Academic Program Description Form

University Name: Al-Nahrain University

Faculty/Institute: College of Pharmacy

Scientific Department: Pharmaceutics Department

Academic or Professional Program Name: Pharmaceutics

Final Certificate Name: Bachelor's degree

Academic System: Courses

Description Preparation Date: 26/3/2025

File Completion Date: 26/3/2025

Signature:

Head of Department Name:
Ameerah Abdulelah Radhi

Date:26/3/2025

Signature:

Scientific Associate Name:
Asst. Prof. Dr. Shaymaa. H. Hammadee

Date: 26/3/2025

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department: Dr. Noor Adil

Date: 26/3/2025

Signature:

Republic of Iraq
Ministry of Education and Scientific Research
Al-Nahrain University / College of Pharmacy

Approval of the Dean

Prof. Dr. Haydar B Salih

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

2025

Introduction:

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

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

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

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

Concepts and terminology:

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

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

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

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

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

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

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

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

1. Program Vision

The vision of pharmaceutics department is to be focus on innovative work in research and education that related to pharmaceutics and drug delivery to achieve superiority in this respect

2. Program Mission

The mission of pharmaceutics department involve two target one related to education and training mission and other related to research and innovation mission, the first target attained by offering undergraduate and postgraduate student with essential knowledge for understanding the physicochemical and biopharmaceutics aspect of dosage form design , evaluation and manufacturing whereas the second target accomplished by performing and directing new knowledge to external partner to amend drug delivery and patient care.

3. Program Objectives

1/ submit education and training on scientific course that organized by the department

2/ impart professional skill on drug preparation, synthesis and evaluations

3/ offer scientific concept essential for lifelong learning and valuable knowledge for rational, effectiveness and safety of the drugs

4/ create synchronized between course learning outcome and graduate attribute properties

5/ activate the role of department in high quality research and innovation

4. Program Accreditation

Do not have program accreditation? And from

5. **Other external influences**
Is there a sponsor for the program?

6. **Program Structure**				
Program Structure	**Number of Courses**	**Credit hours**	**Percentage**	**Reviews***
Institution Requirements	**10**	**43**	**20%**	**basic**
College Requirements	**10**	**43**	**20%**	**basic**
Department Requirements	**10**	**43**	**20%**	**basic**
Summer Training	**2**	–	–	–
Other				

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

7. **Program Description**				
Year/Level	**Course Code**	**Course Name**	**Credit Hours**	
			theoretical	**practical**
First	10301102	Principle of pharmacy practice	**2**	–
	10301109	pharmaceutical calculation	**2**	**1**
Second	10301218	Physical pharmacy I	**3**	**1**
	10301225	Physical pharmacy II	**3**	**1**
Third	10301334	Pharmaceutical technology I	**3**	**1**
	10301339	Pharmaceutical technology II	**3**	**1**
Forth	10301447	Biopharmaceutics	**2**	**1**
	10301454	Industrial pharmacy I	**3**	**1**
Fifth	10301557	Industrial pharmacy II	**3**	**1**

	10301568	Dosage form design	**2**	–
	10301569	Pharmaceutical biotechnology	**1**	–

8. Expected learning outcomes of the program

Knowledge

At the end of this program, students will be able to identify

1. Principles of pharmacy and pharmaceutical calculations
2. Physicochemical properties of active pharmaceutical ingredients in pharmaceutical products
3. Compounding and manufacture of various dosage forms
4. The bioavailability of active pharmaceutical ingredients
5. Applications of biotechnology products

Skills

1. Acquisition of skills of problem solving related to calculations
2. Acquisition of skill in preparation and compounding at small scale
3. Acquiring the skill of preparing and evaluation of various dosage forms including tablets
4. Learn how to dispense prescription

Ethics

Students will learn how to:

1. Do small scientific projects
2. Work within a group
3. Present and discuss their results

6. Teaching and Learning Strategies

Power Point Presentation, Tutorials (Pen and Whiteboard),
Problem Solving, Practicalities
Scientific researches, Laboratory teaching

7. Evaluation methods

Quizzes
reports
Mid term Exam
Final Exam

8. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
	pharmacist	pharmaceutics	–	–	٧	٠

Professional Development

Mentoring new faculty members

This section provides a brief description of the procedures used to mentor new, visiting, full-time, and part-time faculty members at both the institutional and departmental levels.
The mentoring program includes guidance on academic and administrative policies, orientation on course content, teaching methods, and assessment strategies. It also involves academic and professional support through supervision by experienced faculty members, with the aim of facilitating their integration into the academic environment and enhancing their teaching performance.

Professional development of faculty members

This section outlines the academic and professional development plans and arrangements established for faculty members. The institution and department support continuous professional growth through structured programs and activities, including workshops on modern teaching and learning strategies, seminars on assessment of learning outcomes, and training

sessions on curriculum development and instructional technologies. Faculty members are also encouraged to participate in research activities, attend scientific conferences, and engage in community service. These initiatives aim to enhance teaching effectiveness, promote innovative practices, and ensure alignment with national and international academic standards.

9. **Acceptance Criterion**

Central admission

10. **The most important sources of information about the program**

Pharmaceutical Calculations by Haward C. Ansel
Martin´s Physical Pharmacy and Pharmaceutical sciences by Patrick J. Sinko
Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems
Sprowel's American Pharmacy.
Applied Biopharmaceutics and Pharmacokinetics by Shargel L, and Yu AB.
The Theory and Practice of Industrial Pharmacy by Leon Lachman.
Pharmaceutical biotechnology by J.A. Crommelin, Robert D. Syinder
British Pharmacopeia
United States pharmacopeia
European pharmacopeia

11. Program Development Plan

Personal development - increasing knowledge - scientific discussions - cultural events

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
First	PHC112	Principle of pharmacy practice	**Basic**	√	√	√	√	√	√	√		√	√	√	√
	PHC122	pharmaceutical calculation	**Basic**	√	√	√	√	√	√	√		√	√	√	√
Second	PHC213	Physical pharmacy I	**Basic**	√	√	√	√	√	√	√		√	√	√	√
	PHC223	Physical pharmacy II	**Basic**	√	√	√	√	√	√	√		√	√	√	√
Third	PHC313	Pharmaceutical technology I	**Basic**	√	√	√	√	√	√	√		√	√	√	√
	PHC323	Pharmaceutical technology II	**Basic**	√	√	√	√	√	√	√		√	√	√	√
Fourth	PHC414	Biopharmaceutic	**Basic**	√	√	√	√	√	√	√		√	√	√	√
	PHC425	Industrial pharmacy I	**Basic**	√	√	√	√	√	√	√		√	√	√	√

