


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

**Al-Zahrawi University**
**College of Pharmacy**




# Academic Program and Course Description Guide

**2026**

# Academic Program Description Form

**University Name: Al-Zahrawi University**

**Faculty/Institute: College of Pharmacy**

**Scientific Department: Al-Zahrawi University – College of Pharmacy**

**Academic or Professional Program Name: Bachelor of Pharmacy**

**Final Certificate Name: Bachelor of Pharmaceutical Sciences**

**Academic System: Semester. With daily attendance.**

**Description Preparation Date: 3/March /2026**

**File Completion Date: 2026**

عمادة كلية الصيدلة

**Signature:**

**Scientific Associate Name:**

**Lecturer Dr Mahmood J. Jawad**

**Date:** 3131 2026

**Signature:**

**Dean of college**

**Assist. Prof.Dr. Salam W. Ahjel**

**Date:** 3-3-2026

## Check the file before:

**Division of Quality Assurance and University Performance**

**Name of the Director of the Quality Assurance and University Performance Division:**

**Assist. Prof. Dr Suhad S Humadi**

**Date:** 3/3/26

**Signature:**

**Approval of the university president**

**Prof. Dr. Nazira Hussein Alwan**

## Introduction:

The educational program is a coordinated and organized package of courses that include procedures and experiences organized in the form of academic vocabulary whose main purpose is to build and refine the skills of graduates, making them qualified to meet the requirements of the labor market, which is reviewed and evaluated annually through internal or external audit procedures and programs such as the external examiner program.

The description of the academic program provides a brief summary of the main features of the program and its courses, indicating the skills that are being worked on to acquire for students based on the objectives of the academic program and the importance of this description is evident because it represents the cornerstone in obtaining program accreditation and is written jointly by the teaching staff under the supervision of the scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the vocabulary and paragraphs of the previous guide in light of the developments 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 description of the academic program circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna track as the basis for their work.

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

**Concepts and terminology:**

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

**Course Description:** This provides a summary of the most important characteristics of the course and the learning outcomes expected of the student, proving whether he has made the most of the available learning opportunities. It is derived from the description of the program.

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

**Program Mission:** Briefly outline the objectives and activities necessary to achieve them and define the program's development paths and directions.

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

**Curriculum Structure:** All courses/subjects included in the academic program according to the approved learning system (semester, yearly, Bologna track), whether it is a requirement (ministry, university, college, and scientific department) with the number of study units.

**Learning Outcomes:** The student must acquire a compatible set of knowledge, skills, and values after the successful completion of the academic program, and the learning outcomes of each course must be determined to achieve objectives.

**Teaching and learning strategies:** These are the strategies used by the faculty member to develop the student's teaching and learning, and they are plans that are followed to reach the learning goals. Describe all classroom and extracurricular activities that achieve the learning outcomes of the program.

## 1. Program Vision

The Bachelor of Pharmacy program aspires to be a distinguished, nationally and regionally recognized program that graduates competent, ethical, and patient-centred pharmacists, qualified to practise in community and hospital pharmacy, clinical pharmacy, the pharmaceutical industry, and drug quality control, to pursue postgraduate study and scientific research, and to contribute to the safe and effective use of medicines and the improvement of public health.

## 2. Program Mission

The Bachelor of Pharmacy program is committed to preparing qualified pharmacists through high-quality, integrated education and training that combines the basic, pharmaceutical, and clinical sciences with practical and professional skills, using modern multidisciplinary teaching methods. Throughout the five stages of study, the program develops students' intellectual, practical, clinical, communication, and ethical skills, so that its graduates are able to provide safe and effective pharmaceutical care, spread health awareness in society, engage in scientific research, and continue their professional development for the benefit of society and human health.

## 3. Program Objectives

The Bachelor of Pharmacy program (five years, semester system) aims to:

1. Provide students with sound knowledge of the basic and medical sciences needed for pharmacy, including the normal functions of the human body and the changes associated with disease.
2. Build an understanding of the drug as a chemical and natural entity: its sources, structure, properties, mechanism of action, toxicity, and analysis.
3. Develop students' ability to design, formulate, manufacture, and evaluate

pharmaceutical dosage forms and perform accurate pharmaceutical calculations.

4. Prepare students to select and evaluate appropriate drug therapy, detect drug-related problems and interactions, and monitor treatment outcomes for individual patients.

5. Develop practical laboratory, clinical, and pharmacy-practice skills through laboratory work, clinical laboratory training, and hospital and community pharmacy training.

6. Develop communication skills so that graduates can counsel and educate patients and work effectively with physicians, nurses, and other members of the healthcare team.

7. Instil the ethics of the pharmacy profession, making patient and community safety the first priority of pharmaceutical practice.

8. Develop research, computer, self-learning, and critical-thinking skills that prepare graduates for postgraduate study, scientific research, and lifelong professional development.

9. Prepare graduates who meet the needs of the labour market in community and hospital pharmacy, clinical pharmacy, the pharmaceutical industry, drug quality control, and public health.

## 4. Program Accreditation

None

## 5. Other external influences

Practical part - desk research - extracurricular activities - volunteer activities - others

## 6. Program Structure

| Program Structure | Number of Courses | Credit hours | Percentage | Reviews* |
|---|---|---|---|---|
| **Institution Requirements** | 6 | 12 | 6.7% | Basic |
| **College / Department Requirements** | 51 | 162 | 90.5% | Basic |
| **Summer Training** | — | — | — | Non-credit |
| **Other Requirements** | 3 | 5 | 2.8% | Basic (training & project) |
| **Total** | **60** | **179** | **100%** | |

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

** Credit hours are expressed as credit units: 1 theoretical hour per week = 1 unit; 2 practical hours per week = 1 unit.

