCE126**				
ECTS Credits	٥				
SWL (hr/sem)	١٢٥				
Module Level	1		**Semester of Delivery**	2	
Administering Department	BCE		**College**	Type College Code	
Module Leader	Ghanim Hassan		**e-mail**	dr.ghanim@kecbu.uobaghdad.edu.iq	
Module Leader's Acad. Title	Lect.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Ameel Mohammed Al-Mayah		**e-mail**	drameel@kecbu.uobaghdad.edu.iq	
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1. To develop proficiency in using AutoCAD software for creating, editing, an managing 2D engineering drawings. 2. To understand and apply engineering drawing standards, conventions, an best practices in the context of biochemical engineering projects. 3. To enable students to create accurate and detailed engineering drawings o equipment and components used in biochemical engineering processes. 4. To provide hands-on experience in creating plant layouts and equipmen arrangements considering safety, efficiency, and regulatory requirements i biochemical engineering. 5. To introduce students to the symbols, notations, and annotations commonl used in P&IDs for representing equipment, instrumentation, and pipin components in biochemical engineering. 6. To incorporate instrumentation, control valves, and piping specifications int P&IDs to accurately represent process control and instrumentation i biochemical engineering systems. 7. To emphasize the importance of accuracy, clarity, and organization i engineering drawings for effective communication and collaboration i biochemical engineering projects. 8. To enhance critical thinking and problem-solving skills by analyzing existin engineering drawings, identifying issues, and proposing appropriate solutions 9. To promote teamwork and collaboration through group projects involvin data exchange, version control, and project management using engineerin drawing software. 10. To cultivate an understanding of the significance of engineering drawings in the design, implementation, and documentation of biochemical engineering processes and systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate proficiency in using AutoCAD software for creating, modifying and managing 2D biochemical engineering drawings. 2. Apply engineering drawing standards, conventions, and best practices t create accurate and professional engineering drawings. 3. Generate equipment drawings, distillation columns, including pumps reactors, and heat-exchangers, considering safety considerations an regulations in Biochemical Engineering. 4. Create plant layouts and equipment arrangements that optimize process flo and adhere to industry standards in Biochemical Engineering. 5. Interpret and utilize symbols, conventions, and notations used in P&IDs t represent various equipment, instrumentation, and piping components. 6. Incorporate instrumentation, control valves, and piping specifications int P&IDs to accurately represent the process control and instrumentation i biochemical engineering systems. 7. Demonstrate effective documentation and organization skills for engineerin drawings and project files related to biochemical engineering processes.

	8. Apply critical thinking and problem-solving skills to analyze and interpre existing engineering drawings, identify potential issues, and propos appropriate solutions. 9. Collaborate effectively with team members in engineering drawing projects including data exchange, version control, and project management. 10. Understand the importance of accuracy, clarity, and compliance in engineerin drawings for effective communication and efficient implementation i biochemical engineering projects.
Indicative Contents المحتويات الإرشادية	The Indicative Contents include the following topics: **Introduction to Engineering Drawing:** • Importance and principles of engineering drawing • Standards and conventions in engineering drawing • Different types of drawings and their applications in Biochemical Engineering **Introduction to AutoCAD:** • Overview of AutoCAD software and its interface • Basic commands and functions in AutoCAD • Creating and modifying 2D drawings in AutoCAD **Advanced AutoCAD Techniques:** • Creating and managing layers, linetypes, and hatch patterns • Dimensioning and text annotation in AutoCAD • Plotting and printing drawings in AutoCAD **Equipment Drawings and Plant Layouts:** • Creating equipment drawings such as pumps, reactors, and heat exchangers • Developing plant layouts and equipment arrangement in Biochemical Engineer ng • Incorporating safety considerations and regulations in equipment drawings **Piping and Instrumentation Diagrams (P&IDs):** • Understanding the symbols and conventions used in P&IDs • Creating P&IDs for various processes and systems in Biochemical Engineering • Incorporating instrumentation, control valves, and piping specifications in P&ID s **Project Documentation and Collaboration:** • Documenting and organizing engineering drawings and project files • Collaborative workflows and data exchange between AutoCAD Plant 3D • Version control and project management in engineering drawing projects **Industry Standards and Best Practices:** • Familiarization with industry-specific standards and codes for engineering draw ng • Adhering to best practices in Biochemical Engineering drawing and design • Ensuring accuracy, clarity, and compliance in engineering drawings

	Practical Applications and Case Studies: • Applying engineering drawing principles and software tools to solve real-world engineering problems in Biochemical Engineering • Analyzing and demonstrating real plant drawings and P&IDs in the context of Biochemical Engineering processes • Case studies highlighting the importance of accurate and well-designed engineering drawings in Biochemical Engineering projects

