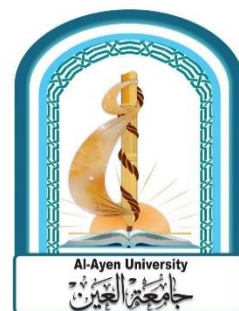




Republic of Iraq
Ministry of Higher Education & Scientific Research
Supervision and Scientific Evaluation Directorate
Quality Assurance and Academic Accreditation
International Accreditation Dept.

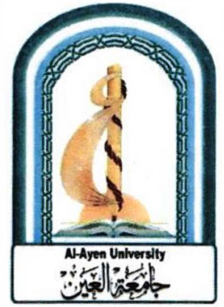


Al-Ayen University

Academic Program Specification for Department of pharmaceuticals 2022-2023

Al-Ayen University

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PROGRAM SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATION

This program specification provides a concise summary of the main features of the program and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the program.

1. Educational institution	Ministry of Higher Education and Scientific Research - Al-Ayen University
2. University department / Center	College of pharmacy
3. Academic program	pharmaceutics
4. The title of the final granted degree	Bachelor of Pharmacy
5. The educational system	Courses system
6. Accreditation program	Under preparation
7. Other external influences	Theoretical lectures + Educational laboratories + hospital training + pharmacy training
8. Date of description form preparation//Revision of this specification	25/9/2022

9. Academic Program Objective.

1. Enable students to become familiar with the principles of pharmacy and pharmaceutical accounts.
2. Enabling students to get acquainted with the physical and chemical characteristics of medicines and additives in preparing various medicinal formulations
3. Enabling students to acquire and understand the processes of preparing, manufacturing, and storing medicines in an appropriate and good manner.
4. Enabling students to get acquainted with the latest medical devices and technologies for the pharmacy and pharmacology sciences.

5. Enabling students to become familiar with the principles of drug dosage design.
6. Preparing students who are qualified and able to practice the profession of pharmacist in the public and private sectors.
7. Enabling students to acquire self-learning skills and to familiarize themselves with the most important sources of knowledge and learning to develop their specialized and general abilities.
8. Enabling students to develop knowledge and laboratory skills through laboratory work using many techniques and chemical devices.
9. Harmonization between theoretical trends and practical reality in the pharmacy sciences.



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10. Required program outcomes and teaching, learning, and assessment methods.

A. Cognitive goals

1. Enable students to acquire and understand physical pharmacy and pharmaceutical technology.
2. Enabling students to acquire and understand industrial pharmacy and dosage form design.
3. Enabling students to acquire and understand different drug dosage manufacturing processes and evaluation methods.
4. Enabling students to acquire and understand the biopharmaceutics and pharmacokinetics in the body.
5. Enabling students to acquire and understand pharmaceutical biotechnology in addition to enabling students to identify the most important references and sources in pharmacy science

B. The skill goals of the program

1. Enabling students to acquire drug preparation skills according to the medical conditions diagnosed by the physician, besides possessing the skills of preparing drug doses.
2. Enabling students to possess the skills of drug storage and possessing the capabilities of pharmaceutical accounts.
3. Enabling students to possess working skills in laboratories and conduct scientific experiments with possession of drug improvement capabilities.
4. Enabling students to read and interpret all medical and pharmacy terms and symbols to possess the skills of using scientific research tools in the academic field.
5. Enabling students to acquire the skills of calculating the validity period and degree of stability of the drug.

Teaching and learning methods for cognitive and skills goals:

- 1. lectures production**
- 2. PowerPoint presentation**
- 3. Scientific practice**
- 4. Writing scientific reports on topics that relate to the vocabulary of the subject before the students**
- 5. Research procedures and how to present the results**
- 6. Training in private pharmacies**
- 7. Making scientific boosters**

Assessment methods

1. Mid term exams
2. Short exams
3. Conducting discussions and oral examinations
4. Evaluating students' skills by evaluating students during practical lessons
5. The final exam

C. Affective and value goals

1. Respect the patient's independence and preferences.
2. Training students to respect the rights of beneficiaries of their profession, culture, religion, gender, and race.
3. Developing students' sense of responsibility during study and work, and enhancing the spirit of cooperation and teamwork when requested.
4. Supporting drug culture among students and community members.
5. Educating students about professional humanitarian work and promoting and consolidating professional and ethical values among students to practice the profession of pharmacist.
6. Raising students on a culture of integrity and fighting corruption in all its forms

Teaching and learning methods

1. Use the strategy of cooperation and assistance during the educational process.
- 2- Field visits to the relevant ministries and educational institutions.
- 3- Holding seminars, courses, and workshops for students that encourage spiritual values.
- 4- Forming a discussion group during the lecture.

Assessment methods

- 1- Observing students' interaction with patients
- 2- Case-based scenarios
- 3- Homework
- 4- Conducting volunteer campaigns
- 5- Questionnaires

D. General and rehabilitative transferred skills (other skills relevant to employability and personal development)

1. Skills in reading prescriptions and how to counsel effectively.
2. Skills in using various computer programs, such as basic Office programs.
3. Gaining the ability to give lectures and seminars.
4. Decision-making skills
5. Listening skills

Teaching and learning methods

- 1- Using a strategy of cooperation and assistance during the education process
- 2- Field visits to relevant ministries and educational institutions
- 3- Holding seminars, courses, and workshops for students that encourage spiritual values
- 4- Form a discussion group during the lecture
- 5- Assigning students tasks that require subjective explanations in causal ways.

Assessment methods

- 1- Oral discussions and written examinations.
- 2- Reviewing thinking and analysis skills, presenting results, and using new methods in learning

11. The program structure

Level/Stage	Course code	Course Title	Credit Hours	
			Theoretical	Practical
First	PH1102	Principle of pharmacy	2	-
First	PH1202	Pharmaceutical calculation	2	2
Second	PH2103	Physical pharmacy 1	3	2
Second	PH2203	Physical pharmacy 2	3	2
Third	PH3103	Pharmaceutical technology 1	3	2
Third	PH3203	Pharmaceutical technology 2	3	2
Forth	PH4104	biopharmacy	2	2
Forth	PH4205	Industrial pharmacy 1	3	2
Fifth	PH5102	Industrial pharmacy 2	3	2
Fifth	PH5107	Graduation Project	1	-
Fifth	PH5206	Dosage form design	2	-
Fifth	PH5207	Pharmaceutical biotechnology	1	-

12. Planning for personal development

1. Participation in training courses held within the college.
2. Participation in the professional courses held at the college within the prescribed curriculum, as well as the professional education courses held at the Pharmacists Syndicate after graduation, which helps in developing the graduate's personal skills within the professional and functional aspects.
3. There are specific modules within the program for personal development that give students the opportunity and encourage them to engage in professionally relevant qualifications that allow the students to reflect on their own professional development.

13. Admission Criteria

This is done according to the acceptance rate in the medical group (Faculty of Pharmacy) within the electronic form approved by the Ministry of Higher Education and Scientific Research (central admission).

14. The most important sources of information about the program

1. Pharmaceutical Calculation, Howard C Ansel, 13 th Edition 2010 Wolters Kluwer Lippincott Williams & Wilkins
2. Martin's physical pharmacy and pharmaceutical sciences, Patrick J. Sinko. Wolters Kluwer. Lippincott Williams & Wilkins. Philadelphia. 2011.
3. Lab manual for physical pharmacy adopted by the department of Pharmaceutics.
4. Lewis W. Dittert, "American pharmacy", Lippincott. Company, 1974.
5. Pharmaceutical dosage forms and drug delivery systems by Haward A. Ansel.
6. Lab manual for pharmaceutical technology by the department of pharmaceutics
7. Aulton's Pharmaceutics: The Design and Manufacture of Medicines, Third edition, Michael E. Aulton (Author). Churchill, Livingstone- Elsevier. (2007)
8. Shargel L., Yu AB., (Eds). Applied Biopharmaceutics and Pharmacokinetics, Fifth edition, International Edition 2005.
9. Lab manual for biopharmaceutics.
10. Theory and practice in industrial pharmacy by Lachmann (2009).
11. Pharmaceutical biotechnology by J.A. Crommelin, Robert D. Syinder.
12. Pharmaceutical biotechnology Fundamentals and Applications 4th Edition by Daan J. A. Crommelin, Robert D. Sindelar, Bernd Meibohm. 2013

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Curriculum Skills Map

Please tick the relevant boxes where individual Program Learning Outcomes are being assessed

Learning outcomes of the program

Year / Level	Course code	Course name	Basic or optio nal	Cognitive goals							Skill goals of the program										Affective and value goals						General and rehabilitative skills				
				A							B										C						D				
				1	2	3	4	5	6	7	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	1	2	3	4	5
First	PH1102	Principle of pharmacy practice	Basic				√				√		√							√	√					√			√		
First	PH1202	Pharmaceutical calculation	Basic				√				√	√	√							√						√		√	√		
Second	PH2103	Physical pharmacy	Basic	√								√												√		√		√	√		
Second	PH2203	Physical pharmacy	Basic	√								√												√		√		√	√		
Third	PH3103	Pharmaceutical technology	Basic	√					√																				√		
Third	PH3203	Pharmaceutical technology	Basic		√																	√		√	√	√	√	√	√		
Fourth	PH4104	Biopharmaceutics	Basic				√							√											√		√	√			
Fourth	PH4205	Industrial pharmacy	Basic		√	√					√			√											√		√	√			
Fifth	PH5102	Industrial pharmacy	Basic		√	√					√			√											√			√			
Fifth	PH5206	Dosage form design	Basic		√	√																			√	√		√			√
Fifth	PH5207	Pharmaceutical biotechnology	Basic					√						√										√		√	√		√		√

COURSE SPECIFICATION

In this course the students will understand the components of typical prescription, the different unit systems and the relation between these systems. Students will also be familiar with the methods and tools of measuring weights and volumes, and how to calculate doses on different bases. Involves brief information about old pharmacy. It

1. Educational institution	Al-Ayen University - College of Pharmacy
2. College department/Center	Pharmaceutics
3. Course title/code	Principle of pharmacy practice PH1102
4. Modes of Attendance offered	Full-time and official attendance hours
5. Semester/Year	1 st semester 2022-2023
6. Credits (total)	30 hrs
7. Date of description form preparation//Revision of this specification	25/9/2022
8. Course Objectives Enable students to interpret a prescription or drug system and use the metric system and the old pharmacy system in pharmaceutical calculations. To calculate the dose and use some basic measurements and calculations. Calculations of density, specific gravity, and specific volume	

9. Learning Outcomes, Teaching, Learning, and Assessment Method

1. Cognitive goals

1. Enabling students to be familiar with the types of numbers, the abbreviations commonly used in prescriptions, and their meanings.
2. Enable students to understand the components of the typical prescription, the system of different units, and the relationship between them.
3. Enabling students to acquire and understand tools for measuring weights and volumes.
4. Enabling students to learn how to calculate drug doses on different bases.
5. Enabling students to collect and understand how to reduce and enlarge Prescriptions