## 6.1 Credit Hours by Academic Year

| Academic Year | First Semester | Second Semester | Total Credits | Percentage |
|---|---|---|---|---|
| **First Year** | 15 | 16 | 31 | 17.3% |
| **Second Year** | 22 | 20 | 42 | 23.5% |
| **Third Year** | 18 | 19 | 37 | 20.7% |
| **Fourth Year** | 16 | 18 | 34 | 19.0% |
| **Fifth Year** | 19 | 16 | 35 | 19.6% |
| **Total** | **89** | **90** | **179** | **100%** |

## 7. Program Description

| Year/Level | Course Code | Course Name | Credit Hours | |
|---|---|---|---|---|
| | | | **Theoretical** | **Practical** |
| First Stage<br>First Semester | PCLS 11 | Human Anatomy and Histology | 2 | 2 |
| First Stage<br>First Semester | PPCT 11 | Medical Physics | 2 | 2 |

## 7. Program Description

| Year/Level | Course Code | Course Name | Credit Hours | |
|---|---|---|---|---|
| | | | Theoretical | Practical |
| First Stage<br>First Semester | PPCS 11 | Analytical Chemistry | 3 | 2 |
| First Stage<br>First Semester | TER 11 | Medical Terminology | 1 | — |
| First Stage<br>First Semester | MAT 12 | Biostatistics | 2 | — |
| First Stage<br>First Semester | DEM 15 | Democracy and Human Rights | 2 | — |
| First Stage<br>Second Semester | PCLS 12 | Physiology I | 3 | 2 |
| First Stage<br>Second Semester | PPCT 12 | Pharmaceutical Calculation | 2 | 2 |
| First Stage<br>Second Semester | PPCS 12 | Organic Chemistry I | 3 | 2 |
| First Stage<br>Second Semester | ARA 13 | Arabic Language I | 2 | — |
| First Stage<br>Second Semester | CSC 17 | Computer Sciences | 1 | 2 |
| Second Stage<br>First Semester | PPCS 23 | Organic Chemistry II | 3 | 2 |
| Second Stage<br>First Semester | PCLS 24 | Medical Microbiology I | 3 | 2 |
| Second Stage<br>First Semester | PPCT 23 | Physical Pharmacy I | 3 | 2 |
| Second Stage<br>First Semester | PPCL 21 | Physiology II | 3 | 2 |
| Second Stage<br>First Semester | ARA 28 | Arabic Language | 2 | — |
| Second Stage<br>First Semester | CSC 29 | Computer Science | 1 | 2 |
| Second Stage<br>First Semester | CRM 210 | Crimes of Al Ba'ath regime in Iraq | 2 | — |
| Second Stage<br>Second Semester | PPCS 24 | Organic Chemistry III | 2 | 2 |
| Second Stage<br>Second Semester | PCLS 25 | Medical Microbiology II | 3 | 2 |
| Second Stage<br>Second Semester | PPCT 24 | Physical Pharmacy II | 3 | 2 |
| Second Stage<br>Second Semester | PPCL 22 | Physiology III | 3 | 2 |
| Second Stage<br>Second Semester | PPCG 21 | Pharmacognosy I | 3 | 2 |
| Second Stage<br>Second Semester | ARA 212 | Arabic Language II | 2 | — |
| Third Stage<br>First Semester | PPCS 35 | Inorganic Pharmaceutical Chemistry | 2 | 2 |
| Third Stage<br>First Semester | PPCG 32 | Pharmacognosy II | 2 | 2 |
| Third Stage<br>First Semester | PPCT 35 | Pharmaceutical Technology | 3 | 2 |

## 7. Program Description

| Year/Level | Course Code | Course Name | Credit Hours | |
|---|---|---|---|---|
| | | | Theoretical | Practical |
| Third Stage<br>First Semester | PCLS 36 | Biochemistry I | 3 | 2 |
| Third Stage<br>First Semester | PCLS 37 | Pathophysiology | 3 | 2 |
| Third Stage<br>Second Semester | PPCS 36 | Organic Pharmaceutical Chemistry I | 3 | 2 |
| Third Stage<br>Second Semester | PPCL 33 | Pharmacology I | 3 | — |
| Third Stage<br>Second Semester | PPCT 36 | Pharmaceutical and Cosmetic Preparation | 3 | 2 |
| Third Stage<br>Second Semester | PCLS 38 | Biochemistry II | 3 | 2 |
| Third Stage<br>Second Semester | PPCG 33 | Pharmacognosy III | 2 | 2 |
| Third Stage<br>Second Semester | PCPC 31 | Pharmacy Ethics | 1 | — |
| Fourth Stage<br>First Semester | PPCL 44 | Pharmacology II | 3 | 2 |
| Fourth Stage<br>First Semester | PPCS 47 | Organic Pharmaceutical Chemistry II | 3 | 2 |
| Fourth Stage<br>First Semester | PCPC 42 | Clinical Pharmacy I | 2 | 2 |
| Fourth Stage<br>First Semester | PPCT 47 | Biopharmaceutics | 2 | 2 |
| Fourth Stage<br>First Semester | PCLS 49 | Public Health | 2 | — |
| Fourth Stage<br>Second Semester | PPCL 45 | Pharmacology III | 2 | — |
| Fourth Stage<br>Second Semester | PPCS 48 | Organic Pharmaceutical Chemistry III | 3 | 2 |
| Fourth Stage<br>Second Semester | PCPC 43 | Clinical Pharmacy II | 2 | 2 |
| Fourth Stage<br>Second Semester | PPCL 46 | General Toxicology | 2 | 2 |
| Fourth Stage<br>Second Semester | PPCT 48 | Industrial Pharmacy I | 3 | 2 |
| Fourth Stage<br>Second Semester | PCPC 44 | Communication Skills | 2 | — |
| Fifth Stage<br>First Semester | PPCS 59 | Organic Pharmaceutical Chemistry IV | 2 | — |
| Fifth Stage<br>First Semester | PPCT 59 | Industrial Pharmacy II | 3 | 2 |
| Fifth Stage<br>First Semester | PCPC 55 | Applied Therapeutics I | 3 | — |
| Fifth Stage<br>First Semester | PCLS 510 | Clinical Chemistry | 3 | 2 |