Fifth	PHC512	Industrial pharmacy II	**Basic**	√	√	√	√	√	√	√		√	√	√	√
	PHC526	Dosage form	**Basic**	√	√	√	√	√	√	√		√	√	√	√
	PHC527	Pharmaceutical biotechnology	**Basic**	√	√	√	√	√	√	√		√	√	√	√

Course Description Form

1. Course Name:
Principles of Pharmacy Practice
2. Course Code: PHC112
3. Semester / Year:
1st semester/ 1st year
4. Description Preparation Date:
22/3/2025
5. Available Attendance Forms:
Theory/ attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
30
7. Course administrator's name (mention all, if more than one name)
Name: As. Prof. Yasser qassem mohammed As. Lec. Ali Qassem As. Lec. Menna raad
8. Course Objectives

Course Objectives	**1/ Learn the rules of mathematic calculations.** **2/ Learn the rules of measurement systems and the relation betw them.** **3/ Learn the rules of components and types of prescriptions.** **4/ Learn the rules of calculating doses and reducing or enlarg formulas.** **5/ Learn the rules of values description in percentage and ratio streng** **6/ Learn the rules of calculating density and specific gravity.**

9. Teaching and Learning Strategies

Strategy	Power Point Presentation, Tutorials (Pen and Whiteboard), Problem Solving, Practicalities

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2	Understand measurement systems	Fundamentals of measurments and calculations	Power Point, Problem Solvi Practicalities	Formative, summative, quize, exam
2	2	Interpret prescript components	Fundamentals of measurments and calculations	Power Point, Problem Solvi Practicalities	Formative, summative, quize, exam
3	2	Understand prescription components	Interpretation prescription medication order	Power Point, Problem Solvi Practicalities	Formative, summative, quize, exam
4	2	Verify prescription accuracy	Interpretation prescription medication order	Power Point, Problem Solvi Practicalities	Formative, summative, quize, exam
5	2	Understand metric units	The metric system	Power Point, Problem Solvi Practicalities	Formative, summative, quize, exam
6	2	Convert metric values	The metric system	Power Point, Problem Solvi Practicalities	Formative, summative, quize, exam
7	٢	Give practice to Solving the problems	Calcultion of doses	Power Point, Problem Solving, Practicalities	Formative, summative, quize, exam
8	2	Apply metric calculations	Calcultion of doses	Power Point, Problem Solving, Practicalities	Formative, summative, quize, exam
Mid term Exam					
9	2	Understand formula scaling	Reducing and enlarging formlas	Power Point, Problem Solvi Practicalities	Formative, summative, quize, exam
10	2	Understand physical properties	Density, specific gravity , specific volume	Power Point, Problem Solvi Practicalities	Formative, summative, quize, exam
11		Calculate specific gravity , specific volume	Density, specific gravity , specific volume	Power Point, Problem Solving, Practicalities	Formative, summative, quize, exam
12	2	Understand percentage strength	Percentage and ratio strength calcultion	Power Point, Problem Solvi Practicalities	Formative, summative, quize, exam

13	3	Calculate ratio strength	Percentage and ratio strength calcultion	Power Point, Problem Solvi Practicalities	Formative, summative, quize, exam
14	3	Apply concentration formulas	Percentage and ratio strength calcultion	Power Point, Problem Solvi Practicalities	Formative, summative, quize, exam
Final Exam					

11 Course Evaluation

Quizzes 5%
Reports 5%
Mid term Exam 20%
Final Exam 70%

11. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Pharmaceutical Calculation by Stoklosa
Main references (sources)	Pharmaceutical Calculation by Stoklosa
Recommended books and references (scientific journals, reports…)	Pharmacy practice by Jason hall
Electronic References, Websites	Oxford university press

Course Description Form

12. Course Name:
Pharmaceutical Calculation
13. Course Code: PHC122
14. Semester / Year:
2nd semester/ 1st year
15. Description Preparation Date:
22/3/2025
16.Available Attendance Forms:
Theory-laboratory/ attendance
17.Number of Credit Hours (Total) / Number of Units (Total)
60
18. Course administrator's name (mention all, if more than one name)
Name: As. Prof. Yasser qassem mohammed As. Lec. Ali Qassem As. Lec. Menna raad
19. Course Objectives

Course Objectives	**1/ Learn the rules of mathematic calculations.** **2/ Learn the rules of components and types of prescriptio** **3/ Learn the rules of calculating doses and reducing enlarging formulas.** **4/ Learn the rules of values description in percentage ratio strength.**
20. Teaching and Learning Strategies	
Strategy	Power Point Presentation, Tutorials (Pen and Whiteboard), Problem Solving, Practicalities Scientific researchs Laboratory teaching

21. Course Structure

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

1-5	10	Calculate solution concentration	Dilution and concentration pharmaceutical preparations.	Power Point, Problem Solvi Practicalities	Formative, summative, quize, exam
6-8	6	Prepare isotonic formulations	Isotonic solutions.	Power Point, Problem Solvi Practicalities	Formative, summative, quize, exam
Mid term Exam					
9-11	6	Understand electrolyte concepts	Electrolyte solutions (milliequivalents, millimoles and milliosmoles).	Power Point, Problem Solvi Practicalities	Formative, summative, quize, exam
12-15	8	Prepare constituted solutions	Constituted solutions.IV admixtures and flow rate calculations.	Power Point, Problem Solvi Practicalities	Formative, summative, quize, exam
Final Exam					

22. Course Evaluation

Quizzes 5%
Reports 5%
Mid term Exam 30%
Final Exam 60%

23. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Pharmaceutical Calculation by Stoklosa
Main references (sources)	Pharmaceutical Calculation by Stoklosa
Recommended books and references (scientific journals, reports…)	Maths skills for pharmacy by chris Lang
Electronic References, Websites	Oxford university press

Course Description Form

24. Course Name:
Physical pharmacy I
25. Course Code: PHC213
26. Semester / Year:
1st semester/ 2nd year
27. Description Preparation Date:
22/3/2025
28.Available Attendance Forms:
Theory and practical/ attendance
29.Number of Credit Hours (Total) / Number of Units (Total)
٤٥
30. Course administrator's name (mention all, if more than one name)
Name: As. Prof. Ameerah abdulela Rahdi As. Prof. Yasser qassem mohammed As. Lec. Rawaa mohammed
31. Course Objectives

Course Objectives	At the end of the course,students are expected to : • Classify the Binding forces between molecules and mention the differences between them. • Mention the First law , second law and third law , free energy and their applications . • Calculate the value of free energy • Define Solutions of nonelectrolytes • Calculate molar concentrations • Define Solutions of electrolytes and its properties • Mention acid-base theories • Calculate pH value • Calculate Ka and Kb • Applicate method of adjusting isotonicity and PH
32. Teaching and Learning Strategies	
Strategy	Power Point Presentation, Tutorials (Pen and Whiteboard), Problem Solvi Practicalities

33. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	States of Matter	States of matter, binding forces between molecules,	Power Point, Problem Solving, Practicalities	Quiz, Discussions Mid- term exam Final exam
2	3	States of Matter	State of gases, liquids, solid and crystalline matters; phase equilibria and phase rule.	Power Point, Problem Solvi Practicalities	Quiz, Discussions Mid- term exam Final exam
3	3	Ionic -equilibria	Acid base theory	Power Point, Problem Solvi Practicalities	Quiz, Discussions Mid- term exam Final exam
4	3	Ionic -equilibria	Calculation of pH solutions containing Only acids, only bases acid -base pair	Power Point, Problem Solvi Practicalities	Quiz, Discussions Mid- term exam Final exam
5	3	Buffer and isotonic solutions	Buffer equations, Buffer capacity	Power Point, Problem Solvi Practicalities	Quiz, Discussions Mid- term exam Final exam
6	3	Buffer and isotonic solutions	Buffer in biological systems, versus solubility, pH versus stability	Power Point, Problem Solvi Practicalities	Quiz, Discussions Mid- term exam Final exam
7	٣	Buffer and isotonic solutions	Preparation isotonic solutions	Power Point, Problem Solvi Practicalities	Quiz, Discussions Mid- term exam Final exam
8			Mid- term Exam		
9	3	Thermodynamic	First law, Second law	Power Point, Problem Solving, Practicalities	Quiz, Discussions Mid- term exam Final exam
10	3	Thermodynamic	Third law, Free energy	Power Point, Problem Solvi Practicalities	Quiz, Discussions Mid- term exam Final exam
11	3	Solutions of nonelectrolytes	Properties, ideal and colligative properties, Raults law	Power Point, Problem Solving, Practicalities	Quiz, Discussions Mid- term exam Final exam
12	3	Solutions of nonelectrolytes	Deviation from Raults law, Melting point determination	Power Point, Problem Solvi Practicalities	Quiz, Discussions Mid- term exam Final exam
13	3	Solutions of nonelectrolytes	Vapor pressure lowering,	Power Point,	Quiz, Discussions Mid- term exam Final exam

			Freezing point depression Elevation of boiling point	Problem Solvi Practicalities	
14	3	solutions electrolytes	Properties, Arrhenius theory	Power Point, Problem Solvi Practicalities	Quiz, Discussions Mid- term exam Final exam
15	3	solutions electrolytes	Ionic strength, Theory of debye-huckel	Power Point, Problem Solving, Practicalities	Quiz, Discussions Mid- term exam Final exam
			Final Exam		

34. Course Evaluation

Quizzes 5%
reports 5%
Midterm Exam 30%
and Final Exam 60%

35. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Martin´s Physical Pharmacy and Pharmaceutical sciences by Patrick J. Sinko
Main references (sources)	Martin´s Physical Pharmacy and Pharmaceutical sciences by Patrick J. Sinko
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

36. Course Name:
Physical pharmacy II
37. Course Code: PHC223
38. Semester / Year:
2nd semester/ 2nd year
39. Description Preparation Date:
22/3/2025
40. Available Attendance Forms:
Theory and practical/ attendance
41. Number of Credit Hours (Total) / Number of Units (Total)
45
42. Course administrator's name (mention all, if more than one name)
Name: As. Prof. Ameerah Abdulelah Rahdi

43. Course Objectives	
Course Objectives	• Provide students with a comprehensive understanding of the physicochemical principles underlying pharmaceutical systems. • Develop the ability to analyze solubility, partitioning, and distribution behavior of drugs. • Introduce concepts of chemical kinetics and stability of pharmaceutical products. • Explain interfacial phenomena and their applications in drug delivery systems. • Strengthen skills in performing pharmaceutical calculations related to solubility, pH, buffer systems, and kinetics. • Foster critical thinking and problem-solving in evaluating pharmaceut formulations and physical processes.

44. Teaching and Learning Strategies	
Strategy	Power Point Presentation, Tutorials (Pen and Whiteboard), Problem Solving, Practicalities

45. Course Structure

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

1-3	9	Solubility Distribution Phenomena	Solubility and distribution phenomena, solvent-solute interactions, the solubility of gases in liquids, solubility of liquids in liquids, solubility of non-ionic solids in liquids, distribution of solutes between immiscible solvents.	PowerPoint, Problem Solving, Practicalities	Quiz, Discussions Mid- term exam Final exam
4,5	6	Chemical Kinetics and Stability	Rate, Specific Rate Constant, Determination of Order, Factors effects on stability, accelerated stability analysis	PowerPoint, Problem Solving, Practicalities	Quiz, Discussions Mid- term exam Final exam
6-9	9	Interfacial phenomenon	Interfacial phenomena, liquid interfaces spreading coefficient, surface active agents, Effect of surfac on solubility of slightly soluble substance Application of surface active agents	PowerPoint, Problem Solving, Practicalities	Quiz, Discussions Mid- term exam Final exam
Midterm exam					
11-13	6	Colloidal Dispersions	Colloids, dispersed system, an pharmaceutical application, types of colloidal systems, kinetic properties, diffusion, zeta potential, solubilization	PowerPoint, Problem Solving, Practicalities	Quiz, Discussions Mid- term exam Final exam
13-15	6	Rheology	Rheology, Newtonian systems, thixotropy measurement, negative thixotropy, determination of thixotropy.	PowerPoint, Problem Solving, Practicalities	Quiz, Discussions Mid- term exam Final exam
			Final Exam		

46. Course Evaluation

Quizzes ,5%
reports , 5%
Midterm Exam , 30%
and Final Exam 60%

47. Learning and Teaching Resources

Required textbooks (curricular books, if any	Martin´s Physical Pharmacy and Pharmaceutical sciences by Patrick J. Sinko
Main references (sources)	Martin´s Physical Pharmacy and Pharmaceutical sciences by Patrick J. Sinko
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

48. Course Name:	
Pharmaceutical technology I	
49. Course Code: PHC313	
50. Semester / Year:	
3rd stage/1st semester	
51. Description Preparation Date:	
18/2/2024	
52.Available Attendance Forms:	
Theory and Practical/ Attendance	
53.Number of Credit Hours (Total) / Number of Units (Total)	
45	
54. Course administrator's name (mention all, if more than one name)	
Name: As. Prof. Ameerah abdulelah rahdi Dr. lec. Maher abulrazzaq luqman As. Lec. Menna raad	
55. Course Objectives	
Course Objectives	Pharmaceutical technology aims to develop, and manufacture safe, effect and quality pharmaceutical products. It encompasses various aspects such as the des formulation, manufacturing, packaging, and quality control of pharmaceutical drugs.
56. Teaching and Learning Strategies	
Strategy	1. Theoretical lectures 2. Blackboard 3. Projector device 4. PowerPoint presentation 5. Educational laboratories 6. Electronic lectures 7. Scientific and practical research 8. Office Research