2. The skills goals special to the course

- 1- Enabling students to have the abilities of pharmaceutical accounts.
- 2- Enabling students to acquire the skills of writing scientific reports.
- 3- Enable students to have skilled work in laboratories and conduct scientific experiments
- 4- Enable students to read and interpret all medical and pharmacy terms and symbols

Teaching and Learning Methods

- 1- PowerPoint and Multimedia presentation
- 2- Class discussion
- 3- attendance lectures
- 4- Presenting discussion cases of ethical dilemmas

Assessment methods

- 1- Short MCQs
- 2- Oral exam and direct questions in the class
- 3- Midterm exam
- 4- Electronic exams on the electronic platform
- 5- Final exam

c-Affective and value goals

1. To uphold the highest standards of ethical conduct and professional conduct in all aspects of therapeutic decision-making and patient care.
2. Demonstrate commitment to patient safety.
3. Evidence-based practice.
4. Respect the patient's autonomy and preferences.
5. Collaborate effectively with other health care professionals.
6. Raising students to respect human dignity and freedom to make decisions.
7. Raising students on humanitarian and professional work.
8. Promoting and consolidating professional and ethical values among students practicing the profession of pharmacist.
9. Raising students on a culture of integrity and fighting corruption in all its forms.
10. Training students to respect the rights of patients regardless of their profession, culture, religion, gender, and custom.
11. Training students to respect the freedom of thought, expression, and creativity of others.
12. Developing students' sense of responsibility during the period of study and work.
13. Supporting drug culture among students and community members.
14. Enhancing the spirit of cooperation and teamwork among students.

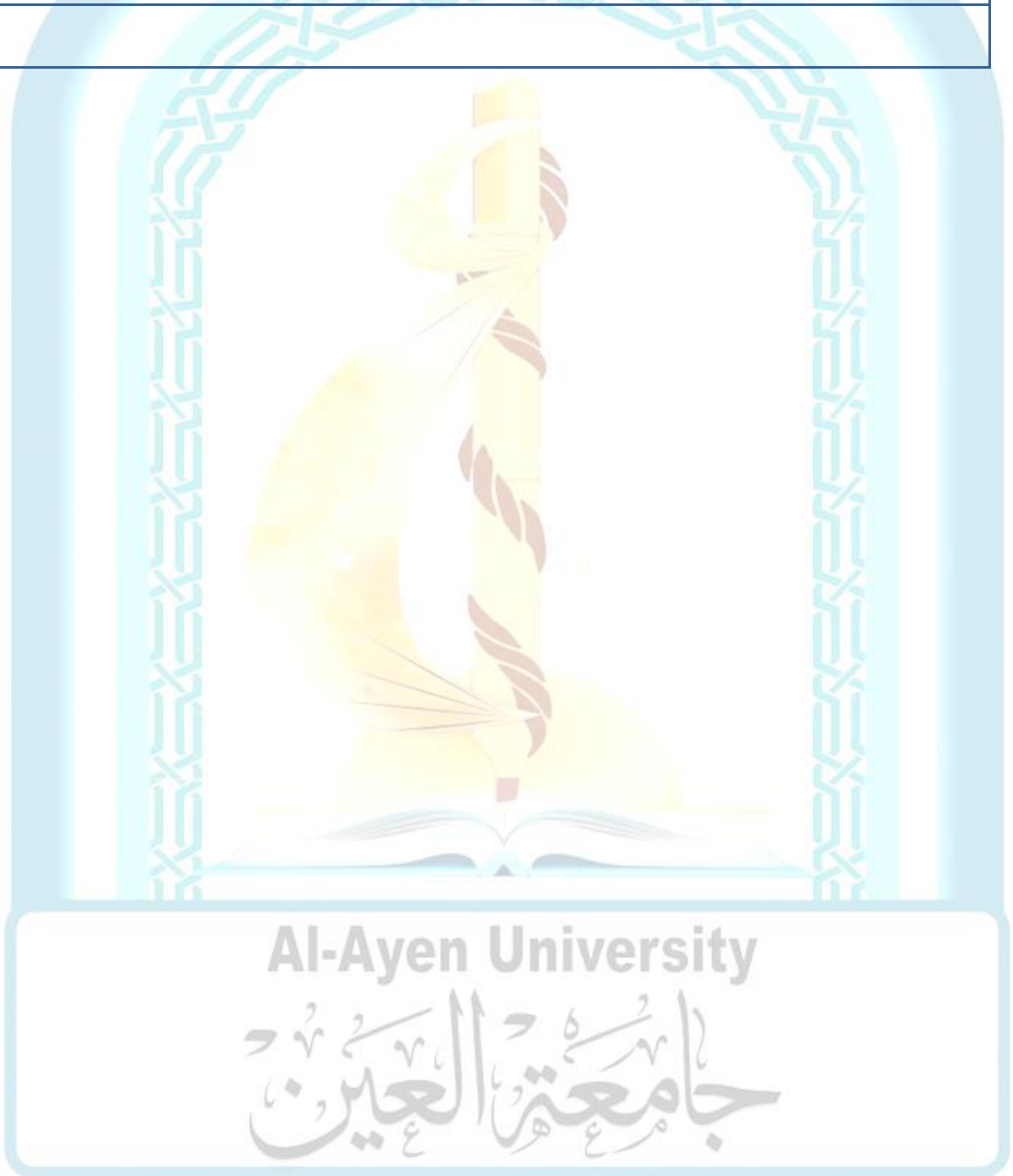
Teaching and Learning Methods

- 1- Case studies
- 2- Group discussions

- 3- Lectures
- 4- Power Point presentation

Assessment methods

1. Homework
2. Electronic MCQs on the electronic platform



10. Course Structure

Week	Hrs	ILOs	Unit/Module or Topic Title	Teaching methods	Assessment methods
1	2	A5,B2,B4,B10,C1,D1,D4	Principles of pharmacy calculations	Smart board	Discussions and practical outcome evaluation
2	2	A5,B2,B4,B10,C1,D1,D4	Prescription and medication orders		
3	2	A5,B2,B4,B10,C1,D1,D4	Translate prescription and medication orders		
4	2	A5,B2,B4,B10,C1,D1,D4	International system of units		
5	2	A5,B2,B4,B10,C1,D1,D4	International system of units		
6	2	A5,B2,B4,B10,C1,D1,D4	Common system of measurements and intersystem conversion		
7	2	A5,B2,B4,B10,C1,D1,D4	Common system of measurements and intersystem conversion		
8	2	A5,B2,B4,B10,C1,D1,D4	Dose calculations General considerations		
9	2	A5,B2,B4,B10,C1,D1,D4	Dose calculations General considerations		
10	2	A5,B2,B4,B10,C1,D1,D4	Dose calculations Patient parameters		
11	2	A5,B2,B4,B10,C1,D1,D4	Dose calculations Patient parameter		
12	2	A5,B2,B4,B10,C1,D1,D4	Density and specific gravity and specific volume		
13	2	A5,B2,B4,B10,C1,D1,D4	Reducing and enlarging the formula		
14	2	A5,B2,B4,B10,C1,D1,D4	Reducing and enlarging the formula		

11. Infrastructure	
Books Required reading	Pharmaceutical Calculation, Howard C. th Edition2010 Wolters Kluwer Lippincott Williams &Wilkins.
Main references (sources)	
Recommended books and references (scientific journals, reports...).	
Electronic references, Internet sites...	

12. Course development plan
none

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COURSE SPECIFICATION

The course teaches calculations for dilution and concentration of different types of liquids and those involved in preparing isotonic solutions, electrolyte solutions and intravenous admixtures. It involves computation of pharmaceutical ingredients, dosage forms, pharmaceutical formulations of extemporaneous compounding, and biological

1. Educational institution	Al-Ayen University - College of Pharmacy
2. College department/Center	pharmaceutics
3. Course title/code	Pharmaceutical calculation PH1202
4. Modes of Attendance offered	Full-time and official attendance hours
5. Semester/Year	Second semester 2022-2023
6. Credits (total)	30 hr theory & 30 hr practical/ semester
7. Date of description form preparation//Revision of this specification	25/9/2022
8. Course Objectives	
1. The use of calculations in pharmacy is varied and broad-based. As pharmaceutical 2. calculations are concerned in several areas, including commercial and research, especially in industry, academics, and government institutions. 3. Applications of pharmaceutical calculations include: the physical and chemical properties of the drug, the biological effectiveness and the speed of absorption of the drug, the spread of the drug in the body, the metabolic changes of the drug and its excretion, statistical information for research and clinical studies of drugs, the development and formulation of drug products, the calculation of drug doses, pharmacoeconomics and other fields	

9. Learning Outcomes, Teaching, Learning, and Assessment Method

A. Cognitive goals

1. Enable students to become familiar with the types of numbers, the abbreviations commonly used in prescriptions, and their meanings.
2. Enable students to understand the components of the typical recipe, the system of different units, and the relationship between them
3. Enabling students to acquire and understand tools for measuring weights and volumes
4. Enabling students to learn how to calculate drug doses on different bases.
5. Enable students to obtain and understand how to reduce and enlarge prescriptions.

B. The skills goals special to the course

- 1- Enable students to possess the capabilities of pharmaceutical calculations.
- 2- Enabling students to acquire the skills of writing scientific reports.
- 3- Enable students to have skilled work in laboratories and perform scientific experiments.
- 4- Enable students to read and interpret all medical and pharmaceutical terms and

Teaching and Learning Methods

- 1- Multimedia lectures
- 2- Directing students to some websites to benefit from them.
- 3- Power Point presentation

Assessment methods

- 1- Short MCQs
- 2- Oral exams and direct questions in the class
- 3- Midterm exam
- 4- Final exam
- 5- Electronic exams on the electronic platform

C. Affective and value goals

1. Adhere to the highest standards of ethical conduct and professional conduct in all aspects of therapeutic decision-making and patient care.
2. Demonstrate commitment to patient safety.
3. Evidence-based practice.
4. Respect the patient's autonomy and preferences.
5. Collaborate effectively with other health care professionals.
6. Raising students to respect human dignity and freedom to make decisions.
7. Raising students on humanitarian and professional work.
8. Promoting and consolidating professional and ethical values among students practicing the profession of pharmacist.
9. Raising students on a culture of integrity and fighting corruption in all its forms.
10. Training students to respect the rights of patients regardless of their profession, culture, religion, gender, and custom.
11. Training students to respect the freedom of thought, expression, and

creativity of others.

12. Developing students' sense of responsibility during the period of study and work.
13. Supporting drug culture among students and community members.
14. Enhancing the spirit of cooperation and teamwork among students.