## 7. Program Description

| Year/Level | Course Code | Course Name | Credit Hours | |
|---|---|---|---|---|
| | | | Theoretical | Practical |
| Fifth Stage<br>First Semester | PCLS 511 | Clinical Laboratory Training | — | 4 |
| Fifth Stage<br>First Semester | PPCL 57 | Clinical Toxicology | 2 | 2 |
| Fifth Stage<br>First Semester | GRP 515 | Graduation Project | 1 | — |
| Fifth Stage<br>Second Semester | PCPC 56 | Pharmacoeconomics | 2 | — |
| Fifth Stage<br>Second Semester | PCPC 57 | Applied Therapeutics II | 2 | — |
| Fifth Stage<br>Second Semester | PCPC 58 | Therapeutic Drug Monitoring (TDM) | 2 | 2 |
| Fifth Stage<br>Second Semester | PPCS 510 | Advanced Pharmaceutical Analysis | 3 | 2 |
| Fifth Stage<br>Second Semester | PCPC 59 | Hospital Training | — | 4 |
| Fifth Stage<br>Second Semester | PPCT 510 | Drug Delivery System | 2 | — |
| Fifth Stage<br>Second Semester | PCLS 512 | Pharmaceutical Biotechnology | 1 | — |
| **Total** | | **60 courses** | **136** | **86** |

## 8. Expected learning outcomes of the program

| **Knowledge** | |
|---|---|
| A1 | Identify the normal functions of the body and the changes in these functions associated with impairment. |
| A2 | Identify the drug as a chemical compound and the consequences of its properties the effectiveness of the drug, its mechanism of action, methods of formulation, and side effects. |
| A3 | Identify the types of drug doses, how to determine the appropriate drug formula for the drug, methods of manufacturing and evaluating them in terms of effectiveness, therapeutic effect, negative effect, stability, and calculating the correct doses |
| A4 | Identify the different treatments and how to test the appropriate treatment for the disease and the desired therapeutic effect. |
| A5 | Learn about the concepts of human rights and citizenship. |
| A6 | Learn about the principles of medical statistics and medical physics. |
| **Skills** | |

| | |
|---|---|
| B1 | The student acquires the skill of dealing with laboratory equipment. |
| B2 | The student acquires the skill of self-learning. |
| B3 | The pharmacist can provide the highest health care to patients in health institutions and the community. |
| B4 | The pharmacist should be able to diagnose therapeutic errors by evaluating the appropriateness of treatment for the pathological condition and the absence of drug interactions or interactions with the patient's general health condition. |
| B5 | The pharmacist deals with patients at various intellectual, scientific, social, psychological, and health levels. |
| B6 | The pharmacist can communicate with various medical staff, such as the doctor, nurse, and others, to correct therapeutic errors, if any, and provide treatment recommendations based on sound foundations. |
| B7 | The pharmacist applies the basic concepts of drug chemistry and his work mechanism to interpret drug interactions and provide pharmaceutical advice to medical staff and society. |
| B8 | The pharmacist can educate the patient on the different aspects of using the drug dose and how to store the drug. |
| **Ethics** | |
| C1 | Dealing with patients according to pharmacy ethics. |
| C2 | Make the security and safety of the patient and the community the first goal of the pharmacy profession |
| C3 | Teamwork with other colleagues in the healthcare team in the work environment |
| **General and Transferable Skills** | |
| D1 | After graduation, pharmacists can identify the necessary aspects of professional development |
| D2 | Pharmacists can conduct job interviews and present scientific and learning materials |
| D3 | The pharmacist can use the computer |
| D4 | The pharmacist can choose the type of pharmaceutical work that suits him |
| D5 | Pharmacist has the skill of dialogue, scientific discussion, and accepting the opinions of others |

## 9. Teaching and Learning Strategies

Presentation and presentation

Interactive Discussions

Brainstorming

Small groups

Research and extrapolation

Reflex rows

Panel Discussions

Field visits to institutions and bodies related to the work of the pharmacist

## 10. Evaluation methods

Individual and group assignments and reports

Daily Exams

Practical Skills Assessment

Midterm and end-of-semester exams

Graduation Projects

## 11. Faculty

**Faculty Members**

| Academic Rank | Specialization | | Special Requirements/Skills (if applicable) | | Number of the teaching staff | |
|---|---|---|---|---|---|---|
| | General | Special | | | Staff | Lecturer |
| Professor | 1 | - | | | 12 | |
| Assistant Professor | 1 | 2 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Lecturer | 2 | 7 | | | | |
| Assistant Lecturer | 1 | 19 | | | | |
| Total | 5 | 28 | | | 12 | |

## Professional Development

**Mentoring new faculty members**

New faculty members are paired with experienced senior faculty in their scientific department, who guide them in preparing course descriptions and lectures, laboratory supervision, student assessment, and the College's quality assurance procedures. They also attend induction sessions on the University and College regulations, the academic program, and the teaching and learning strategies adopted.