57. Course Structure

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

Week1	2	comparisons between different systems	Dispersed systems: their classification; comparisons between different Systems	PowerPoint, Problem Solving, Practicalit	Formative, summative, quiz, exam
Week1-2	2	types of solutions	Solutions and types of solutions	PowerPoint, Problem Solving, Practicalit	Formative, summative, quiz, exam
Week2-3	4	Solubility: Factors affecting solubility;	Solubility: Factors affecting solubility; expression of dissolution; dissolution rate versus solubility; preparation of solutions containing non-volatile materials	PowerPoint, Problem Solving, Practicalit	Formative, summative, quiz, exam
Week3-4	4	Official solutions	Official solutions; classification of official solutions; preparation and uses.	PowerPoint, Problem Solving, Practicalit	Formative, summative, quiz, exam
Week4-5	4	principles; aromatic waters; methods of preparations	Aqueous solutions containing aromatic principles; aromatic waters; methods of preparations; stability.	PowerPoint, Problem Solving, Practicalit	Formative, summative, quiz, exam
Week5-6	4	Syrups: Sugar-based syrups	Syrups: sugar-based syrups; artificial and sorbitol-based syrups; stability of Syrups	PowerPoint, Problem Solving, Practicalit	Formative, summative, quiz, exam
Week6-7	3	Definition and methods of clarification; filter aids in clarification	Definition and methods clarification; filter aids clarification	PowerPoint, Problem Solving, Practicalit	Formative, summative, quiz, exam
Week7-8	3	Preparation of solutions	Preparation of solutions using mixed solvent systems; spirits, and elixirs.	PowerPoint, Problem Solving, Practicalit	Formative, summative, quiz, exam
Week8-9	3	Extraction; maceration and percolation	Extraction; maceration percolation	PowerPoint, Problem Solving, Practicalit	Formative, summative, quiz, exam
Week9-10	4	Tinctures;	Tinctures; fluid extra extracts of resins oleoresins.	PowerPoint, Problem	Formative, summative, quiz, exam

				Solving, Practicalit	
Week10-11	6	Colloidal dispersions lyophilic; lyophobic	Colloidal dispersions; lyophilic; lyophobic	Power Point, Problem Solving, Practicalit	Formative, summative, quize, exam
Week13-14	6	Coarse dispersion	Coarse dispersion; suspensions.	Power Point, Problem Solving, Practicalit	Formative, summative, quize, exam

58. Course Evaluation

Quizzes ,5%
reports , 5%
Midterm Exam , 30%
and Final Exam 60%

59. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Pharmaceutical Calculation by Stoklosa • Physical Pharmacy by Alfred Martin et al. • Pharmaceutical Dosage forms and Drug Delivery Systems By Haward A. Ansel; latest edition. And Sprowel's American Pharmacy. • Shargel L, Yu AB, (Eds.), Applied Biopharmaceutics and Pharmacokinetics. • The Theory and Practice Industrial Pharmacy by Le Lachman et al.
Main references (sources)	Encyclopedia of Pharmaceutical Technology
Recommended books and references (scientific journals, reports…)	British Pharmacopeia United state pharmacopeia European pharmacopeia
Electronic References, Websites	Slide share

Course Description Form

60. Course Name:
Pharmaceutical technology II
61. Course Code: PHC323
62. Semester / Year:
3rd stage/ 2nd semester
63. Description Preparation Date:
٢٢/٣/٢٠٢٥
64.Available Attendance Forms:
Theory and practical/ attendance
65.Number of Credit Hours (Total) / Number of Units (Total)
45
66. Course administrator's name (mention all, if more than one name)
Name: Dr. lec. Maher abdulrazzaq luqman As. Lec Abdullah Qusai
67. Course Objectives

Course Objectives	The aim of pharmaceutical technology is to create high-quality, s products. It encompasses various aspects such as the design, formulat manufacturing, packaging, and quality control of pharmaceutical drugs
68. Teaching and Learning Strategies	
Strategy	1. Theoretical lectures 2. Blackboard 3. Projector device 4. PowerPoint presentation 5. Educational laboratories 6. Electronic lectures 7. Scientific and practical research 8. Office Research

69. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week1-4	10	Emulsions; purpose of emulsification;	Emulsions; purpose of emulsification; methods of emulsification;	Power Point, Problem	Formative, summative, quize, exam

			emulsifying agents; HLB system; stability emulsions.	Solving, Practicalities	
Week4-5	5	Information Lotions; liniments and collodions.	Lotions; liniments collodions.	Power Point, Problem Solving, Practicalities	Formative, summative, quize, exam
Week-6-7	6	Inromation Suppositories.	Suppositories.	Power Point, Problem Solving, Practicalities	Formative, summative, quize, exam
Week8-11	10	Powdered dosage forms.	Powdered dosage forms.	Power Point, Problem Solving, Practicalities	Formative, summative, quize, exam
Week11-14	10	Semisolid dosage forms.	Semisolid dosage forms.	Power Point, Problem Solving, Practicalities	Formative, summative, quize, exam
Week15-16	4	Incompatibilities pharmaceutical dosage forms	Incompatibilities pharmaceutical dosage forms.	Power Point, Problem Solving, Practicalities	Formative, summative, quize, exam

70. Course Evaluation

Quizzes ,5%
reports , 5%
Midterm Exam , 30%
and Final Exam 60%

71. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Pharmaceutical Calculation by Stoklosa • Physical Pharmacy by Alfred Martin et al. • Pharmaceutical Dosage forms and Drug Delivery Systems By Haward A. Ansel; latest edition. And Sprowel's American Pharmacy. • Shargel L, Yu AB, (Eds.), Applied Biopharmaceutics and Pharmacokinetics. • The Theory and Practice of Industr Pharmacy by Leon Lachman et al.
Main references (sources)	Encyclopedia of Pharmaceutical

	Technology
Recommended books and references (scientific journals, reports…)	British Pharmacopeia United state pharmacopeia European pharmacopeia
Electronic References, Websites	Slide share

Course Description Form

1. Course Name:
Biopharmaceutics
2. Course Code: PHC414
10301447
3. Semester / Year:
4rd stage/ 1nd semester
4. Description Preparation Date:
18/4/٢٠٢٥
5. Available Attendance Forms:
Theory and Practical/ Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
32
7. Course administrator's name (mention all, if more than one name)
Name: Dr. lec. Maher abdulrazzaq luqman As. Lec. Rawaa Mohammed As. Lec. Ali Qassim
8. Course Objectives

Course Objectives	The course should enable the student to: 1. Understand the idea of biopharmaceutics and their aspect. 2. Understand the idea of pharmacokinetic, linear and non linear 3. Understand the idea of one compartment model and multi compartment model. 4. Understand the idea of dosage form and multiple dosage regimens. 5. Understand the idea of bioavailability and bioequivalence 6. Understand the idea of drug absorption and protein binding 7. Understand the idea of drug elimination by liver and by kidney.