Teaching and Learning Methods

1. Group discussions
2. Lectures
3. Power Point presentation
4. Electronic exams on the electronic platform

Assessment methods

1. Homework
2. Electronic exams on the electronic platform

D. General and rehabilitative transferred skills (other skills relevant to employability and personal development)

1. Determine the appropriate medication at the appropriate dose for an individual or multiple disease condition.
2. Solve problems and design treatment plans and schedules to achieve goals on time.
3. To be able to work in the hospital's pharmacy and specialized departments.

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10. Theory Course Structure

Week	Hrs	ILOs	Unit/Module or Topic Title	Teaching methods	Assessment methods
1.	2	A5,B2,B3,B4,C1,D1,D5	Isotonic solutions	Smart & white board, handout Electronic Schools, Free Conference call	Discussion and practical work evaluation and assessments
2.	2	A5,B2,B3,B4,C1,D1,D5	Apply physical chemical principles in the calculation of isotonic solutions		
3.	2	A5,B2,B3,B4,C1,D1,D5	Perform the calculations required to prepare isotonic component prescription		
4.	2	A5,B2,B3,B4,C1,D1,D5	Calculate the milliequivalent weight from and atomic or formula weight		
5.	2	A5,B2,B3,B4,C1,D1,D5	Convert between milligrams and milliequivalents		
6.	2	A5,B2,B3,B4,C1,D1,D5	Calculate problems Involving milliequivalents		
7.	2	A5,B2,B3,B4,C1,D1,D5	Calculate problems Involving millimoles and milliosmoles.		
8.	2	A5,B2,B3,B4,C1,D1,D5	Perform calculations for altering product strength by dilution		
9.	2	A5,B2,B3,B4,C1,D1,D5	Perform calculations for altering product strength by concentration		
10.	2	A5,B2,B3,B4,C1,D1,D5	Perform calculations for preparation and use of stock solutions.		
11.	2	A5,B2,B3,B4,C1,D1,D5	Apply allegation medial and allegation alternate in problem-solving.		
12.	2	A5,B2,B3,B4,C1,D1,D5	Perform calculations for adults and pediatric intravenous infusions.		
13.	2	A5,B2,B3,B4,C1,D1,D5	Perform calculations for intravenous additives.		

14	2	A5,B2,B3,B4,C1,D1,D5	Perform rate of flow calculations for intravenous fluids.		
15	2	A5,B2,B3,B4,C1,D1,D5	Utilize the correct rate of flow tables and nomograms.		



10. Laboratory Course Structure

Week	Hrs	ILOs	Unit/Module or Topic Title	Teaching methods	Assessment methods
1	2	A5,B2,B3,B4,C1,D1,D5	Demonstration of different glass wares and equipment used in the field of pharmacy	Smart & white board	Discussion and practical work evaluation and assessments
2	2	A5,B2,B3,B4,C1,D1,D5	Pharmaceutical measurements		
3	2	A5,B2,B3,B4,C1,D1,D5	Volume measurements		
4-5	4	A5,B2,B3,B4,C1,D1,D5	Preparation of aromatic waters		
6-7	4	A5,B2,B3,B4,C1,D1,D5	Preparation of simple solutions		
8-10	6	A5,B2,B3,B4,C1,D1,D5	Reducing and enlarging prescription contents		
11-12	4	A5,B2,B3,B4,C1,D1,D5	Percentages in calculating prescription contents		
13-15	6	A5,B2,B3,B4,C1,D1,D5	Stock solutions and dilution technique during dispensing technique		

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11. Infrastructure	
Books Required reading	Pharmaceutical calculations 1 “, Ansel Wolters Kluwer. , 2010.
Main references (sources)	Aulton's Pharmaceutics: The Design and Manufacture of Medicines, 3ed Michael E. Aulton (Author) Churchill,
Recommended books and references (scientific journals, reports...).	
Electronic references, Internet sites...	

12. Course development plan
Not available

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To understand the application of quantitative and theoretical principles of the physical characters of matter in the practice of pharmacy. It aids the pharmacists in their attempt to predict the solubility, compatibility and biological activity of drug products. As a result of this knowledge it will help in the development of new drugs and dosage forms

1. Educational institution	Al-Ayen University - College of Pharmacy
2. College department/Center	pharmaceutics
3. Course title/code	Physical pharmacy 1/ PH2103
4. Modes of Attendance offered	Full-time and official attendance hours
5. Semester/Year	First semester 2022-2023
6. Credits (total)	45 hr theory & 30 hr practical/ semester
7. Date of description form preparation//Revision of this specification	25/9/2022
8. Course Objectives	
In the theoretical part: to understand and apply quantitative and theoretical principles of different states of matter and ways to benefit from them in the fields of pharmacy. It also helps the pharmacist calculate the solubility, compatibility, and biological activity of drugs. As a result of this knowledge, will help in the development of new drugs and formulations as well as in improving various drug delivery methods.	

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9. Learning Outcomes, Teaching, Learning, and Assessment Method

a- Cognitive goals

- 1- Enabling students to identify states of matter.
- 2- Enabling students to acquire and understand thermodynamics.
- 3- Enabling students to collect and understand electrolyte and non-electrolyte solutions.
- 4- Enabling students to obtain and understand ionic balance and buffers

b- The skills goals special to the course

1. Enabling students to acquire skills in solving mathematical problems related to the course.
2. Enabling students to possess medication storage skills
3. Enabling students to possess the skills to work in laboratories and conduct scientific experiments
4. Enabling students to acquire the skill of writing scientific reports

Teaching and Learning Methods

- 1- Multimedia lectures
- 2- Group discussion
- 3- Workshops and seminars
- 4- Presentation of cases
- 5- Power Point presentation

Assessment methods

1. Short tests
2. Oral exam and direct questions
3. Midterm exam
4. Electronic exams on the electronic platform
5. Final exam

c- Affective and value goals

1. Adhere to the highest standards of ethical behavior and professional behavior in all aspects of treatment decision-making and patient care.
2. Demonstrating commitment to patient safety.
3. Evidence-based practice. A4- Respect the patient's autonomy and preferences.
4. Collaborate effectively with other health care professionals

Teaching and Learning Methods

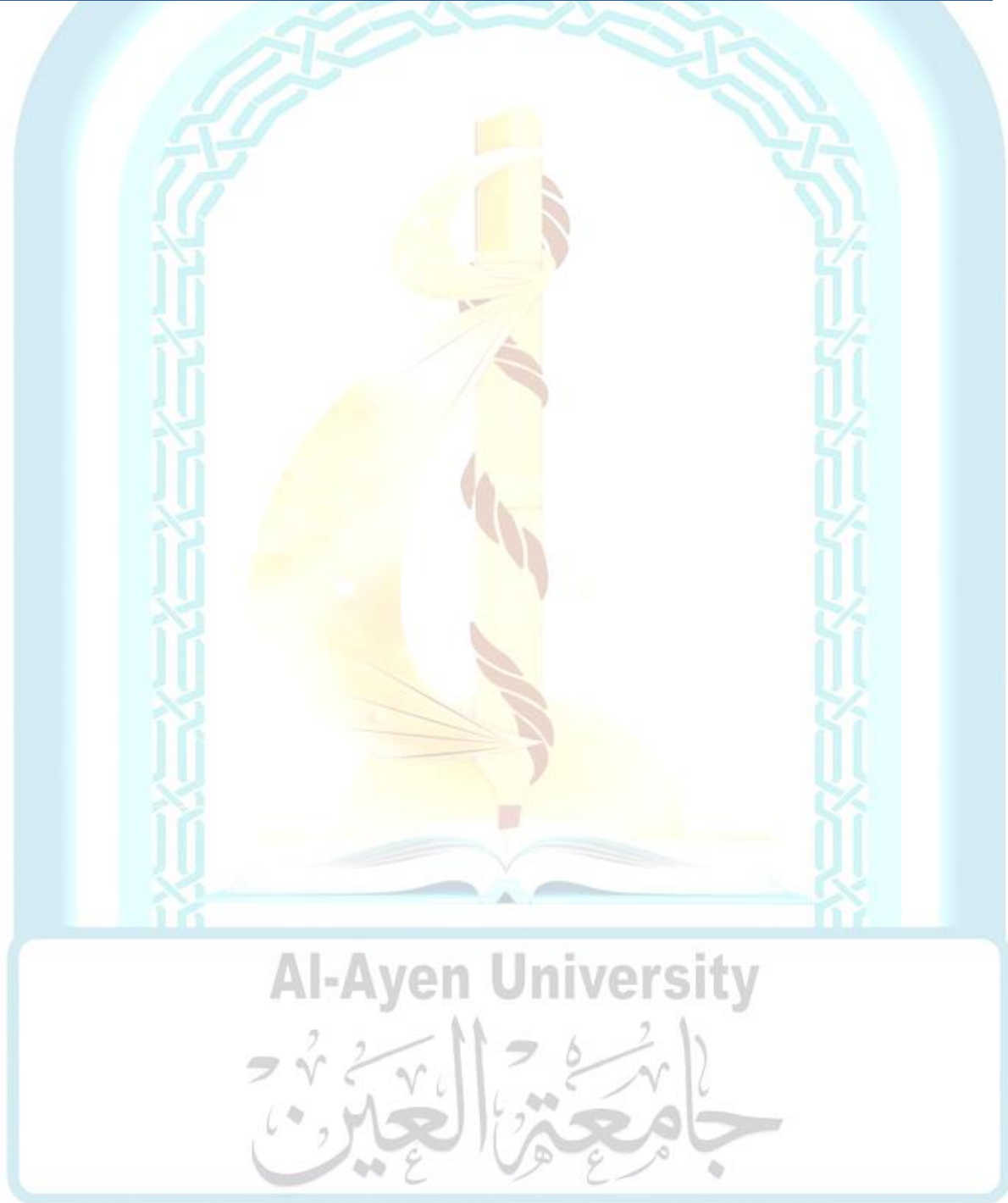
- 1- Group discussions
- 2- Lectures
- 3- Small group tasks
- 4- Power Point presentation

Assessment methods

1. Homework
2. Role-playing scenarios
3. Electronic exams on the electronic platform

d- General and rehabilitative transferred skills (other skills relevant to employability and personal development)

- 1. Raising students on humanitarian and professional work.**
- 2. Developing students' sense of responsibility during the period of study and work.**
- 3. Supporting drug culture among students and community members.**
- 4. Enhancing the spirit of cooperation and teamwork among students**