**Professional development of faculty members**

Faculty members take part in workshops, seminars, and training courses on modern teaching and learning methods, e-learning, assessment, research skills, and scientific publishing organized by the College and the University's Continuing Education Unit; they attend local and international scientific conferences; and their teaching performance is reviewed through peer evaluation and student feedback to identify further development needs.

## 12. Acceptance Criterion

**Academic average and physical health as approved by the Ministry of Higher Education and Scientific Research**

## 13. The most important sources of information about the program

The website of Al-Zahrawi University – College of Pharmacy in Arabic and English

Website of the Ministry of Higher Education and Scientific Research
Al-Zahrawi University page on social networking sites Panels installed in the college corridors

## 14. Program Development Plan

The academic program includes workshops, seminars, and panel discussions on the general community and pharmaceutical behavior.
The academic program includes student participation in various sports, cultural, humanitarian, and community activities and special seminars in which students present scientific products.

| Program Skills Outline | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Required program Learning outcomes | | | | | | | | | | | | | | | | | | | | | | |
| Year/Level | Course Code | Course Name | Basic or optional | Knowledge | | | | | | Skills | | | | | | | | Ethics | | | General & Transferable Skills | | | | | |
| | | | | A1 | A2 | A3 | A4 | A5 | A6 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | C1 | C2 | C3 | D 1 | D 2 | D 3 | D 4 | D 5 |
| First Stage | PCLS 11 | Human Anatomy and Histology | Basic | | | / | | | | / | | / | | | / | | | / | / | | / | | | | |
| First Stage | PPCT 11 | Medical Physics | Basic | | | / | | | | / | | / | | | / | | | / | / | | / | | | | |
| First Stage | PPCS 11 | Analytical Chemistry | Basic | | | / | | | | / | | | | / | | | | | / | | | | | / | |
| First Stage | TER 11 | Medical Terminology | Basic | | | / | | | | / | | | | / | | | | | / | | | | | / | |
| First Stage | MAT 12 | Biostatistics | Basic | | | / | / | | | / | | | / | | / | | | | / | / | | / | | / | |
| First Stage | DEM 15 | Democracy and Human Rights | Basic | | | | | / | | | / | / | | | | | | / | / | / | | / | | | |
| First Stage | PCLS 12 | Physiology I | Basic | | | / | / | | | / | | | / | | | | | | / | | | | / | / | |
| First Stage | PPCT 12 | Pharmaceutical Calculation | Basic | | / | / | | | | / | | | | / | | | | | / | / | | | | / | |
| First Stage | PPCS 12 | Organic Chemistry I | Basic | | / | | | | | / | / | / | | | | | | | / | | | | | | / |
| First Stage | ARA 13 | Arabic Language I | Basic | | | | | | | | / | / | | | | | | | / | | | / | | | |
| First Stage | CSC 17 | Computer Sciences | Basic | | | | | | / | | / | / | | | | | | | / | | | | / | | |
| Second Stage | PPCS 23 | Organic Chemistry II | Basic | | / | | | | | / | / | / | | | | | | | / | | | / | | | |
| Second Stage | PCLS 24 | Medical Microbiology I | Basic | / | | | / | | | | / | / | | | | | | | / | | | / | | | |
| Second Stage | PPCT 23 | Physical Pharmacy I | Basic | | / | / | | | | / | / | / | | | | | | | / | | | | / | | |
| Second Stage | PPCL 21 | Physiology II | Basic | / | | | | | | | / | / | | | | | | | / | | | / | | | / |
| Second Stage | ARA 28 | Arabic Language | Basic | | | | | | | | / | / | | | | | | | / | | | / | | | |
| Second Stage | CSC 29 | Computer Science | Basic | | | | | | / | | / | / | | | | | | | / | | | / | | | |
| Second Stage | CRM 210 | Crimes of Al Ba'ath regime in Iraq | Basic | | | | | | | | / | / | | | | | | | / | / | | / | | | / |
| Second Stage | PPCS 24 | Organic Chemistry III | Basic | | / | | | | | / | / | / | | | | | | | / | | | / | | | / |
| Second Stage | PCLS 25 | Medical Microbiology II | Basic | / | | | / | | | / | / | / | | | | | | | / | / | | / | | | / |
| Second Stage | PPCT 24 | Physical Pharmacy II | Basic | | / | / | | | | / | / | / | | | | | | | / | | | / | | | / |
| Second Stage | PPCL 22 | Physiology III | Basic | / | | | | | | | / | / | | | | | | | / | / | | / | | | / |
| Second Stage | PPCG 21 | Pharmacognosy I | Basic | | / | | | | | / | / | / | | | | / | | | / | | | / | | | / |
| Second Stage | ARA 212 | Arabic Language II | Basic | | | | | | | | / | / | | | | | | | / | | | / | | | |
| Third Stage | PPCS 35 | Inorganic Pharmaceutical Chemistry | Basic | | / | | | | | / | / | / | | | | / | | | / | | | / | / | | / |
| Third Stage | PPCG 32 | Pharmacognosy II | Basic | | / | | | | | | / | / | | | | | | | / | | | / | | | / |
| Third Stage | PPCT 35 | Pharmaceutical Technology | Basic | | | / | | | | / | / | / | | | | | / | / | / | / | | / | | / | / |
| Third Stage | PCLS 36 | Biochemistry I | Basic | / | | | | | | / | / | / | | | | | | | / | | | / | | / | |
| Third Stage | PCLS 37 | Pathophysiology | Basic | / | | | | | | / | / | / | | | | | | | / | | | / | | | |
| Third Stage | PPCS 36 | Organic Pharmaceutical Chemistry I | Basic | | / | | | | | / | / | / | | | | / | | | / | | | / | | / | |
| Third Stage | PPCL 33 | Pharmacology I | Basic | | / | | / | | | | / | / | | | | / | | / | / | | | / | | / | |