9. Teaching and Learning Strategies

Strategy	Power Point Presentation, Tutorials (Pen and Whiteboard), Problem Solving, Practicalities Scientific research's , Laboratory teaching

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2		Introduction to biopharmaceutics.	Power Point, Problem Solving, Practicalities	Formative, summative, quize, exam
2-4	6		Biopharmaceutic aspects of products; drug absorption; mechanisms of absorption; physicochemical factors; dissolution rate; effects of excipients;type of dosage forms.	Power Point, Problem Solving, Practicalities	Formative, summative, quize, exam
5,6	4		One compartment open model., Multicompartment models.	Power Point, Problem Solving, Practicalities	Formative, summative, quize, exam
7,8	6		Pharmacokinetics of drug absorption. Bioavailability and bioequivalence.	Power Point, Problem Solving, Practicalities	Formative, summative, quize, exam
9-11	6		Clearance of drugs from the biological systems. Hepatic elimination of drugs ,Protein binding of drugs.	Power Point, Problem Solving, Practicalities	Formative, summative, quize, exam
12-15	8		Intravenous infusion, Multiple dosage regimens. Non-linear pharmacokinetics. Dosage adjustment in renal diseases	Power Point, Problem Solving, Practicalities	Formative, summative, quize, exam
			Final Exam		

11. Course Evaluation

Quizzes,5%
reports, 5%
Midterm Exam, 30%
and Final Exam 60%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Shargel L, Yu AB, (Eds.), Applied Biopharmaceutics and Pharmacokinetics.
Main references (sources)	Shargel L, Yu AB, (Eds.),

	Applied Biopharmaceutics and Pharmacokinetics.
Recommended books and references (scientific journals, reports…)	British Pharmacopeia United state pharmacopeia European pharmacopeia
Electronic References, Websites	

Course Description Form

72. Course Name:
Industrial pharmacy I
73. Course Code: PHC425
74. Semester / Year:
4th years/ 2nd semester
75. Description Preparation Date:
22/3/2025
76.Available Attendance Forms:
Theory and practical/ attendance
77.Number of Credit Hours (Total) / Number of Units (Total)
45
78. Course administrator's name (mention all, if more than one name)
Name: As. Prof. Yasir qassim mohammed
79. Course Objectives

Course Objectives	**Industrial pharmacy's mission where the student studies the equipment used in pharmaceutical manufacturing facilities, including mixing, packaging, and mixing.**

80. Teaching and Learning Strategies	
Strategy	1. Theoretical lectures 2. Blackboard 3. Projector device 4. PowerPoint presentation 5. Educational laboratories 6. Electronic lectures 7. Scientific and practical research 8. Office Research

81. Course Structure

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

Week 1-2	7	The principles of pharmaceutical processing	The principles of pharmaceutical processing; mixing; fluid mixing; flow characteristics; mechanisms of mixing; mixing equipments; batch and continuous mixing; mixer selection; solid mixing theory and particulate solid variables; forces and mechanisms	Power Point, Problem Solving, Practicalitie	Formative, summative, quize, exam
Week 3-4	7	pharmaceutical application; size measurement methods	Milling; pharmaceutical application; size measurement methods; theory and energy of commenution; types of mills; factors influencing milling; selection of mill techniques; specialized drying methods	Power Point, Problem Solving, Practicalitie	Formative, summative, quize, exam
Week 5-6	7	Drying: definition; purpose; humidity measurement	Drying: definition; purpose; humidity measurement; theory of drying; drying of solids, and classification of dryer; specialized drying methods.	Power Point, Problem Solving, Practicalitie	Formative, summative, quize, exam
Week 7-8	7	Understand filtration principles	Clarification and filtration: Theory; filter media; filter aids; selection of drying method; non-sterile and sterile operations; integrity testing; equipments and systems (commercial and laboratory).	Power Point, Problem Solving, Practicalitie	Formative, summative, quize, exam
Week 9-10	7	Understand sterilization principles	Sterilization; validation of methods; microbial death kinetics; methods of sterilization (thermal and non-thermal); mechanisms; evaluation.	Power Point, Problem Solving, Practicalitie	Formative, summative, quize, exam
Week 11	3	Understand dosage design	Pharmaceutical dosage form design; pre-formulation; preliminary evaluation; bulk characterization; solubility and stability analysis.	Power Point, Problem Solving, Practicalitie	Formative, summative, quize, exam
Week 12-13	7	Understand sterile formulations	Pharmaceutical dosage forms; sterile products; development; formulation; production; processing; quality control.	Power Point, Problem Solving, Practicalitie	Formative, summative, quize, exam
82. Course Evaluation					

Quizzes ,5% reports , 5% Midterm Exam , 30% and Final Exam 60%

83. Learning and Teaching Resources	
Required textbooks	• Pharmaceutical Calculation by Stoklosa • Physical Pharmacy by Alfred Martin et al. • Pharmaceutical Dosage forms and Drug Delivery Systems By Haward A. Ansel; latest edition. And Sprowel's American Pharmacy. • Shargel L, Yu AB, (Eds.), Applied Biopharmaceutics and Pharmacokinetics. • The Theory and Practice of Industrial Pharmacy Leon Lachman et al.
Main references (sources)	Encyclopedia of Pharmaceutical Technology
Recommended books and references (scientific journals, reports…)	British Pharmacopeia United state pharmacopeia European pharmacopia
Electronic References, Websites	Slide share

Course Description Form

84. Course Name:	
Industrial pharmacy II	
85. Course Code: PHC512	
86. Semester / Year:	
1st semester/5th year	
87. Description Preparation Date:	
22/3/2025	
88. Available Attendance Forms:	
Theory and Practical/ Attendance	
89. Number of Credit Hours (Total) / Number of Units (Total)	
45	
90. Course administrator's name (mention all, if more than one name)	
Name: As. Lec. Abdulla qussay As. Lec. Ali Kassim	
91. Course Objectives	
Course Objectives	• Provide students with a foundational knowledge of pharmaceutical manufacturing processes. • Introduce principles of Good Manufacturing Practice (GMP) and regulatory requirements. • Develop an understanding of formulation design and optimization of various dosage forms. • Familiarize students with equipment and technologies used in industrial-scale production. • Explain quality control and quality assurance processes in pharmaceutical industries. • Enhance practical skills related to scale-up, validation, and documentation. • Encourage awareness of industrial safety, environmental controls, and ethical practices.