10. Theory Course Structure

Week	Hrs	ILOs	Unit/Module or Topic Title	Teaching methods	Assessment methods
1.	3	A1,B3,C5,D1,D3,D4	Stats of matter: Ionic forces	Lectures Discussion data show	Written and oral exams and direct questions
2.	3	A1,B3,C5,D1,D3,D4	Liquid and solid state		
3.	3	A1,B3,C5,D1,D3,D4	Gaseous state		
4.	3	A1,B3,C5,D1,D3,D4	Thermodynamic: First law of thermodynamic		
5.	3	A1,B3,C5,D1,D3,D4	Thermodynamic: Second law of thermodynamic		
6.	3	A1,B3,C5,D1,D3,D4	Thermodynamic: Third law of thermodynamic		
7.	3	A1,B3,C5,D1,D3,D4	Solution of non Electrolyte: Property		
8.	3	A1,B3,C5,D1,D3,D4	Solution of electrolyte: Law and equations		
9.	3	A1,B3,C5,D1,D3,D4	Solution of electrolyte: Property		
10.	3	A1,B3,C5,D1,D3,D4	Solution of electrolyte: Law and equations		
11.	3	A1,B3,C5,D1,D3,D4	Ionic equilibrium: Acid-base theory		
12.	3	A1,B3,C5,D1,D3,D4	Ionic equilibrium: Equations for different cases		
13.	3	A1,B3,C5,D1,D3,D4	Buffer: Type and preparation		
14.	3	A1,B3,C5,D1,D3,D4	Buffer: Isotonic solution		
15.	3	A1,B3,C5,D1,D3,D4	Buffer: Isotonic solution		

10. Laboratory Course Structure

Week	Hrs	ILOs	Unit/Module or Topic Title	Teaching methods	Assessment methods
1	2	A1,B3,C5,D1,D3,D4	Introduction to physical pharmacy	Lectures Discussion data show	Written and oral exams, seminar and direct questions
2-3	4	A1,B3,C5,D1,D3,D4	Expression of concentrations in pharmaceutical preparation		
4-5	4	A1,B3,C5,D1,D3,D4	Two-component systems containing liquid phases		
6-7	4	A1,B3,C5,D1,D3,D4	Three-component systems		
8-9	4	A1,B3,C5,D1,D3,D4	Tie linear for three-component systems		
10	2	A1,B3,C5,D1,D3,D4	Partition coefficient: Measurements and evaluation		
11-12	4	A1,B3,C5,D1,D3,D4	Solubility methods		
13-14	4	A1,B3,C5,D1,D3,D4	Buffer solution		
15	2	A1,B3,C5,D1,D3,D4	Determination of solubility product constant of slightly soluble salts		

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11. Infrastructure	
Books Required reading	Pharmaceutical Dosage forms and drug delivery Edited By Ram I. Mahato, Ajit S. Narang by Taylor & Francis Group, LLC Third Edition
Main references (sources)	1- Martin's physical pharmacy and pharmaceutical sciences, Patrick J. Sinko . Wolters Kluwer. Lippincott Williams & Wilkins. Philadelphia. 2011. 2- Lab manual for physical pharmacy adopted by the department
Recommended books and references (scientific journals, reports...).	
Electronic references, Internet sites...	
12. Course development plan	
Not available	

Al-Ayen University

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To understand the application of quantitative and theoretical principles of the physical characters of matter in the practice of pharmacy. It aids the pharmacists in their attempt to predict the solubility, compatibility and biological activity of drug products. As a result of this knowledge it will help in the development of new drugs and dosage forms

1. Educational institution	Al-Ayen University - College of Pharmacy
2. College department/Center	pharmaceutics
3. Course title/code	Physical pharmacy 2/ PH2203
4. Modes of Attendance offered	Full-time and official attendance hours
5. Semester/Year	Second semester 2022-2023
6. Credits (total)	45 hr theory & 30 hr practical/ semester
7. Date of description form preparation//Revision of this specification	25/9/2022
8. Course Objectives In the theoretical part: to understand and apply quantitative and theoretical principles of different states of matter and ways to benefit from them in the fields of pharmacy. It also helps the pharmacist calculate the solubility, compatibility, and biological activity of drugs. As a result of this knowledge, will help in the development of new drugs and formulations as well as in improving various drug delivery methods.	

9. Learning Outcomes, Teaching, Learning, and Assessment Method

a- Cognitive goals

1. Enabling students to achieve and understand the degree of solubility and the phenomenon of distribution.
2. Enabling students to obtain and understand the degree of reactions and the effect of temperature and other factors on the speed of the reaction.
3. Enable students to achieve the degree of viscosity of fluids and rheology.
4. Enable students to achieve and understand the properties of surfaces and colloidal solutions

b- The skills goals special to the course

- 1- Enabling students to acquire skills in solving mathematical problems related to the course.
- 2- Enabling students to possess medication storage skills
- 3- Enabling students to possess the skills to work in laboratories and conduct scientific experiments
- 4- Enabling students to acquire the skill of writing scientific reports

Teaching and Learning Methods

- 1- Multimedia lectures
- 2- Group discussion
- 3- Workshops and seminars
- 4- Small group tasks
- 5- Power Point presentation

Assessment methods

- 1- Short tests
- 2- Oral exam and direct questions
- 3- Midterm exam
- 4- Electronic exams on the electronic platform
- 5- Final exam

c- effective and value goals

- 1- Promoting awareness of the importance of empathy and understanding in providing pharmaceutical care and dealing with patients humanely.
- 2- Promote pharmaceutical ethical values such as honesty, integrity, respect, and fairness in the pharmacist's interactions with patients and other medical teams.
- 3- Encouraging evidence-based values and critical thinking in pharmaceutical decision-making based on scientific research and clinical information.
- 4- Enhancing awareness of the importance of the pharmacist's social and professional responsibility in providing quality and safe health care.
- 5- Promoting awareness of the importance of maintaining patients' privacy and confidentiality of their health information and the legal obligations related to this aspect.

- 6- Encouraging the development of effective communication capabilities and the ability to collaborate and work within multidisciplinary health care teams.
- 7- Promoting awareness of the importance of achieving a balance between pharmaceutical work and personal life to maintain emotional and psychological satisfaction

Teaching and Learning Methods

- 1- Using a strategy of cooperation and assistance during the education process
- 2- Field visits to relevant ministries and educational institutions
- 3- Holding seminars, courses, and workshops for students that encourage spiritual values
- 4- Form a discussion group during the lecture
- 5- Assigning students tasks that require subjective explanations in causal ways

Assessment methods

- 1- Discussion in small groups
- 2- Homework
- 3- Role-playing scenarios

d- General and rehabilitative transferred skills (other skills relevant to employability and personal development)

- 1- Using sources from the Internet
- 2- Conduct a research study

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10. Theory Course Structure

Week	Hrs	ILOs	Unit/Module or Topic Title	Teaching methods	Assessment methods
1.	3	A1,B3,C5,D1,D3,D4	Solubility: Definitions	Lectures Discussion data show	Written and oral exams and direct questions
2.	3	A1,B3,C5,D1,D3,D4	Solubility: Theories		
3.	3	A1,B3,C5,D1,D3,D4	Solubility: Distribution		
4.	3	A1,B3,C5,D1,D3,D4	Kinetics: First, second and thirds		
5.	3	A1,B3,C5,D1,D3,D4	Kinetics: Expiry date		
6.	3	A1,B3,C5,D1,D3,D4	Kinetics: Shelf life		
7.	3	A1,B3,C5,D1,D3,D4	Rheology: Newtonian systems, change in flow		
8.	3	A1,B3,C5,D1,D3,D4	Rheology: Liquefy-negative textures		
9.	3	A1,B3,C5,D1,D3,D4	Rheology: Calculate the change in flow		
10.	3	A1,B3,C5,D1,D3,D4	Surface tension: interfaces, the free energy of the interfaces		
11.	3	A1,B3,C5,D1,D3,D4	Surface tension: Measurement of surface tension and diffusion coefficient		
12.	3	A1,B3,C5,D1,D3,D4	Surface tension: Surface active elements and hydration phenomena		
13.	3	A1,B3,C5,D1,D3,D4	Colloids: Colloidal systems and their pharmaceutical applications		
14.	3	A1,B3,C5,D1,D3,D4	Colloids: Types of colloidal solutions, kinetic properties of colloids		
15.	3	A1,B3,C5,D1,D3,D4	Colloids: Optical and electrical properties of colloids		

10. Laboratory Course Structure

Week	Hrs	ILOs	Unit/Module or Topic Title	Teaching methods	Assessment methods
1-2	4	A1,B3,C5,D1,D3,D4	Solubility: Solubilization of components of pharmaceutical preparations	Lectures Discussion data show	Written and oral exams and direct questions
3-4	4	A1,B3,C5,D1,D3,D4	Solubility: Solubilization of Aspirin		
5	2	A1,B3,C5,D1,D3,D4	Solubility: Determination of partition coefficient		
6-7	4	A1,B3,C5,D1,D3,D4	Solubility: Surface tension: measurements and calculations		
8-9	4	A1,B3,C5,D1,D3,D4	Kinetic: Rate kinetic: Application in the stability of pharmaceutical stability		
10	2	A1,B3,C5,D1,D3,D4	Review and tutorial		
11-13	6	A1,B3,C5,D1,D3,D4	Viscosity: Viscosity: Measurements and calculation		
14-15	4	A1,B3,C5,D1,D3,D4	Adsorption isotherm		

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11. Infrastructure	
Books Required reading	1- Martin's physical pharmacy and pharmaceutical sciences, Patrick J. Sinko. Wolters Kluwer. Lippincott Williams & Wilkins. Philadelphia. 2011. 2- Lab manual for physical pharmacy adopted by the department
Main references (sources)	Pharmaceutical Dosage forms and drug delivery Edited By Ram I. Mahato, Ajit S. Narang by Taylor & Francis Group, LLC Third Edition
Recommended books and references (scientific journals, reports...).	
Electronic references, Internet sites...	

12. Course development plan	
Not available	

To teach theoretical bases for the technology of preparing different dosage forms with respect to their raw materials, compositions, methods of preparation, stability, storage and uses.

1. Educational institution	Al-Ayen University - College of Pharmacy
2. College department/Center	pharmaceutics
3. Course title/code	Pharmaceutical technology 1/PH3103
4. Modes of Attendance offered	Full-time and official attendance hours
5. Semester/Year	First semester 2022-2023
6. Credits (total)	45 hr theory & 30 hr practical/ semester
7. Date of description form preparation//Revision of this specification	25/9/2022
8. Course Objectives The use of pharmacy technology in pharmacy includes: methods of preparing and detecting different drug forms, calculations of medicinal preparations in addition to identifying the physiochemical properties of pharmaceutical substances and methods of dealing with them	

9. Learning Outcomes, Teaching, Learning, and Assessment Method

A. Cognitive goals

- 1- Enabling students to acquire skills in solving mathematical problems related to the course.
- 2 Enabling students to possess medication storage skills
- 3- Enabling students to possess the skills to work in laboratories and conduct scientific experiments
- 4- Enabling students to acquire the skill of writing scientific reports.