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. **Lecture-Based Learning:** The course can begin with lecture-based sessions to introduce fundamental concepts and principles of engineering drawing, AutoCAD. Lectures can provide theoretical knowledge, demonstrations of software usage, and discussions on best practices in biochemical engineering. 2. **Hands-on Practice:** Hands-on practice is essential for developing proficiency in using AutoCAD. Students should have regular access to computer labs equipped with the necessary software. Lab sessions should be dedicated to practical exercises and projects, allowing students to apply the learned concepts, create drawings, and solve real-world engineering problems in biochemical engineering. 3. **Collaborative Learning:** Encourage collaborative learning by assigning group projects or activities that require teamwork. This promotes effective communication, problem-solving, and sharing of ideas among students. Group work can involve designing equipment layouts, or developing comprehensive plant drawings in biochemical engineering using AutoCAD. 4. **Case Studies and Real-Life Examples***:* Integrate case studies and real-life examples from the field of Biochemical Engineering to illustrate the practical application of engineering drawing techniques. Analyze existing plant layouts, P&IDs, and equipment designs to identify strengths and areas for improvement. This approach helps students develop a deeper understanding of how engineering drawing is utilized in real-world scenarios. 5. **Continuous Assessment:** Implement continuous assessment methods such as quizzes, assignments, homeworks, classworks, and practical evaluations to monitor students' progress throughout the course. Assessments should cover both theoretical knowledge and practical skills in using AutoCAD. Provide timely feedback to students to help them identify areas for improvement and reinforce their learning.

	6. **Resources and References:** Provide biochemical students with relevant textbooks, online resources, tutorials, and documentation for AutoCAD. Encourage self-study and exploration of additional features and functionalities of the software tools. This empowers students to expand their knowledge and enhance their proficiency beyond the scope of the course. 7. **Classroom Discussions and Q&A Sessions:** Foster classroom discussions to address biochemical student questions, clarify doubts, and encourage critical thinking. Q&A sessions can also serve as an opportunity for students to share their experiences, challenges, and innovative approaches they discovered while working on projects. 8. **Capstone Project:** Allocate time for a capstone project where students can apply their cumulative knowledge and skills acquired throughout the course. The project can involve designing a complete biochemical plant layout, including P&IDs, equipment drawings, and 3D models. This project allows biochemical students to showcase their abilities and creativity in utilizing AutoCAD.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ **14** اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	٦٣	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	٤
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	٦٢	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	٤
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	١٢٥		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2h/3	10% (10)	4 , 8 and 13	LO #1, - #7, #10, and #12
	Assignments	3h/6	10% (10)	2, 4, 6, 8, 10, 12, and 14	LO #1, #3 and #5, #7, #9-#12
	Projects / Lab.	3h/4	10% (10)	Continuous	All
	Report	0	-	-	-
Summative assessment	Midterm Exam	2h/١	20% (10)	6 and 12	All
	Final Exam	3h/1	50% (50)	١٥	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction to Engineering Drawing** • Overview of engineering drawing and its importance in Biochemical Engineering • Introduction to AutoCAD Plant 3D software and its interface
Week 2	**Basic Drawing Techniques** • Understanding drawing tools and commands in AutoCAD • Drawing basic shapes, lines, and curves • Applying layers, colors, and linetypes to drawings
Week 3	**Basic Drawing Techniques** • Understanding drawing tools and commands in AutoCAD • Drawing basic shapes, lines, and curves Applying layers, colors, and linetypes to drawings
Week 4	**Orthographic Projection** • Principles of orthographic projection in Biochemical Engineering • Drawing orthographic projections of simple objects in AutoCAD
Week 5	**Orthographic Projection** • Principles of orthographic projection in Biochemical Engineering Drawing orthographic projections of simple objects in AutoCAD
Week 6	**Isometric Projection** • Introduction to isometric projection and its application in Biochemical Engineering • Creating isometric drawings in AutoCAD