	• Promote critical thinking in problem-solving related to manufacturing challenges.

92. Teaching and Learning Strategies	
Strategy	1. Theoretical lectures 2. Blackboard 3. Projector device 4. PowerPoint presentation 5. Educational laboratories 6. Electronic lectures 7. Scientific and practical research 8. Office Research

93. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	10	Understand tablet formulation	Pharmaceutical dosage forms: Tablets; role in therapy; advantages and disadvantages; formulation; properties; evaluation; machines used in tableting; quality control; problems; granulation, and methods of production; excipients, and types of tablets	PowerPoint, Problem Solving, Practicalities	Formative, summative, quiz, exam
2	4	Understand coating principles	Tablet coating; principles; properties; equipment; processing; types of coating (sugar and film); quality control, and problems.	PowerPoint, Problem Solving, Practicalities	Formative, summative, quiz, exam
3	3	Understand capsule formulation	Capsules: Hard gelatin capsules; materials; production; filling equipment; formulation; special techniques.	PowerPoint, Problem Solving, Practicalities	Formative, summative, quiz, exam

4	2	Understand softgel composition	Soft gelatin capsules: Manufacturing methods; nature of capsule shell and content; processing and control; stability	PowerPoint, Problem Solving, Practicalities	Formative, summative, quiz, exam
5	2	Understand microencapsulation principles	Micro-encapsulation; core and coating materials; stability; equipment and Methodology.	PowerPoint, Problem Solving, Practicalities	Formative, summative, quiz, exam
6	3	Understand sustained release concepts	Modified (sustained release) dosage forms; theory and concepts; evaluation and testing; formulation.	PowerPoint, Problem Solving, Practicalities	Formative, summative, quiz, exam
7-7	3	Formulate pharmaceutical liquids	Liquids: Formulation; stability and equipment.	PowerPoint, Problem Solving, Practicalities	Formative, summative, quiz, exam
8-9	3	Understand suspension principles	Suspensions: Theory; formulation and evaluation	PowerPoint, Problem Solving, Practicalities	Formative, summative, quiz, exam
11-12	3	Understand emulsion systems	Emulsions: Theory and application; types; formulation; equipment and quality control	PowerPoint, Problem Solving, Practicalities	Formative, summative, quiz, exam
13-14	3	Understand percutaneous absorption and semisolid	Semisolids: Percutaneouse absorption; formulation; types of bases (vehicles)	PowerPoint, Problem Solving, Practicalities	Formative, summative, quiz, exam

94. Course Evaluation

Quizzes,5%
reports, 5%
Midterm Exam, 30%
and Final Exam 60%

95. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Pharmaceutical Calculation by Stoklosa • Physical Pharmacy by Alfred Martin et al. • Pharmaceutical Dosage Forms and Drug Delivery Systems By Haward A. Ansel; latest edition. And Sprowel's American Pharmacy. • Shargel L, Yu AB, (Eds.), Applied Biopharmaceutics and Pharmacokinetics.

	•The Theory and Practice of Industr Pharmacy by Leon Lachman et al.
Main references (sources)	Encyclopedia of Pharmaceutical Technology
Recommended books and references (scientific journals, reports…)	British Pharmacopeia United state pharmacopeia European pharmacopia
Electronic References, Websites	Slide share

Course Description Form

96. Course Name:	
Dosage form design	
97. Course Code: PHC526	
98. Semester / Year:	
2nd semester/5th year	
99. Description Preparation Date:	
٢٦/٣/20٢٥	
100. Available Attendance Forms:	
Theory and Practical/ Attendance	
101. Number of Credit Hours (Total) / Number of Units (Total)	
30	
102. Course administrator's name (mention all, if more than one name)	
Name: As. Lec. Menna raad As. Lec. Rawaa mohammed	
103. Course Objectives	
Course Objectives	1/ To help students understand the principles and factors influence the designing of dosage forms 2/ Learn the applications of these principles to the practice of pharmaceutical industry 3/ Learn the Pre-formulation studies ; physical descript microscopic examination, Melting point; phase rule; particle s polymorphism; solubility. 4/ Learn the Formulation consideration: Excipients; definition types. 5/ Learn the Biopharmaceutical considerations. 6/ Learn Bioavailability and bioequivalency; FDA requirements 7/ Learn the Pharmacokinetic principles
104. Teaching and Learning Strategies	
Strategy	PowerPoint Presentation, Tutorials (Pen and Whiteboard), Probl Solving
105. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understand dosage form necessity	Pharmaceutical consideration: The need for the dosage form.	Powerpoint, Problem-solving	Formative, summative, quiz
2	2	Identify dosage form components	General consideration of the dosage form	Powerpoint, Problem-solving	Formative, summative, quiz
3	2	Understand pre-formulation principles	Pre-formulation; physical description, microscopic examination.	Powerpoint, Problem-solving	Formative, summative, quiz
4	2	Measure melting point	Melting point; phase r particle size; polymorphi solubility.	Powerpoint, Problem-solving	Formative, summative, quiz
5	2	Evaluate drug permeability	Permeability; pH; partition coefficient; pka; stability; kinetics; shelf life	Powerpoint, Problem-solving	Formative, summative, quiz
6	2	Analyze reaction rate	Rate reaction; enhanc stability.	Powerpoint, Problem-solving	Formative, summative, quiz
7	2	Define and classify excipients	Formulation consideration: Excipients; definition and types; appearance; palatability; flavoring	Powerpoint, Problem-solving	Formative, summative, quiz
Mid-Term exam					
9	2	Understand sweetening and coloring agents	Sweetening; coloring pharmaceuticals; preservatives; sterilization; preservatives selection.	Powerpoint, Problem-solving	Formative, summative, quiz
10	2	Understand drug absorption principles	Biopharmaceutical considerations: Principle drug absorption; dissolut of the drugs.	Powerpoint, Problem-solving	Formative, summative, quiz
11	2	Define bioavailability and bioequivalency	Bioavailability and bioequivalency; FDA requirements	Powerpoint, Problem-solving	Formative, summative, quiz
12	2	Assess drug bioavailability	Assessment of bioavailability;	Powerpoint, Problem-solving	Formative, summative, quiz

			bioequivalence among drug products.		
13	2	Understand pharmacokinetic parameters (half-life, clearance)	Pharmacokinetic princip Half-life; clearance; dos regimen considerations	Powerpoint, Problem-solving	Formative, summative, quiz
14	2	Understand drug discovery processes	Drug discovery and drug design	Powerpoint, Problem-solving	Formative, summative, quiz
Final-term exam					

106.