B. The skills goals special to the course

- 1- Enabling students to acquire skills in solving mathematical problems related to the course.
- 2- Enabling students to possess medication storage skills
- 3- Enabling students to possess the skills to work in laboratories and conduct scientific experiments
- 4- Enabling students to acquire the skill of writing scientific reports.

Teaching and Learning Methods

- 1- Multimedia lectures
- 2- Group discussion
- 3- Workshops and seminars
- 4- Presentation of cases
- 5- Power Point presentation

Assessment methods

- 1- Short tests
- 2- Oral exam and direct questions
- 3- Midterm exam
- 4- Electronic exams on the electronic platform
- 5- Final exam

C. Affective and value goals

1. Adhere to the highest standards of ethical behavior and professional behavior in all aspects of treatment decision-making and patient care.
2. Demonstrating commitment to patient safety.
3. Evidence-based practice.
4. Respect the patient's autonomy and preferences.
5. Collaborate effectively with other health care professionals

Teaching and Learning Methods

1. Group discussions
2. Lectures
3. Small group tasks
4. Power Point presentation

Assessment methods

1. Group discussion
2. Homework
3. Role-playing scenarios

D. General and rehabilitative transferred skills (other skills relevant to employability and personal development)

D1- Using sources from the Internet

D2 - Conducting a research study

10. Theory Course Structure

Week	Hrs	ILOs	Unit/Module or Topic Title	Teaching methods	Assessment methods
1.	3	A1,B3,C5,D1,D3,D4	Solution and type of Solutions: Differentiation between the solubility of pharmaceutical ingredients and factors affecting their solubility	Lectures Discussion Data show	Written and oral exams and direct questions
2.	3	A1,B3,C5,D1,D3,D4	Solubility and factors Affecting solubility: Differentiation between the solubility of pharmaceutical ingredients and factors affecting their solubility		
3.	3	A1,B3,C5,D1,D3,D4	Official solutions: Identification of official solutions		
4.	3	A1,B3,C5,D1,D3,D4	Differentiation between aqueous solutions: Aqueous solution & Aromatic water		
5.	3	A1,B3,C5,D1,D3,D4	Definition of pharmaceutical syrup dosage form and differentiation between their types: Syrups & sugar-based syrups		
6.	3	A1,B3,C5,D1,D3,D4	Identification of the methods of clarification and the equipment used for clarification		
7.	3	A1,B3,C5,D1,D3,D4	Identification of the constituents of the spirit dosage form and its methods of preparation		
8.	3	A1,B3,C5,D1,D3,D4	Identification of the constituents of elixir dosage form and its methods of preparation		

9.	3	A1,B3,C5,D1,D3,D4	Knowing the methods of extraction		
10.	3	A1,B3,C5,D1,D3,D4	Knowing the methods of maceration		
11	3	A1,B3,C5,D1,D3,D4	Identification of the constituents of Tinctures dosage form and its methods of preparation.		
12	3	A1,B3,C5,D1,D3,D4	Identification of the constituents of fluid extract dosage form and its methods of preparation		
13	3	A1,B3,C5,D1,D3,D4	Knowing the types of colloidal dispersion		
14	3	A1,B3,C5,D1,D3,D4	Knowing the types of Coarse dispersion		
15	3	A1,B3,C5,D1,D3,D4	Suspension: Identification of the constituents of suspension dosage form and its methods of preparation		

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10. Laboratory Course Structure

Week	Hrs.	ILOs	Unit/Module or Topic Title	Teaching methods	Assessment methods
1-2	4	A1,B3,C5,D1,D3,D4	Solutions (Into body cavity, oral and external use)	Lectures Discussion Data show	Written and oral exams and direct questions
3-5	6	A1,B3,C5,D1,D3,D4	Syrups: Preparation techniques and quality evaluation		
6-7	4	A1,B3,C5,D1,D3,D4	Elixirs: Preparation techniques and quality evaluation		
8-10	6	A1,B3,C5,D1,D3,D4	Spirits: Preparation techniques and quality evaluation		
11-13	6	A1,B3,C5,D1,D3,D4	Suspensions: Preparation techniques and quality evaluation		
14-15	4	A1,B3,C5,D1,D3,D4	Dispersion of oils in inhalations		

11. Infrastructure	
Books Required reading	1-Pharmaceutical dosage forms and drug delivery systems by Haward A. Ansel; 10th edition, 2015.Lippincott Williams & Wilkins, a Wolters Kluwer business 2. Sprowels American pharmacy.
Main references (sources)	Aulton's Pharmaceutics: The Design and Manufacture of Medicines, 3rd ed. Michael E. Aulton (Author) Churchill
Recommended books and references (scientific journals, reports...).	
Electronic references, Internet sites...	

12. Course development plan

Adding new experiments concerning practical works in the laboratory
(Formulation of paracetamol suspension from Trigonella foenum mucilage)

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To teach theoretical bases for the technology of preparing different dosage forms with respect to their raw materials, compositions, methods of preparation, stability, storage and uses. in addition to define and characterize the possible incompatibilities that may occur

1. Educational institution	Al-Ayen University - College of Pharmacy
2. College department/Center	pharmaceutics
3. Course title/code	Pharmaceutical technology 2/ PH3203
4. Modes of Attendance offered	Full-time and official attendance hours
5. Semester/Year	Second semester 2022-2023
6. Credits (total)	45 hr theory & 30 hr practical/ semester
7. Date of description form preparation//Revision of this specification	25/9/2022
8. Course Objectives The use of pharmaceutical technology in pharmacy includes: methods of preparing and detecting different drug forms, calculations of medicinal preparations in addition to identifying the physiochemical properties of pharmaceutical substances and methods of dealing with them	

9. Learning Outcomes, Teaching, Learning, and Assessment Method

A- Cognitive goals

1. Enabling students to get knowledge about different dosage forms.
2. Enabling students to understand the different preparation methods at small scale and pharmacy level.
3. Enabling students to know the basis of dosage form preparation, stability, and storage.
4. Enabling students to identify changes in the physicochemical properties or when incompatibility is present between the ingredients of various dosage forms

B- The skills goals special to the course

- 1- Enable students to acquire the skills to prepare medicine according to the medical conditions diagnosed by the physician
2. Enabling students to possess the skills of preparing medicinal doses
3. Enable students to possess the skills of proper storage conditions for drug

Teaching and Learning Methods

- 1- Multimedia lectures
- 2- Group discussion
- 3- Workshops and seminars
- 4- Presentation of cases
- 5- Power Point presentation

Assessment methods

- 1- Short tests
- 2- Oral exam and direct questions
- 3- Midterm exam
- 4- Final exam

C- Affective and value goals

- 1- Adhere to the highest standards of ethical behavior and professional behavior in all aspects of treatment decision-making and patient care.
- 2- Demonstrating commitment to patient safety.
- 3- Evidence-based practice.
- 4- Respect the patient's autonomy and preferences.
- 5- Collaborate effectively with other health care professionals

Teaching and Learning Methods

- 1- Group discussions
- 2- Lectures
- 3- Small group tasks
- 4- Power Point presentation

Assessment methods

- 1- Homework
- 2- Role-playing scenarios

D- General and rehabilitative transferred skills (other skills relevant to employability and personal development)

D1- Using sources from the Internet

D2 - Conducting a research study

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10. Theory Course Structure

Week	Hrs	ILOs	Unit/Module or Topic Title	Teaching methods	Assessment methods
1.	3	A1,A6,B1,B3,C2,C4,C5,C6,D1,D3,D4	Emulsions: An introduction to emulsions and their preparation methods	Lectures Discussion Data show	Written and oral exams and direct questions
2.	3	A1,A6,B1,B3,C2,C4,C5,C6,D1,D3,D4	Emulsions: Types of emulsifying agents		
3.	3	A1,A6,B1,B3,C2,C4,C5,C6,D1,D3,D4	Liniments AND Collodions		
4.	3	A1,A6,B1,B3,C2,C4,C5,C6,D1,D3,D4	Suppositories base types		
5.	3	A1,A6,B1,B3,C2,C4,C5,C6,D1,D3,D4	Preparation of Suppositories		
6.	3	A1,A6,B1,B3,C2,C4,C5,C6,D1,D3,D4	Semisolid dosage form: Ointments, creams and pastes		
7.	3	A1,A6,B1,B3,C2,C4,C5,C6,D1,D3,D4	Semisolid dosage form: Types of ointment bases		
8.	3	A1,A6,B1,B3,C2,C4,C5,C6,D1,D3,D4	Properties ophthalmic ointments		
9.	3	A1,A6,B1,B3,C2,C4,C5,C6,D1,D3,D4	Powders and granules: Micronization and measurements of powder particle size		
10.	3	A1,A6,B1,B3,C2,C4,C5,C6,D1,D3,D4	Powders and granules: Bulk and divided powders		
11.	3	A1,A6,B1,B3,C2,C4,C5,C6,D1,D3,D4	Advantages and properties of Powders and granules		
12.	3	A1,A6,B1,B3,C2,C4,C5,C6,D1,D3,D4	Hard and soft gelatin capsules		
13.	3	A1,A6,B1,B3,C2,C4,C5,C6,D1,D3,D4	Capsules: Problems associated with filling of solid powders		
14.	3	A1,A6,B1,B3,C2,C4,C5,C6,D1,D3,D4	Incompatibilities: Identification of physical, chemical and therapeutic incompatibilities		

10. Laboratory Course Structure

Week	Hrs	ILOs	Unit/Module or Topic Title	Teaching methods	Assessment methods
1-3	6	A1,A6,B1,B3,C2,C4,C5,C6, D1,D3,D4	Emulsions: Preparation techniques and quality evaluation	Lectures Discussion Data show	Written and oral exams and direct questions
4-6	6	A1,A6,B1,B3,C2,C4,C5,C6,D 1,D3,D4	Suppositories: Preparation techniques and quality evaluation		
7-9	6	A1,A6,B1,B3,C2,C4,C5,C6, D1,D3,D4	Powders: Preparation techniques and quality evaluation		
10-12	6	A1,A6,B1,B3,C2,C4,C5,C6,D 1,D3,D4	Capsules: Preparation techniques and quality evaluation		
13-15	6	A1,A6,B1,B3,C2,C4,C5,C6,D 1,D3,D4	Semisolid dosage forms: Preparation techniques and quality evaluation		

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11. Infrastructure	
Books Required reading	1-Pharmaceutical dosage forms and drug delivery systems by Haward A. Ansel; 10th edition, 2015.Lippincott Williams & Wilkins, a Wolters Kluwer business 2. Sprowels American pharmacy.
Main references (sources)	Aulton's Pharmaceutics: The Design and Manufacture of Medicines, 3rd ed. Michael E. Aulton (Author) Churchill
Recommended books and references (scientific journals, reports...).	
Electronic references, Internet sites...	