Week 7	**Isometric Projection** • Introduction to isometric projection and its application in Biochemical Engineering • Creating isometric drawings in AutoCAD
Week 8	**Piping and Instrumentation Diagrams (P&IDs)** • Introduction to P&IDs in Biochemical Engineering • Understanding P&ID symbols and their meanings • Creating P&IDs using AutoCAD
Week 9	**Piping and Instrumentation Diagrams (P&IDs)** • Introduction to P&IDs in Biochemical Engineering • Understanding P&ID symbols and their meanings • Creating P&IDs using AutoCAD
Week 10	**Equipment and Plant Layout Design** • Designing equipment layouts for biochemical processes • Creating 2D and 3D models of equipment using AutoCAD • Incorporating P&IDs into the equipment layout
Week 11	**Equipment and Plant Layout Design** • Designing equipment layouts for biochemical processes • Creating 2D models of equipment using AutoCAD • Incorporating P&IDs into the equipment layout
Week 12	**Assembly Drawings** • Creating detailed assembly drawings of biochemical equipment and components • Adding dimensions, annotations, and labels to assembly drawings
Week 13	**Assembly Drawings** • Creating detailed assembly drawings of biochemical equipment and components • Adding dimensions, annotations, and labels to assembly drawings
Week 1٤	**Project Work and Review** • Students work on a final project that integrates the skills and knowledge acquired throughout the course • Review and assessment of the students' project work using AutoCAD Plant 3D Presentations of the final projects and feedback
Week 1٥	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to AutoCAD Overview of the course and lab expectations Familiarization with the software interface and basic commands

Week 2	Lab 2: Basic drawing techniques in AutoCAD Drawing simple shapes and lines Applying layers and colors to drawings
Week 3	Lab 3: Introduction to P&IDs in Biochemical Engineering Understanding P&ID symbols and their usage Creating P&ID drawings using AutoCAD
Week 4	Lab 4: Orthographic projection principles Drawing orthographic projections of simple objects in AutoCAD
Week 5	Lab 5: Isometric projection principles Creating isometric drawings in AutoCAD
Week 6	Lab 6: Designing equipment layouts for biochemical processes Creating 2D equipment layout drawings in AutoCAD
Week 7	Lab 7: Introduction to 3D modeling in AutoCAD Plant 3D Creating 3D models of equipment and components
Week 8	Lab 8: Incorporating P&IDs into the equipment layout Integrating 2D and 3D drawings in AutoCAD
Week 9	Lab 9: Creating assembly drawings of biochemical equipment Adding dimensions and annotations to assembly drawings
Week 10	Lab 10: Project work and review session Students work on a mini-project applying the skills learned so far
Week 11	Lab 11: Advanced drawing techniques in AutoCAD Exploring advanced commands and tools for more complex drawing
Week 12	Lab 12:

	3D modeling of plant layouts using AutoCAD Creating 3D models of complete biochemical plants
Week 13	Lab 13: Generating detailed reports and documentation from P&ID drawings Creating Bill of Materials (BOM) and other relevant documentation
Week 14	Lab 14: Project work and review session Students continue working on their main project and receive feedback
Week 1٥	Lab 15: Final project presentation and assessment Presenting the main project to the class and receiving evaluations

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**AutoCAD 2023 Instructor** By James A. Leach B.I.D., M.Ed., Shawna Lockhart	No
Recommended Texts	AutoCAD 2023: A Power Guide for Beginners and Intermediate Users	No
Websites	https://www.autodesk.com/learn	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English Language**			**Module Delivery**	
Module Type	**Suport or related learning activity**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOB102**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Mohammed Bassil Ali		**e-mail**	mohammed.b@kecbu.uobaghdad.edu.iq	
Module Leader's Acad. Title	Asst.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	٢٠٢٤/٢/٢٤		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- Understand and use the verbs; Introduce oneself and others using expressions like "This is..." and basic greetings.