Quizzes 5%
Reports 5%
Midterm Exam 20%
Final-term Exam 70%

107. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1- Pharmaceutical Dosage Forms and Drug Deliv Systems by Haward A. Ansel. Latest Edition.
Main references (sources)	1- Pharmaceutical Dosage Forms and Drug Delivery Systems by Haward A. Ansel. Latest Edition. 2- Handbook of pharmaceutical excipients, Raymond C Rowe et al, Latest edition.
Recommended books and references (scientific journals, reports…)	1-Applied Biopharmaceutics & Pharmacokinetics, by Leon Shargel et al, seventh edition. 2- British Pharmacopeia, latest edition.
Electronic References, Websites	1-https://www.fda.gov/industry/structured-product-labeling-resources/dosage-forms.

Course Description Form

1. Course Name:
Pharmaceutical biotechnology
2. Course Code: PHC527
3. Semester / Year:
2nd semester/5th year
4. Description Preparation Date:
24/3/2025
5. Available Attendance Forms:
Theory/ attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
15
7. Course administrator's name (mention all, if more than one name)
Name: Ali qasim Email: ali.qasim.ph24@nahrainuniv.edu.iq

8. Course Objectives	
Course Objectives	1-Introduce the Concept of Biotechnology in Pharmacy help students understand what biotechnology means. Show how it's used to make medicines from living cells (like insu and vaccines). 2-Learn How Biotech Medicines Are Made teach the basic steps of how biotech drugs are produced. explain the role of microbes, enzymes, and cells in creating these medicines. 3-Understand Drug Delivery Systems 4-Know the Importance of Safety and Quality teach why we need to check the safety, purity, and strength of biotech drugs. 5-Explore Real-Life Applications Show examples of biotech in real medicine: insulin for diabetes, vaccines, cancer treatments. help students see how biotechnology improves health and saves li

9. Teaching and Learning Strategies	
Strategy	Power Point Presentation, Tutorials (Pen and Whiteboard), Probl Solving

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1		Formulation of biotechnology products Microbiological considerations	Power po Problem solving	Formative, summative, Quiz
2	1		Formulation of biotechnol products Microbiolog considerations	Power po Problem solving	Formative, summative, qui
3	1		Formulation of biotechnology products Microbiological considerations	Power po Problem solving	Formative, summative, qui
4	1		Compound found in parente formulation of biote products	Power po Problem solving	Formative, summative, qui
5	1		Compound found in parenteral formulation of biotech. products	Power po Problem solving	Formative, summative, qui
6	1		Compound found in parente formulation of biote products	Power po Problem solving	Formative, summative, qui
7	1		Delivery of protein; routs of administration and absorption enhancement pharmaceuticals; preservatives; sterilization; preservatives selection	Power po Problem solving	Formative, summative, qui
8			Mid-Term exam		
9	1		Delivery of protein; routs of administration and absorption enhancement pharmaceuticals; preservatives; sterilization; preservatives selectio	Power po Problem solving	Formative, summative, qui
10	1		Pharmacokinetics pharmacodynamics of pept and protein drugs ,Eliminat of protein drugs	Power po Problem solving	Formative, summative, qui
11	1		Pharmacokinetics and pharmacodynamics of peptide and protein drugs ,Elimination of protein drugs	Power po Problem solving	Formative, summative, qui
12	1		Pharmacokinetics pharmacodynamics of pept and protein drugs ,Eliminat of protein drugs	Power po Problem solving	Formative, summative, qui

13	1		Pharmacokinetics pharmacodynamics of pept and protein drugs ,Eliminat of protein drugs	Power po Problem solving	Formative, summative, qui
14	1		Pharmacokinetics pharmacodynamics of pept and protein drugs ,Eliminat of protein drugs	Power po Problem solving	Formative, summative, qui
15			Final-term exam		

11.

Mid term Exam 30%
Final-term Exam 70%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1-Sprowls' American Pharmacy: An Introduction to Pharmaceutical Techniques and Dosage Forms 2-Martin's Physical Pharmacy and Pharmaceutical Sciences 3-Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems 4-Applied biopharmaceutics and pharmacokinetics by Leon Shargel The Theory and Practice of Industrial Pharmacy Herbert Lieberman and Leon Lachman.
Main references (sources)	1-Encyclopedia of Pharmaceutical Technology 2-Physicochemical Principles of Pharmacy by Alexander T. Florence 3-Aulton's Pharmaceutics : The Design Manufacture of Medicines.
Recommended books and references (scientific journals, reports…)	1-British pharmacopoeia 2-United State Pharmacopoeia 3-European Pharmacopeia
Electronic References, Websites	1- https://www.ncbi.nlm.nih.gov 2- https://www.sciencedirect.com

1. Course Name:

Advanced Drug Delivery Systems

2. Course Code: PHG126

3. Semester / Year:

2st semester/ Postgraduate students (MSC degree)

4. Description Preparation Date:

5. Available Attendance Forms:

Theory/ attendance

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

22

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

Assist. Prof. Dr. Yasir Qasim Mohammad
Email:Yasir.Q.Mohammed@nahrainuniv.edu.iq

Assist. Prof. Dr. Hassanain S. Taghi
Email:h.sagban@albayan.edu.iq

Assist. Prof. Dr. Ameerah Abdulelah Radhi
Email: Ameerah.abdulelah@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	**At the end students will be able to:** **1. Introduction to Nanotechnology in Drug Delivery** Understand the fundamentals of nanotechnology and its role in modern drug delivery. Identify different types of nanocarriers and their pharmaceutical applications. **2. Lipid-Based and Polymeric Nanocarriers** Explore lipid-based nanostructures for enhancing oral bioavailabilit of poorly soluble drugs. Understand polymeric nanoparticles as carriers for controlled drug release. **3. Advanced Nanocarrier Systems** Investigate nanoemulgels as novel topical drug delivery tools. Study magnetically modulated drug delivery for targeted therapy.