12. Course development plan
none

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The course deals with the physical and chemical properties of drug substance, dosage form and the biological effectiveness of the drug or drug product upon administration, including drug availability in the human or animal body from a given dosage form. The pharmacokinetic part of the course deals with the time-course of the drug in the biological system, and quantification of drug concentration pattern in normal subjects and in certain disease states

1. Educational institution	Al-Ayen University - College of Pharmacy
2. College department/Center	pharmaceutics
3. Course title/code	Biopharmaceutics PH4104
4. Modes of Attendance offered	Full-time and official attendance hours
5. Semester/Year	first semester 2022-2023
6. Credits (total)	30 hr theory & 30 hr practical/ semester
7. Date of description form preparation//Revision of this specification	25/9/2022
8. Course Objectives	
Explain the basis of drug movement in the body according to one or two compartments, and the pharmaceutical and biological factors that affect the absorption of the drug, its distribution inside the body, and its excretion from the body when taken orally. Explanation of the drug dissolution process from drug doses and the physical and chemical factors affecting them. The movement of the drug in the body when taken intravenously in a single dose or a continuous intravenous feeding. Drug bioavailability and how to calculate it, depending on the drug concentration in the blood and the area it shows in the blood in the gra	

9. Learning Outcomes, Teaching, Learning, and Assessment Method

- 1- Explaining the basics of drug kinetics in the body according to one or two compartments, and pharmaceutical and biological factors Affecting the absorption of the drug, its distribution within the body, and its excretion from**

the body when taken orally

2. Explaining the drug dissolution process, including drug doses and the physical and chemical factors affecting it
3. Drug kinetics in the body when taken intravenously as a single dose or as continuous intravenous nutrition.

Explain the kinetics of the drug after multiple doses.

The bioavailability of drugs and how to calculate it depends on the concentration of the drug in the blood and the area in which it appears in the blood

Charts.

Being able to calculate the half-life of eliminating a drug from the body and many parameters using mathematical equations and graphs

A- Cognitive goals

- 1-Enabling students to learn about the physical properties of medicines and how to evaluate them in the laboratory
- 2 -Enabling students to become familiar with the mechanism of drug absorption inside the body and the factors affecting them
- 3 -Enabling students to achieve and understand the difference between a single compartment and a multi-compartment model
- 4 -Enabling students to acquire and understand drug bioavailability calculations
- 5 -Enabling students to obtain and understand the link between drugs and protein
- 6- Enabling students to acquire and understand the mechanism of drug disposal from the body

B- The skills goals special to the course

- 1 -Enable students to acquire the skills of drawing the standard curve of drugs
- 2 -Enabling students to acquire the skills of laboratory drug evaluation
- 3 -Enabling students to acquire the skills of studying aspirin degradation in the laboratory
- 4- Enabling students to acquire the skills of calculating the storage age of aspirin

Teaching and Learning Methods

- 1- Multimedia lectures
- 2- Group discussion
- 3- Workshops and seminars
- 4- Presentation of cases
- 5- Power Point presentation

Assessment methods

- 1- Short tests
- 2- Oral exam and direct questions
- 3- Mid-term exam
- 4- Final exam

C- Affective and value goals

- 1 . Educating students on professional humanitarian work and promoting and consolidating professional and ethical values upon students to practice the profession of pharmacist
- 2 . Educating students on a culture of integrity and combating corruption in all its forms
- 3 . Training students to respect the rights of the beneficiaries of their profession, their culture, religion, gender, and ethnicity, and training students to respect the freedom of thought, expression, and creativity among others.

4 . Developing students 'sense of sense of responsibility during the study period and work and enhancing the spirit of cooperation and teamwork among the students.

5 . Supports the pharmaceutical culture when students and members of society

Teaching and Learning Methods

- 1- Group discussions
- 2- Small group tasks
- 3- Power Point presentation

Assessment methods

- 1- Homework
- 2- Role-playing scenarios

D- General and rehabilitative transferred skills (other skills relevant to employability and personal development)

D1- Using sources from the Internet

D2 - Conducting a research study

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10. Theory Course Structure

Week	Hrs	ILOs	Unit/Module or Topic Title	Teaching methods	Assessment methods
1.	2	A4,B3,B5,C4,D1,D3,D4	Introduction to the biopharmacy: Introduce the students to many definitions related to the biopharmacy	Lectures Discussion Data show	Written and oral exams and direct questions
2.	2	A4,B3,B5,C4,D1,D3,D4	Biopharmaceutics standards: Drug absorption and its mechanism		
3.	2	A4,B3,B5,C4,D1,D3,D4	Absorption kinetics: Factors effect absorption		
4.	2	A4,B3,B5,C4,D1,D3,D4	Physicochemical factors effect on absorption: Effect of dru and different additives		
5.	2	A4,B3,B5,C4,D1,D3,D4	Physicochemical factors effect on absorption: Effect of different additives on different dosage forms		
6.	2	A4,B3,B5,C4,D1,D3,D4	One compartment system: The one comp model for oral and intravenous injections		
7.	2	A4,B3,B5,C4,D1,D3,D4	Multi-compartment system: Two-compartment model for oral and intravenous doses		
8.	2	A4,B3,B5,C4,D1,D3,D4	Oral absorption kinetic: The zero and first oral absorption kinetic		
9.	2	A4,B3,B5,C4,D1,D3,D4	Multiple oral Dosage kinetic: How to reach a plateau		
10.	2	A4,B3,B5,C4,D1,D3,D4	Nonlinear kinetics: Reasons for nonlinear Absorption metabolism		
11	2	A4,B3,B5,C4,D1,D3,D4	Different bio availabilities: Bio availability and equivalences		
12	2	A4,B3,B5,C4,D1,D3,D4	Elimination via liver and kidney; Theories of drug Elimination through kidney		

			and liver		
13	2	A4,B3,B5,C4,D1,D3,D4	Protein kinetics: How proteins bind to receptors		
14	2	A4,B3,B5,C4,D1,D3,D4	Dose adjustment in renal failure patient: Rules to adjust doses in renal failure		



10. Laboratory Course Structure

Week	Hrs	ILOs	Unit/Module or Topic Title	Teaching methods	Assessment methods
1	2	A4,B3,B5,C4,D1,D3,D4	Preparation of calibration curve of salicylic acid.	Lectures Discussion Data show	Written and oral exams and direct questions
2	2	A4,B3,B5,C4,D1,D3,D4	In vitro evaluation of bulk laxative		
3	2	A4,B3,B5,C4,D1,D3,D4	In vitro evaluation of antacids.		
4-5	4	A4,B3,B5,C4,D1,D3,D4	Dissolution of tablets.		
6	2		Review and tutorial		
7-8	4	A4,B3,B5,C4,D1,D3,D4	Determination of pharmacokinetic parameters from CP-time by residual method.		
9-10	4	A4,B3,B5,C4,D1,D3,D4	Determination of pharmacokinetic parameters from CP-time by trapezoidal method.		
11-12	4	A4,B3,B5,C4,D1,D3,D4	Determination of pharmacokinetic parameters from urine excretion samples.		
13-14	4	A4,B3,B5,C4,D1,D3,D4	Hydrolysis of aspirin in buffer pH 6.8.		
15	2	Review and tutorial	Review and tutorial		

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11. Infrastructure	
Books Required reading	Shargel L., Yu AB., (Eds). Applied Biopharmaceutics and Pharmacokinetics
Main references (sources)	Aulton's Pharmaceutics: The Design and Manufacture of Medicines, 3rd ed. Michael E. Aulton (Author) Churchill
Recommended books and references (scientific journals, reports...).	Aulton's Pharmaceutics: The Design and Manufacture of Medicines, 3ed Michael E. Aulton (Author). Churchill, Livingstone- Elsevier
Electronic references, Internet sites...	

12. Course development plan
Development of buffer capacity in the lab experiment

Al-Ayen University
 جامعة العين

The subject aim to teach pharmacy students the steps and lines upon which the preformulation processing of pharmaceutical dosage forms. This fundamental coarse provide the required principles to integrate knowledge of Pharmaceutical Technology in preformulation of perfect dosage form.

1. Educational institution	Al-Ayen University - College of Pharmacy
2. College department/Center	pharmaceutics
3. Course title/code	Industrial pharmacy 1 / PH4205
4. Modes of Attendance offered	Full-time and official attendance hours
5. Semester/Year	second semester 2022-2023
6. Credits (total)	45 hr theory & 30 hr practical/ semester
7. Date of description form preparation//Revision of this specification	25/9/2022
8. Course Objectives Be able to know various principles of pharmaceutical processing, solid mixing, fluid mixing, mixing mechanisms, and equipment. Be able to contrast between different types of mills and the milling application in pharmacy, in addition to size measurement of particles and the factors affecting milling. Besides the selection of milling techniques. Be able to describe drying and humidity measurements also classification of dryers and theories of drying. Have obtained hands-on experience in pharmaceutical requirements to obtain sterile products. In practical: Help students to start designing different pharmaceutical dosage forms through knowing pre-formulation, preliminary evaluation, bulk characterization, solubility and stability analysis	

9. Learning Outcomes, Teaching, Learning, and Assessment Method

- 1- To be able to know the different principles of drug processing, mixing of solids, and mixing of liquids, Mechanisms, and equipment for mixing
- 2-To be able to differentiate between different types of grinders and apply grinding in pharmacy, in addition, To measuring the particle size and influencing factors for grinding them. In addition to a set of grinding techniques.
- 3- To be able to describe drying, measure humidity, classify dryers, and dry theories.
- 4-Obtain experience in pharmaceutical requirements to obtain sterile products. In addition to the decision in development Production, processing, and quality control.
- 5-Providing different solutions for purifying pharmaceutical products by knowing the methods required for filters And sterilization operations.
- 6-Obtaining benefits from the presence of various sterilization and evaluation mechanisms to verify the validity of the disposal kinetics Microbial.
- 7- Helping the student to start designing various pharmaceutical forms through knowledge of pre-preparation and initial evaluation Solubility and stability analysis

A- Cognitive goals

A- Cognitive objectives.