| Program Skills Outline | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Required program Learning outcomes | | | | | | | | | | | | | | | | | | | | | | |
| Year/Level | Course Code | Course Name | Basic or optional | Knowledge | | | | | | Skills | | | | | | | | Ethics | | | General & Transferable Skills | | | | | |
| | | | | A1 | A2 | A3 | A4 | A5 | A6 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | C1 | C2 | C3 | D 1 | D 2 | D 3 | D 4 | D 5 |
| Third Stage | PPCT 36 | Pharmaceutical and Cosmetic Preparation | Basic | | | / | | | | | / | / | | | | | / | / | / | / | | / | | / | / |
| Third Stage | PCLS 38 | Biochemistry II | Basic | / | | | | | | / | / | / | | | | | | | / | / | | / | | / | |
| Third Stage | PPCG 33 | Pharmacognosy III | Basic | | / | | | | | / | / | / | | | | | / | | | / | | / | | | / |
| Third Stage | PCPC 31 | Pharmacy Ethics | Basic | | | | / | / | | | / | / | | / | / | | | / | / | / | / | / | | / | / |
| Fourth Stage | PPCL 44 | Pharmacology II | Basic | / | | / | | | | / | / | | | / | | | / | / | | | | / | | | / |
| Fourth Stage | PPCS 47 | Organic Pharmaceutical Chemistry II | Basic | / | | | | | / | / | / | | | | / | | | / | / | | | / | / | / | / |
| Fourth Stage | PCPC 42 | Clinical Pharmacy I | Basic | | | / | | | | / | / | / | / | | | / | / | / | / | | / | / | | / | / |
| Fourth Stage | PPCT 47 | Biopharmaceutics | Basic | | / | | | | | / | / | | | | | / | | | | / | | / | / | | / |
| Fourth Stage | PCLS 49 | Public Health | Basic | | | / | | | | / | / | / | / | | | | | / | / | / | / | / | | | / |
| Fourth Stage | PPCL 45 | Pharmacology III | Basic | / | | / | | | | / | / | | | / | | | | / | / | | | / | | | / |
| Fourth Stage | PPCS 48 | Organic Pharmaceutical Chemistry III | Basic | | / | | | | | / | / | / | | | | / | | | / | | | / | / | | / |
| Fourth Stage | PCPC 43 | Clinical Pharmacy II | Basic | | | | / | | | | / | / | / | / | | / | / | / | / | | / | / | | / | / |
| Fourth Stage | PPCL 46 | General Toxicology | Basic | | / | | / | | | | / | / | | | | / | | / | / | | | / | | / | / |
| Fourth Stage | PPCT 48 | Industrial Pharmacy I | Basic | | / | | | | | / | / | / | | | | / | / | / | / | | | | | / | / |
| Fourth Stage | PCPC 44 | Communication Skills | Basic | | | | / | | | | / | / | | / | | | | / | / | | | | | / | / |
| Fifth Stage | PPCS 59 | Organic Pharmaceutical Chemistry IV | Basic | | / | | | | | / | / | / | | | | / | | | / | | | / | | | / |
| Fifth Stage | PPCT 59 | Industrial Pharmacy II | Basic | | / | / | | | | | / | / | | | | / | / | | / | | | / | / | / | / |
| Fifth Stage | PCPC 55 | Applied Therapeutics I | Basic | | | | / | | | / | / | / | | | | | | | / | | / | / | | | / |
| Fifth Stage | PCLS 510 | Clinical Chemistry | Basic | / | | | | | | / | / | / | | | | | | | / | | / | / | | | / |
| Fifth Stage | PCLS 511 | Clinical Laboratory Training | Basic | / | | | | | | | / | / | | / | | | | / | / | / | / | / | | / | / |
| Fifth Stage | PPCL 57 | Clinical Toxicology | Basic | | / | | / | | | | / | / | | | | / | | | / | | | / | | | / |
| Fifth Stage | GRP 515 | Graduation Project | Basic | | | | | | | | / | | | | | | | | | / | / | / | / | | / |
| Fifth Stage | PCPC 56 | Pharmacoeconomics | Basic | | | | | | / | | / | / | | | | / | | | / | / | / | | | / | / |
| Fifth Stage | PCPC 57 | Applied Therapeutics II | Basic | | | | / | | | | / | / | / | | | / | | | / | / | | | | / | |
| Fifth Stage | PCPC 58 | Therapeutic Drug Monitoring (TDM) | Basic | | | / | | | | | / | / | / | | | / | | | / | / | / | | | | / |
| Fifth Stage | PPCS 510 | Advanced Pharmaceutical Analysis | Basic | | / | | | | | / | / | / | | | | / | | / | / | / | | | | / | / |
| Fifth Stage | PCPC 59 | Hospital Training | Basic | | | | / | | | | / | / | | | / | / | | | / | / | | | | / | / |