	Examine porous carriers for improved drug loading and release kinetics. **4. Nanoparticles in Cancer Therapy & Disease-Specific Applications** Understand nanoparticle-based drug delivery in cancer treatment a passive/active targeting. Explore colon-specific drug delivery for targeted gastrointestinal treatments. Discuss nanotechnology approaches for blood-brain barrier (BBB) transport in CNS drug delivery. **5. Nanotechnology in Herbal & Phytochemical Drug Delivery** Examine nanotechnology's role in enhancing phytochemical bioavailability and stability. Understand challenges in herbal drug solubility and targeted delive **6. Cutting-Edge Research & Emerging Technologies** Review artificial intelligence's impact on drug discovery and nanomedicine development. Explore electrospinning techniques for designing novel drug delive carriers. Understand spherical crystallization and liquisolid technology for optimizing drug formulation. **7. Characterization & Regulatory Aspects** Learn techniques for nanocarrier characterization (DLS, TEM, SEM FTIR, etc.). Understand FDA and EMA regulations for nanopharmaceuticals. Assess safety, toxicity, and ethical considerations in nanomedicine

9. Teaching and Learning Strategies

Strategy	Power Point Presentation, Tutorials (Pen and Whiteboard),

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Drug delivery	present, past, and future of medicine	Smartboard, whiteboard	Discussion
2	2	Lipid-based nanostructured drug delivery systems Spherical crystallizat techniques	for oral bioavailability enhancem of poorly water-soluble drugs,	Smartboard, whiteboard	Discussion

3	2	An overview of liquisolid technology, Porous carriers in drug delivery systems	for oral bioavailability enhancem of poorly water-soluble drugs,	Smartboard, whiteboard	Discussion
4	2	Polymeric nanoparticles as carrier for controlled release, Magnetically modulated drug delivery systems	for oral bioavailability enhancem of poorly water-soluble drugs, drug targeting and theragnostic use	Smartboard, whiteboard	Discussion
5			Mid-Term		
6	2	Recent advances in colon-specific drug delivery system, Fast dissolving films as drug delivery system	drug targeting and theragnostic use bypass first pass metabolism and enhance drug absorption	Smartboard, whiteboard	Discussion
7	2	Recent Progress in Blood–Brain Barrier and Blood–CSF Barrier Transport Research:Pharmaceutical Relevance for Drug Delivery to the Brain	New approaches to reach brain	Smartboard, whiteboard	Discussion
8	٢	Novel Multi-component Nano pharmaceuticals for A HIV Effects	New methods of treatments	Smartboard, whiteboard	Discussion
9	2	Hydrogel-based drug delivery systems: Smart gels, 3 D printing of hydrogels, hydrogels-based microneedles, polymer-free gels	New strategy for treatm and based disorder	Smartboard, whiteboard	Discussion
10	2	Nanotechnology- based drug delivery systems phytochemical compounds, Nanoemulgel: A novel nano carrier as a tool for topical drug delivery	Natural products in nanotechnology penetration enhancer of topical drugs	Smartboard, whiteboard	Discussion
11	2	Nanoparticle-based drug delivery in cancer therapy, Characterization of nanocarriers	Role and benefits of drug loaded nanoparticles for cancer	Smartboard, whiteboard	Discussion
12	2	Nanoparticles in Cosmetics	Revolution in cosmetics	Smartboard, whiteboard	Discussion
14			Final Exam		
11 Course Evaluation					
Mid- term Exam 30%					

Final Exam 70%	
11. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	
Main references (sources)	Aulton's Pharmaceutics: The Design and Manufacture of Medicines by: Michael E. Aulton and Kevin M. G. Taylor Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems Ninth Edition
Recommended books and references (scientific journals, reports…)	Shargel L. Applied biopharmaceutics a Pharmacokinetics: The desig and manufacture medecines.
Electronic References, Websites	

1. Course Name:
Advanced biopharmaceutics
2. Course Code: PHG112
3. Semester / Year:
1st semester/ Postgraduate students (MSC degree)
4. Description Preparation Date:
5. Available Attendance Forms:
Theory/ attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
30
7. Course administrator's name (mention all, if more than one name)
Assist. Prof. Dr. Ameerah Abdulelah Radhi Email: Ameerah.abdulelah@nahrainuniv.edu.iq Assist. Prof. Dr. Yasir Qasim Mohammad Email: Assist. Prof. Dr. Hassanain S. Taghi
8. Course Objectives

Course Objectives	**At the end students will be able to:** **1. Describe the factors affecting bioavailability of drugs.** **2. Define dissolution and solubility** **3. Identify the differences in Pharmacokinetic properties of small molecules, biologics, drug delivery systems** **4.Identify different mechanisms of drugs Diffusion through biological membranes** **5. Identify the mathematical models of drug release from dosage forms** **6. Describe various technologies to improve the solubility and bioavailability of different drugs**

9. Teaching and Learning Strategies	
Strategy	Power Point Presentation, Tutorials (Pen and Whiteboard),

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Bioavailability of drugs	Controlling factors; physiologic factors influence oral absorption	Smartboard, whiteboard	Discussion
2	2	Bioavailability of drugs	Controlling factors; Physicochemical factors	Smartboard, whiteboard	Discussion
3	2	Dissolution and solubility	Dissolution rate of solids liquids, factors affecting the rate dissolution	Smartboard, whiteboard	Discussion
4	2	Dissolution and solubility	Solubility, determination of solubility of solids in liquids, factors affecting the solubi of solids in liquids	Smartboard, whiteboard	Discussion
5	2	Pharmacokinetic Pharmacodynamic Properties of Drug Delivery Systems	Pharmacokinetic properties of small molecules, biologics, drug delivery systems	Smartboard, whiteboard	Discussion
6	2	Diffusion	Mechanisms of drugs Diffusion through biological membranes	Smartboard, whiteboard	Discussion
7	٢	Diffusion	Modelling drug release	Smartboard, whiteboard	Discussion
8			Mid-Term		
9	2	Bioavailability Enhancement Technique	Technologies to improve the solubility and bioavailability of poorly water-soluble drugs	Smartboard, whiteboard	Discussion
10	2	Modified release peroral dosage forms	Maintenance of therapeutics drug concentration by Modified release peroral dosage forms	Smartboard, whiteboard	Discussion
11	2	Nanotechnology based- drug delivery systems	Current Applications of Nanoparticles in Therapeutics	Smartboard, whiteboard	Discussion
12	2	Oral insulin preparations	Oral insulin delivery strategies	Smartboard, whiteboard	Discussion
13	2	Ocular drug delivery	Penetration enhancers in ocular drug delivery	Smartboard, whiteboard	Discussion
14			Final Exam		

11 Course Evaluation

Mid- term Exam 30%
Final Exam 70%

11. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Aulton's Pharmaceutics: The Design and Manufacture of Medicines by: Michael E. Aulton and Kevin M. G. Taylor

	Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems Ninth Edition
Recommended books and references (scientific journals, reports…)	Shargel L. Applied biopharmaceutics a Pharmacokinetics: The desig and manufacture medecines.
Electronic References, Websites	