1. Enabling students to identify the types of drug dosages available in the market.
2. Enable students to learn how to manufacture effervescent granules and their advantages as pharmaceutical doses.
3. Enable students to identify the flow properties of pharmaceutical molecules.
4. Enabling students to learn about density calculations and thus know the flow of pharmaceutical molecules.
5. Enabling students to identify the necessary characteristics of the drug and additives before manufacturing.
6. Enabling students to learn about the manufacture of long-term pharmaceutical doses

B- The skills goals special to the course

- 1 - Enabling students to acquire skills in manufacturing effervescent granules
- 2 - Enabling students to acquire the skills of measuring powder flow
- 3 - Enabling students to acquire the skills of calculating the density necessary for powder flow
- 4- Enabling students to possess the skills of manufacturing long-term pharmaceutical doses

Teaching and Learning Methods

- 1- Multimedia lectures
- 2- Group discussion
- 3- Power Point presentation

Assessment methods

- 1- Short tests
- 2- Oral exam and direct questions
- 3- Mid-term exam
- 4- Final exam

C- Affective and value goals

- 1- Adhere to the highest standards of ethical conduct and professional conduct in all aspects of therapeutic decision-making and patient care.
- 2- Demonstrating commitment to patient safety.
- 3- Evidence-based practice.
- 4- Respect the patient's autonomy and preferences.
- 5- Collaborate effectively with other health care professionals.

Teaching and Learning Methods

- 1- Group discussions

- 2- Small group tasks
- 3- Power Point presentation

Assessment methods

- 1- Theoretical and practical exams
- 2- Case-based scenarios

D- General and rehabilitative transferred skills (other skills relevant to employability and personal development)

D1- Using sources from the Internet

D2 - Conducting a research study

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10. Theory Course Structure

Week	Hrs	ILOs	Unit/Module or Topic Title	Teaching methods	Assessment methods
1.	3	A2,A3,B2,B4,C3,D1,D3,D4	Sterilization: Describe Different sterilization ways and equipment required	Lectures Discussion Data show	Written and oral exams and direct questions
2.	3	A2,A3,B2,B4,C3,D1,D3,D4	Preformulation part 1: Steps required changing an active ingredient into a suitable dosage form		
3.	3	A2,A3,B2,B4,C3,D1,D3,D4	Preformulation part 2: Solubility and stability of active ingredient in its chosen dosage form		
4.	3	A2,A3,B2,B4,C3,D1,D3,D4	Clarification and Filtration part 1: Factors affecting Filtration processes		
5.	3	A2,A3,B2,B4,C3,D1,D3,D4	Clarification and Filtration part 1: Selection of suitable filter media for suitable filtration process		
6.	3	A2,A3,B2,B4,C3,D1,D3,D4	Milling part 1: Describe milling size distribution and its measurement		
7.	3	A2,A3,B2,B4,C3,D1,D3,D4	Milling part 2: Theory of milling, milling equipment, types of milling, and mechanisms of size reduction		
8.	3	A2,A3,B2,B4,C3,D1,D3,D4	Milling part 3: Factors influence milling and selection of mill		
9.	3	A2,A3,B2,B4,C3,D1,D3,D4	Mixing part 1: Fluid mixing and their mechanisms and mixer selection		
10.	3	A2,A3,B2,B4,C3,D1,D3,D4	Mixing part 2: Solid mixing and their mixing		
11.	3	A2,A3,B2,B4,C3,D1,D3,D4	Mixing part 3: Equipment mixing and mixer selection		
12.	3	A2,A3,B2,B4,C3,D1,D3,D4	Drying par 1: Definition of drying, Purposes of drying,		

			Psychrometry and Theory of drying		
13	3	A2,A3,B2,B4,C3,D1,D3,D4	Drying part 2: Behavior of solids during drying and classification of dryers		
14	3	A2,A3,B2,B4,C3,D1,D3,D4	Sterile product part 1: Product development, solvents, nonaqueous Solvents, and solutes		
15	3	A2,A3,B2,B4,C3,D1,D3,D4	Sterile product part 2: Containers, filling procedures and packaging		

10. Laboratory Course Structure

Week	Hrs	ILOs	Unit/Module or Topic Title	Teaching methods	Assessment methods
1	2	A2,A3,B2,B4,C3,D1,D3,D4	Introduction in industrial pharmacy and pre-formulation.	Lectures Discussion Data show	Written and oral exams and direct questions
2-3	4	A2,A3,B2,B4,C3,D1,D3,D4	Effervescent granules: Preparation and characterization		
4-5	4	A2,A3,B2,B4,C3,D1,D3,D4	Effervescent granules: flow properties and rheology of granules.		
6-7	4	A2,A3,B2,B4,C3,D1,D3,D4	Tablet dosage form: Preparation and characterization.		
8	2	A2,A3,B2,B4,C3,D1,D3,D4	Review and tutorial		
9-10	4	A2,A3,B2,B4,C3,D1,D3,D4	Tablet dosage form		
11	2	A2,A3,B2,B4,C3,D1,D3,D4	Tablet dosage form: Preparation of children's aspirin by wet granulation method.		
12-13	4	A2,A3,B2,B4,C3,D1,D3,D4	Tablet dosage form: Sustained release dosage forms: Preparation and characterization		
14	2	A2,A3,B2,B4,C3,D1,D3,D4	Tablet dosage form: Coating techniques of tablets.		
15	2	Review and tutorial	Review and tutorial		

11. Infrastructure	
Books Required reading	Leon Lachman, "The Theory and practice of industrial pharmacy"
Main references (sources)	Aulton's Pharmaceutics: The Design and Manufacture of Medicines, 3ed Michael E. Aulton (Author). Churchill, Livingstone- Elsevier
Recommended books and references (scientific journals, reports...).	
Electronic references, Internet sites...	

12. Course development plan
1- replacement of some tests due to lack of equipment 2- Study the drug content in pills using ultraviolet light analysis – 3- Capsule evaluation . 4- Study drug hydrolysis using USP dissolution device and apply it to different types of pills and draw them using an excel program

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The course enables technical setup for coordination of standards for formulation of typical dosage forms and the principles needed to learn mass production of different pharmaceutical dosage forms. The syllabus includes different dosage forms like tablets, capsules, aerosols, emulsion, etc, besides the advanced techniques like enteric coating and micro-encapsulation.

1. Educational institution	Al-Ayen University - College of Pharmacy
2. College department/Center	pharmaceutics
3. Course title/code	Industrial pharmacy 2 / PH5102
4. Modes of Attendance offered	Full-time and official attendance hours
5. Semester/Year	first semester 2022-2023
6. Credits (total)	45 hr theory & 30 hr practical/ semester
7. Date of description form preparation//Revision of this specification	25/9/2022
8. Course Objectives In the theoretical part: This semester, different types of pharmaceutical forms and methods are covered. There are also different materials included in their production and quality control for each of these types. In the practical part: experiments are conducted on how to compress Tablets using different manufacturing methods, in addition to methods, Various evaluations of tablets, such as examining decomposition, brittleness, and fragmentation, as well as experiments on manufacturing methods of Capsules conducted and methods for making injections and nebulizers	

9. Learning Outcomes, Teaching, Learning, and Assessment Method

- Preparation of formulation standards for standard dosage forms.
- Learn the principles necessary for mass production of various pharmaceutical forms

A- Cognitive goals

- 1- Enabling students to learn about tablet manufacturing methods
- 2- Enable students to learn how to evaluate grains
- 3- Enabling students to learn about the different methods of packaging tablets
- 4- Enabling students to learn about the capsule industry
- 5- Enabling students to learn about the microcapsule industry
- 6- Enabling students to identify semi-solids

B- The skills goals special to the course

- 1 – Enabling students to acquire tablet manufacturing skills
- 2 - Enabling students to possess the skills of measuring and controlling the release of medicine and its disintegration from pills
- 3 - Enabling students to acquire capsule manufacturing skills
- 4- Enabling students to possess the skills of measuring and controlling the release of the drug and its disintegration from the capsule

Teaching and Learning Methods

Lectures

PowerPoint presentation

Assessment methods

- 1- Short tests
- 2- Oral exam and direct questions
- 3- Mid-term exam
- 4- Final exam

C- Affective and value goals

- 1- Raising students on professional humanitarian work and promoting and consolidating professional and controversial values among students To practice the profession of pharmacy
- 2- Raising students on the culture of integrity and fighting corruption in all its forms
- 3- training students to respect the rights of the beneficiaries of their profession, their culture, religion, gender, race, and training Students respect the freedom of thought, expression, and creativity of others
- 4- Developing students' sense of responsibility during the study period and work and enhancing the spirit of Cooperation and teamwork among students
- 5- Supports drug culture among students and community members

Teaching and Learning Methods

- 1- Group discussions
- 2- Lectures

Assessment methods

- 1- Case-based scenarios
- 2- Homework

D- General and rehabilitative transferred skills (other skills relevant to employability and personal development)

D1- Using sources from the Internet

D2 - Conducting a research study



10. Theory Course Structure

Week	Hrs	ILOs	Unit/Module or Topic Title	Teaching methods	Assessment methods
1.	3	A2,A3,B2,B4,C1,D1,D4	Tablets: Introduction	Lectures Discussion Data show	Written and oral exams and direct questions
2.	3	A2,A3,B2,B4,C1,D1,D4	Tablets Manufacturing: Knowing the different methods used in the manufacturing of tablets		
3.	3	A2,A3,B2,B4,C1,D1,D4	Evaluation of Tablets: Knowing the different methods used in the manufacturing of tablets		
4.	3	A2,A3,B2,B4,C1,D1,D4	Problems of Tableting: Identification of problems associated with tablets manufacturing		
5.	3	A2,A3,B2,B4,C1,D1,D4	Tablets Coating: Knowing the reasons behind coating and the different methods used for coating		
6.	3	A2,A3,B2,B4,C1,D1,D4	Quality Control of Tablets: Identification of tests used to evaluate the prepared tablets		
7.	3	A2,A3,B2,B4,C1,D1,D4	Hard Gelatin Capsule: Definition of hard gelatin capsules and its manufacturing methods		
8.	3	A2,A3,B2,B4,C1,D1,D4	Evaluation of Hard Gelatin Capsule: Identification of tests used to evaluate the hard gelatin capsules		
9.	3	A2,A3,B2,B4,C1,D1,D4	Soft Gelatin Capsules: Definition of hard gelatin capsules and its Manufacturing methods		
10.	3	A2,A3,B2,B4,C1,D1,D4	Evaluation of Soft Gelatin Capsules: Identification of tests		

			used to evaluate the soft gelatin capsules		
11	3	A2,A3,B2,B4,C1,D1,D4	Microencapsulation: Definition of microencapsulation and its types with manufacturing methods		
12	3	A2,A3,B2,B4,C1,D1,D4	Semisolids: Knowing the manufacturing methods and factors affecting their activity		
13	3	A2,A3,B2,B4,C1,D1,D4	Evaluation of Semisolids: Identification of tests used to Evaluate semisolids		
14	3	A2,A3,B2,B4,C1,D1,D4	Aerosols: Knowing the Manufacturing methods of aerosols		

10. Laboratory Course Structure

Week	Hrs	ILOs	Unit/Module or Topic Title	Teaching methods	Assessment methods
1-3	6	A2,A3,B2,B4,C1,D1,D4	Tablets dosage forms: Direct compression method for preparation of tablets	Lectures Discussion Data show	Written and oral exams and direct questions
4-6	6	A2,A3,B2,B4,C1,D1,D4	Tablets dosage forms: Wet granulation method for preparation of tablets		
7-9	6	A2,A3,B2,B4,C1,D1,D4	Tablets dosage forms: Dry granulation method for preparation of tablets		
10-11	4	A2,A3,B2,B4,C1,D1,D4	Tablets dosage forms: Evaluation of tablets		
12-13	4	A2,A3,B2,B4,C1,D1,D4	Capsules dosage forms: Capsules dosage form: Preparation and evaluation		
14-15	4	A2,A3,B2,B4,C1,D1,D4	Parenteral dosage forms		

11. Infrastructure	
Books Required reading	Leon Lachman, "The Theory and practice of industrial pharmacy"
Main references (sources)	Aulton's Pharmaceutics: The Design and Manufacture of Medicines, 3ed Michael E. Aulton (Author). Churchill, Livingstone- Elsevier
Recommended books and references (scientific journals, reports...).	
Electronic references, Internet sites...	