| Program Skills Outline | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Required program Learning outcomes | | | | | | | | | | | | | | | | | | | | | | |
| Year/Level | Course Code | Course Name | Basic or optional | Knowledge | | | | | | Skills | | | | | | | | Ethics | | | General & Transferable Skills | | | | | |
| | | | | A1 | A2 | A3 | A4 | A5 | A6 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | C1 | C2 | C3 | D 1 | D 2 | D 3 | D 4 | D 5 |
| Fifth Stage | PPCT 510 | Drug Delivery System | Basic | | / | / | | | | | / | / | | | | / | | | / | | | / | | | |
| Fifth Stage | PCLS 512 | Pharmaceutical Biotechnology | Basic | | / | / | | | | | / | / | | | | / | | | / | | / | / | | | / |

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

# Course Description Form

## 1. Course Name:

**Human Anatomy and Histology**

## 2. Course Code:

PCLS 11

## 3. Semester / Year:

First Semester / First Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2024–2025

## 5. Available Attendance Forms:

Daily in-person attendance

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

30 theoretical hours (2 hours per week) / 3 units (2 theoretical + 2 practical hours per week)

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

Name: Muntadher Zyara
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Integrate the key concepts and fundamental principles of human biology and histology.<br>2. Enable students to understand the basic structure and organization of the human body, including cells, tissues, organs and organ systems.<br>3. Enable students to distinguish the different types of human tissues and relate their microscopic structure to their physiological functions.<br>4. Develop students' ability to understand the relationship between structural changes and disease conditions. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Discussion and dialogue method.<br>2. Problem-solving (troubleshooting) approach.<br>3. Seminars.<br>4. Blackboard and screen presentations supported by laboratory demonstrations. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge; experimental skills | Introduction to general anatomy | Blackboard, screen presentations and laboratory demonstration | Daily exams and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 2 | Knowledge; experimental skills | Anatomical terms and models | Blackboard, screen presentations and laboratory demonstration | Daily exams and oral questions |
| 3 | 2 | Knowledge; experimental skills | Skeleton: bones and joints | Blackboard, screen presentations and laboratory demonstration | Daily exams and oral questions |
| 4 | 2 | Knowledge; experimental skills | Circulatory system | Blackboard, screen presentations and laboratory demonstration | Daily exams and oral questions |
| 5 | 2 | Knowledge; experimental skills | Glandular epithelium and the endocrine system | Blackboard, screen presentations and laboratory demonstration | Daily exams and oral questions |
| 6 | 2 | Knowledge; experimental skills | Digestive system I (upper GIT): oral cavity, pharynx, oesophagus and stomach | Blackboard, screen presentations and laboratory demonstration | Daily exams and oral questions |
| 7 | 2 | Knowledge; experimental skills | Digestive system II (lower GIT and accessory organs): small and large intestine, rectum, anus, salivary glands, pancreas, liver and gallbladder | Blackboard, screen presentations and laboratory demonstration | Daily exams and oral questions |
| 8 | 2 | Knowledge; experimental skills | Respiratory system | Blackboard, screen presentations and laboratory demonstration | Daily exams and oral questions |
| 9 | 2 | Knowledge; experimental skills | Nervous system | Blackboard, screen presentations and laboratory demonstration | Daily exams and oral questions |
| 10 | 2 | Knowledge; experimental skills | Urinary system | Blackboard, screen presentations and laboratory demonstration | Daily exams and oral questions |
| 11 | 2 | Knowledge; experimental skills | Lymphoid tissue | Blackboard, screen presentations and laboratory demonstration | Daily exams and oral questions |
| 12 | 2 | Knowledge; experimental skills | Lymphoid nodules (MALT) and tonsils | Blackboard, screen presentations and laboratory demonstration | Daily exams and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 13 | 2 | Knowledge; experimental skills | Male reproductive system | Blackboard, screen presentations and laboratory demonstration | Daily exams and oral questions |
| 14 | 2 | Knowledge; experimental skills | Female reproductive system | Blackboard, screen presentations and laboratory demonstration | Daily exams and oral questions |
| 15 | 2 | Knowledge; experimental skills | Integumentary system (the skin) | Blackboard, screen presentations and laboratory demonstration | Daily exams and oral questions |

## 11. Course Evaluation

Written examinations assessing students' knowledge and understanding of human anatomy and histology, daily exams and oral questions. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Moore, K. L. Clinically Oriented Anatomy. |
| Main references (sources) | Junqueira's Basic Histology: Text and Atlas. |
| Recommended books and references (scientific journals, reports…) | Relevant anatomy and histology atlases and scientific journals. |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Human Anatomy and Histology (Practical – Histology)**