	2- Ask and respond to simple questions about well-being using appropriate expressions; Count from 1 to 10 and use plurals in basic contexts. 3- Identify and discuss different countries, nationalities, and origins. 4- Use pronouns Ask and answer questions about someone's origin using appropriate phrases; Describe and express opinions using words; Count from 11 to 30. 5- Discuss different jobs and professions using appropriate vocabulary. 6- Engage in conversations and ask questions about personal details. 7- Understand and use social expressions in basic interactions; Talk about sports, food and drinks using appropriate vocabulary. 8- Understand and use articles "a/an" appropriately. 9- Discuss numbers and prices in basic contexts; Express and understand the concept of time. 10- Use adverbs to modify verbs; Combine adjectives with nouns appropriately. 11- Use phrases like "I'd like," "some/any" in various contexts; Order food and drinks in a restaurant. 12- Understand and interpret signs and symbols; use polite expressions and manners. 13- Use present continuous tense to talk about ongoing actions; use social expressions and common phrases in context.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate understanding of basic English grammar concepts, such as the use of am, are, is; he, she, they; possessives, and plurals. 2. Use appropriate vocabulary and expressions to greet and interact with others, including asking and answering simple questions about personal information, well-being, and origins. 3. Comprehend and use numbers, both in counting and discussing quantities, up to 30. 4. Identify and describe countries, nationalities, and languages. 5. Discuss family relationships, using possessive forms and basic vocabulary related to family members. 6. Communicate about personal preferences, likes, and dislikes, using adjectives and the modal verb "can." 7. Describe living arrangements, including rooms, furniture, and directions, using appropriate prepositions. 8. Discuss past events and personal history, including talking about birthdates, past activities, and experiences using past simple tense. 9. Express future plans and intentions using appropriate vocabulary and grammar structures. 10. Engage in conversations about leisure activities, sports, and sightseeing experiences using past simple and present continuous tenses. 11. Use polite expressions, such as please and thank you, and understand basic social signs and symbols. 12. Describe and discuss colours, clothes, and present continuous tense. 13. Express ability, limitations, and preferences using the modal verb "can," adverbs, and adjective-noun combinations. 14. Demonstrate understanding of basic grammar and vocabulary through revision exercises and practice.
Indicative Contents المحتويات الإرشادية	➢ Use past simple tense with regular and irregular verbs; Formulate questions and negatives using the past simple tense; Discuss sports, leisure activities, and going sightseeing; Share experiences and talk about past events. **[1 hr.]** ➢ Use past simple tense with regular and irregular verbs; Formulate questions and negatives using the past simple tense; Discuss sports, leisure activities, and going sightseeing; Share experiences and talk about past events. **[1 hr.]** ➢ Use past simple tense with regular and irregular verbs; Formulate questions and negatives using the past simple tense; Discuss sports, leisure activities, and going sightseeing; Share experiences and talk about past events. **[1hr.]**

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The strategies for teaching the different units in the language module can include various interactive activities and exercises. Emphasis can be placed on role-playing greetings and introductions, vocabulary games for numbers and plurals, and dialogue-based exercises for practicing basic sentence structures. As well as involve cultural exchange activities, role-playing with pronouns and possessive pronouns, vocabulary drills for numbers and descriptive adjectives, and interactive tasks for asking about someone's origin. It can include role-playing scenarios, personal information sharing activities, discussions on job roles, and role-plays focusing on social expressions. Incorporate group activities describing family members, vocabulary games, and exercises related to family, and interactive tasks for practicing possessive pronouns. These strategies aim to engage students and provide them with opportunities to practice and apply the language skills and concepts taught in each unit.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	٣٣	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	١٧	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	٤	10% (٤٠)	1and 5	L.N; 1, 2, ٤, and ٥
	Assignments	٤	10% (٤٠)	3 and 7	L.N; 3, 4, 6 and 7
	Projects	4	10% (٤٠)	13	L.N; 8, 9 and 11.
	Report	1	10% (٤٠)	Continuous	All.
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	L.N; 1 – 7.
	Final Exam	3hr	٥٠% (50)	16	All.
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Unit 1: Hello (am, are, is; This is….; How are you?; Good morning!; Number 1-10; Plurals).
Week 2	Unit 2: Your World: (Countries; he, she, they, his, her; where's from?; fantastic/ awful/ beautiful; numbers 11-30).
Week 3	Unit 3: All about you (Jobs; am/are/is; negatives and questions; personal information; social expressions (1))
Week 4	Unit 4: Family and friends (our/their; possessive's; the family; has/have; the alphabet)
Week 5	Unit 5: The way I live (sports/food/drinks; present simple- I/you/we/they; a/an; languages and nationalities; numbers and prices)
Week 6	Unit 6: every day (The time; present simple-he/she; always/sometime/never; words that go together; days of the week)
Week 7	**Mid exam**
Week 8	Unit 7: My favourites (question words; me/him/us/them; this/that; adjectives; can I ……..?
Week 9	Unit 8: Where I live (Rooms and furniture; there is/are; prepositions; directions)
Week 10	Unit 9: Times past (saying years; was/were born; past simple – irregular verbs; have/do/go when's your birthday)
Week 11	Unit 10: We had a great time (past simple; regular and irregular; questions and negatives; sports and leisure; going sightseeing)
Week 12	Unit 11: I can do that! (can/can't; adverbs; adjective + noun; everyday problems)
Week 13	Unit 12: Please and thank you (I'd like – some/any; in a restaurant; signs all arounds)
Week 14	Unit 13: Here and now (colours and clothes; present continuous; opposite verbs; what's the matter)
Week 15	Unit 14: It's time to go! (Future plans; grammar revision; vocabulary revision; social expressions)
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?

Required Texts	**"New headway, Beginner students' book''**, third addition. John and Liz Soars	Yes
Recommended Texts	**"English Grammar in Use",** Raymond Murphy.	No
Websites	British Council **(www.learnenglish.britishcouncil.org);** Cambridge English **(www.cambridgeenglish.org).**	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound works with notable errors
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