12. Course development plan

Adding new experiments concerning practical works in laboratory

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This course enables students to understand the principles and factors that influence design dosage forms; and the applications of these principles in the practice of pharmaceutical industry.

1. Educational institution	Al-Ayen University - College of Pharmacy
2. College department/Center	pharmaceutics
3. Course title/code	Dosage form design PH5206
4. Modes of Attendance offered	Full-time and official attendance hours
5. Semester/Year	Second semester 2022-2023
6. Credits (total)	30 hr theory

7. Date of description form preparation//Revision of this specification	25/9/2022
8. Course Objectives Clarify the principles of drug dosage design and the factors affecting them and The use of these foundations in pharmaceutical industry applications	

9. Learning Outcomes, Teaching, Learning, and Assessment Method

A- Cognitive goals

Enabling students to learn the history of the emergence of pharmacy and pharmaceutical constitutions

2- Enabling students to learn about drug development and the stages of market approval

3-Enabling students to obtain and understand good industrial standards and effective drug formulations

4- Enabling students to achieve and understand pharmaceutical standards in drug design

5- Enabling students to achieve and understand the standards of biological pharmacy and pharmacokinetics

B- The skills goals special to the course

- 1- Enabling students to acquire skills in solving mathematical problems
- 2- Enabling students to acquire the skills of making a presentation on a scientific topic
- 3- Enabling students to acquire the skills of writing scientific reports
- 4- Enabling students to acquire the capabilities of debate in small groups

Teaching and Learning Methods

- 1- Use of smart board and white board

Assessment methods

- 1- Short tests
- 2- Oral exam and direct questions
- 3- Mid-term exam
- 4- Final exam

C- Affective and value goals

- 1- Encouraging students on humanitarian work and promoting and consolidating professional and ethical values
- 2- Educating students on a culture of integrity and combating corruption in all its forms
- 3- Training students to respect the rights of the beneficiaries of their profession, their culture, religion, gender, and ethnicity, and training students to respect the freedom of thought, expression, and creativity in others
- 4- To develop in students a sense of responsibility during the study period and work and to enhance the spirit of cooperation and teamwork among the students
- 5- Educate communities on drug culture

Teaching and Learning Methods

- 1- Group discussions
- 2- Power Point lectures

Assessment methods

- 1- Case-based scenarios
- 2- Homework

D- General and rehabilitative transferred skills (other skills relevant to employability and personal development)

D1- Using sources from the Internet

D2 - Conducting a research study

10. Theory Course Structure

Week	Hrs	ILOs	Unit/Module or Topic Title	Teaching methods	Assessment methods
1.	2	A2,A3,B6,D1,D2,D4,D5	Introduction to pharmacy: History of pharmacy and pharmacopeia	Lectures Discussion Data show	Written and oral exams and direct questions
2.	2	A2,A3,B6,D1,D2,D4,D5	Regulation laws on drugs: All laws related to drug development		
3.	2	A2,A3,B6,D1,D2,D4,D5	Development of new drugs and approval process: new drug applications		
4.	2	A2,A3,B6,D1,D2,D4,D5	Drug identification according to FDA: Examples of new drugs		
5.	2	A2,A3,B6,D1,D2,D4,D5	Good manufacturing practice principle		
6.	2	A2,A3,B6,D1,D2,D4,D5	Good manufacturing practice principle		
7.	2	A2,A3,B6,D1,D2,D4,D5	Dosage form design Pharmaceutical principles: The reason for dosage forms		
8.	2	A2,A3,B6,D1,D2,D4,D5	Dosage form Design pharmaceutical principles: Physical principles		
9.	2	A2,A3,B6,D1,D2,D4,D5	Dosage form design Pharmaceutical principles; Physical principles		
10.	2	A2,A3,B6,D1,D2,D4,D5	Formulation principles :Excipients		
11	2	A2,A3,B6,D1,D2,D4,D5	Formulation principles: Coloring and flavoring agents		
12	2	A2,A3,B6,D1,D2,D4,D5	Biopharmaceutics principles: Drug absorption		
13	2	A2,A3,B6,D1,D2,D4,D5	Biopharmaceutics principles: Drug metabolism		

14	2	A2,A3,B6,D1,D2,D4,D5	Pharmacokinetics: Bioequivalency and comparing different dosage forms		
15	2	A2,A3,B6,D1,D2,D4,D5	Pharmacokinetics: Calculation of the expiration date of medications		

11. Infrastructure

Books Required reading	Shargel L., Yu AB., (Eds). Applied Biopharmaceutics and Pharmacokinetics
Main references (sources)	Aulton's Pharmaceutics: The Design and Manufacture of Medicines, 3rd ed. Michael E. Aulton (Author) Churchill Livingstone- Elsevier
Recommended books and references (scientific journals, reports...).	
Electronic references, Internet sites...	

12. Course development plan

none

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The course provide information about Formulation of biotechnology product from biopharmaceutical Consideration and different rout of administration with their problems

1. Educational institution	Al-Ayen University - College of Pharmacy
2. College department/Center	pharmaceutics
3. Course title/code	Pharmaceutical biotechnology PH5207
4. Modes of Attendance offered	Full-time and official attendance hours
5. Semester/Year	Second semester 2022-2023
6. Credits (total)	15 hr theory
7. Date of description form preparation//Revision of this specification	25/9/2022
8. Course Objectives there would be an introduction to pharmaceutical biotechnological science, along with the types and uses of biotechnological products in medicine. It covers the formulation aspect of biotechnological products into pharmaceutical dosage form and the methods of administration, what are the obstacles, and how to overcome them. Moreover, it covers studying the pharmacokinetics of biotechnological products inside the human body.	

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9. Learning Outcomes, Teaching, Learning, and Assessment Method

A- Cognitive goals

- 1- Enable students to learn about pharmaceutical biotechnological products such as proteins
- 2- Enable students to collect and understand information on the basic principles of the formulation and preparation of pharmaceutical biotechnological products and biopharmaceuticals
- 3- Enable students to learn about freezing drying technology and excipients that are used in protein formulation through this technique
- 4- Enable students to collect and understand information about the traditional and alternative methods used to deliver protein to the body

B- The skills goals special to the course

- 1- Enabling students to have problem-solving capabilities during the preparation of pharmaceutical biotechnological products
- 2- Enabling students to have the ability to formulate therapeutic proteins
- 3- Enable students to acquire the skills to give presentations on specific topics
- 4- Enable students to acquire scientific reporting skills

Teaching and Learning Methods

1. Use smart blackboard
2. video demonstration of practical experiments
3. Writing scientific reports on certain problems

Assessment methods

- 1- Short tests
- 2- Oral exam and direct questions
- 3- Mid-term exam
- 4- Final exam

C- Affective and value goals

1. Raising students for professional human work and promoting and consolidating professional and moral values when students practice the profession of pharmacist
2. Educating students on the culture of integrity and fighting corruption in all its forms
3. Training students to respect the rights of the beneficiaries of their profession, culture, religion, gender, and race, and to train students to respect the freedom of thought, expression and creativity of others.
4. Develop a sense of responsibility when students feel responsible during the study period and work and promote the spirit of cooperation and teamwork when students

Teaching and Learning Methods

- 1- Using the strategy of cooperation and assistance during the education process
- 2 field visits to relevant ministries and educational institutions
3. Holding seminars, courses, and workshops for students that stimulate spiritual values
4. Forming a discussion group during the lecture

5. Assigning students to duties that require subjective interpretation

Assessment methods

1. Semester and final exams
3. Short exams
4. Discussion in small groups
5. Powerpoint presentation

D- General and rehabilitative transferred skills (other skills relevant to employability and personal development)

D1- Using sources from the Internet

D2 - Conducting a research study

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10. Theory Course Structure

Week	Hrs	ILOs	Unit/Module or Topic Title	Teaching methods	Assessment methods
1.	1	A5,B3,C5,D1,D2,D4,D5	Introduction to biotechnology	Lectures Discussion Data show	Written and oral exams and direct questions
2-4	3	A5,B3,C5,D1,D2,D4,D5	Formulation of pharmaceutical biotechnology: Microbiological concerns Sterilization of final Product Removal of pyrogen		
5-7	3	A5,B3,C5,D1,D2,D4,D5	The components of parenteral dosage form: Excipients in parenteral dosage form of Bioproduct Antioxidant Solubility enhancer Antiadsorptant		
8	1	A5,B3,C5,D1,D2,D4,D5	Preservatives and osmotic agents Freeze drying		
9	1	A5,B3,C5,D1,D2,D4,D5	Protein delivery: Parenteral administration		
10	1	A5,B3,C5,D1,D2,D4,D5	Alternative routes of Administration: Cos and pros for the alternative route of administrations		
11	1	A5,B3,C5,D1,D2,D4,D5	Pharmacokinetics of protein and therapeutic peptides		
12	1	A5,B3,C5,D1,D2,D4,D5	Pharmacokinetic : volume of distribution		
13	1	A5,B3,C5,D1,D2,D4,D5	Pharmacokinetic: metabolism of protein		
14	1	Pharmacokinetic: elimination of protein via kidney	Pharmacokinetic		
15	1	Pharmacokinetic (elimination of protein via liver)	Pharmacokinetic		

11. Infrastructure	
Books Required reading	1. Pharmaceutical biotechnology by J.A. Crommelin, Robert D. Snyder. 2. Aulton's Pharmaceutics: The Design and Manufacture of Medicines, 3rd Michael E. Aulton (Author). Churchill, Livingstone- Elsevier
Main references (sources)	
Recommended books and references (scientific journals, reports...).	
Electronic references, Internet sites...	

12. Course development plan
Special needs (including, for example, workshops, courses, IT programs and websites)

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