## 2. Course Code:

PCLS 11

## 3. Semester / Year:

First Semester / First Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2024–2025

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

45 practical hours (3 hours per week) / 3 units (2 theoretical + 2 practical hours per week)

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

Name: Teacher Aumaima Tariq Abed
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Develop core practical skills in preparing tissue glass slides and using light microscopy to examine cell and tissue structures.<br>2. Systematically identify and differentiate the histological structures and cellular components of the major human organ systems.<br>3. Understand how specialized tissue microanatomy supports organ physiology, biological barriers and mucosal transport.<br>4. Connect microscopic organ characteristics to pharmacy (drug distribution and action). |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Discussion and dialogue.<br>2. Laboratory microscopy and slide examination.<br>3. Exploratory lectures. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 3 | Knowledge; practical skills | Slide preparation techniques and microscopic structure of blood vessels | Blackboard, projector and microscopy | Daily exams and oral questions |
| 2 | 3 | Knowledge; practical skills | Microscopic structure of lymphatic capillaries and vessels | Blackboard, projector and microscopy | Daily exams and oral questions |
| 3 | 3 | Knowledge; practical skills | Histological features of the thymus, spleen and lymph nodes | Blackboard, projector and microscopy | Daily exams and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 4 | 3 | Knowledge; practical skills | Mucosa-associated lymphoid tissue and tonsils | Blackboard, projector and microscopy | Daily exams and oral questions |
| 5 | 3 | Knowledge; practical skills | Histology of central and peripheral nervous tissue | Blackboard, projector and microscopy | Daily exams and oral questions |
| 6 | 3 | Knowledge; practical skills | Respiratory conducting zone and alveolar lung tissue | Blackboard, projector and microscopy | Daily exams and oral questions |
| 7 | 3 | Knowledge; practical skills | Histological layers of the oesophagus, stomach and intestinal wall | Blackboard, projector and microscopy | Daily exams and oral questions |
| 8 | 3 | Knowledge; practical skills | Salivary glands, liver, pancreas and gallbladder | Blackboard, projector and microscopy | Daily exams and oral questions |
| 9 | 3 | Knowledge; practical skills | Adenohypophysis and neurohypophysis | Blackboard, projector and microscopy | Daily exams and oral questions |
| 10 | 3 | Knowledge; practical skills | Adrenal, thyroid, parathyroid and pineal glands | Blackboard, projector and microscopy | Daily exams and oral questions |
| 11 | 3 | Knowledge; practical skills | Seminiferous tubules and stages of sperm development | Blackboard, projector and microscopy | Daily exams and oral questions |
| 12 | 3 | Knowledge; practical skills | Epididymis, vas deferens and prostate | Blackboard, projector and microscopy | Daily exams and oral questions |
| 13 | 3 | Knowledge; practical skills | Ovarian follicles, uterine tubes and endometrium | Blackboard, projector and microscopy | Daily exams and oral questions |
| 14 | 3 | Knowledge; practical skills | Renal nephrons and urinary tract epithelium | Blackboard, projector and microscopy | Daily exams and oral questions |
| 15 | 3 | Knowledge; practical skills | Thick and thin skin: comparative epidermal layers | Blackboard, projector and microscopy | Daily exams and oral questions |

## 11. Course Evaluation

Weekly reports, practical examinations, discussion sessions and presentations. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Mescher A. L. Junqueira's Basic Histology: Text and Atlas, 17th ed. McGraw Hill, 2024. |
| Main references (sources) | — |
| Recommended books and references (scientific journals, reports…) | — |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Medical Physics**

## 2. Course Code:

PPCT 11

## 3. Semester / Year:

First Semester / First Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

30 hours (2 hours per week × 15 weeks) / 3 units according to the study plan (2 theoretical + 2 practical hours per week)

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

Name: Dr. Mariam Raheem
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Understand fundamental concepts of physics and their relevance to medicine and the pharmaceutical and laboratory sciences.<br>2. Use physical terminology, units, standards and common abbreviations correctly in medical applications.<br>3. Explain the basic principles of thermodynamics, pressure, temperature, heat, work, power, gases, diffusion and rheology.<br>4. Describe the physical principles and clinical applications of selected medical instruments and devices.<br>5. Explain the basic principles of ECG, EEG, X-ray, MRI, CT, radiotherapy and radioactive iodine.<br>6. Recognize the medical and biological effects of radiation and the importance of radiation safety. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Theoretical lectures and PowerPoint presentations.<br>2. Demonstrations, device-based learning and practical examples.<br>3. Calculations and problem-solving exercises.<br>4. Small-group discussions and laboratory-oriented activities. |

## 10. Course Structure

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

| | | | | | |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge and practical application | General concepts and thermodynamics: methods of physics and standards; thermodynamic systems and their properties; conservation of energy | PowerPoint presentations, explanation, demonstration, discussion and practical examples | Quizzes, assignments, oral questions, practical exercises and written assessment |
| 2 | 2 | Knowledge and practical application | Pressure, temperature and gas laws: Celsius, Fahrenheit and Kelvin scales; equation of state; ideal and real gases | PowerPoint presentations, explanation, demonstration, discussion and practical examples | Quizzes, assignments, oral questions, practical exercises and written assessment |
| 3 | 2 | Knowledge and practical application | Heat, energy, work and power: first law of thermodynamics; Boyle's and Charles's laws | PowerPoint presentations, explanation, demonstration, discussion and practical examples | Quizzes, assignments, oral questions, practical exercises and written assessment |
| 4 | 2 | Knowledge and practical application | Blood glucose monitoring devices: physical principles, components and clinical applications | PowerPoint presentations, explanation, demonstration, discussion and practical examples | Quizzes, assignments, oral questions, practical exercises and written assessment |
| 5 | 2 | Knowledge and practical application | Parenteral infusion devices and cardiac output measurement | PowerPoint presentations, explanation, demonstration, discussion and practical examples | Quizzes, assignments, oral questions, practical exercises and written assessment |
| 6 | 2 | Knowledge and practical application | Implantable cardiac pacemakers: electrical principles, components and function | PowerPoint presentations, explanation, demonstration, discussion and practical examples | Quizzes, assignments, oral questions, practical exercises and written assessment |
| 7 | 2 | Knowledge and practical application | Electrocardiogram (ECG): electrical activity of the heart, leads, recording and waveforms | PowerPoint presentations, explanation, demonstration, discussion and practical examples | Quizzes, assignments, oral questions, practical exercises and written assessment |
| 8 | 2 | Knowledge and practical application | Electroencephalography (EEG): electrical activity of the brain, electrodes and recording | PowerPoint presentations, explanation, demonstration, discussion and practical examples | Quizzes, assignments, oral questions, practical exercises and written assessment |
| 9 | 2 | Knowledge and practical application | Thermal radiation and heat transfer: Kirchhoff's, Planck's, | PowerPoint presentations, explanation, | Quizzes, assignments, oral questions, |

| | | | | | |
|---|---|---|---|---|---|
| | | | Stefan–Boltzmann and Wien's laws; conduction, convection and radiation | demonstration, discussion and practical examples | practical exercises and written assessment |
| 10 | 2 | Knowledge and practical application | X-rays: production, spectra, absorption and medical imaging | PowerPoint presentations, explanation, demonstration, discussion and practical examples | Quizzes, assignments, oral questions, practical exercises and written assessment |
| 11 | 2 | Knowledge and practical application | UV and IR radiation and the biological effects of radiation; radiation safety | PowerPoint presentations, explanation, demonstration, discussion and practical examples | Quizzes, assignments, oral questions, practical exercises and written assessment |
| 12 | 2 | Knowledge and practical application | Radiotherapy and radioactive iodine | PowerPoint presentations, explanation, demonstration, discussion and practical examples | Quizzes, assignments, oral questions, practical exercises and written assessment |
| 13 | 2 | Knowledge and practical application | Magnetic resonance imaging (MRI): principles, image formation and safety | PowerPoint presentations, explanation, demonstration, discussion and practical examples | Quizzes, assignments, oral questions, practical exercises and written assessment |
| 14 | 2 | Knowledge and practical application | Computed tomography (CT): X-ray attenuation, image reconstruction and applications | PowerPoint presentations, explanation, demonstration, discussion and practical examples | Quizzes, assignments, oral questions, practical exercises and written assessment |
| 15 | 2 | Knowledge and practical application | Diffusion and rheology: diffusion in biological systems; viscosity and flow behaviour | PowerPoint presentations, explanation, demonstration, discussion and practical examples | Quizzes, assignments, oral questions, practical exercises and written assessment |

## 11. Course Evaluation

Written examinations, quizzes, assignments, practical exercises, device identification, calculations, oral questions, reports and class participation. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

| 12. Learning and Teaching Resources | |
|---|---|
| Required textbooks (curricular books, if any) | Physics for Biology and Medical Students, 2nd ed. |
| Main references (sources) | Schreiner, S. Medical Instruments and Devices: Principles and Practices. CRC Press, 2015. |
| Recommended books and references (scientific journals, reports…) | Medical device demonstrations, audiovisual materials and relevant scientific references. |
| Electronic References, Websites | Appropriate simulation and teaching resources. |

# Course Description Form

## 1. Course Name:

**Medical Physics (Practical)**

## 2. Course Code:

PPCT 11

## 3. Semester / Year:

First Semester / First Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2026

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

30 practical hours (2 hours per week × 15 weeks) / 3 units (2 theoretical + 2 practical hours per week)

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

Name: Dr. Mariam Raheem
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Apply fundamental physical principles through laboratory measurements and demonstrations.<br>2. Use basic instruments correctly and record physical quantities in appropriate units.<br>3. Demonstrate the operating principles of selected medical monitoring and diagnostic devices.<br>4. Perform calculations related to pressure, temperature, gases, heat, work, power, diffusion and rheology.<br>5. Observe and interpret basic ECG and EEG signals and understand their physical basis.<br>6. Recognize the practical principles and safety considerations of X-ray, radiotherapy, MRI and CT. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Laboratory and device demonstrations.<br>2. Hands-on experiments and guided calculations.<br>3. Practical worksheets and small-group activities.<br>4. Interpretation of results. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Practical knowledge and application | General concepts and thermodynamics: | Demonstration, hands-on | Practical quiz, worksheet/report |

| | | | | | |
|---|---|---|---|---|---|
| | | | measurement standards, units and laboratory instruments | activity and guided calculations | and oral questions |
| 2 | 2 | Practical knowledge and application | Pressure, temperature and gas laws | Demonstration, hands-on activity and guided calculations | Practical quiz, worksheet/report and oral questions |
| 3 | 2 | Practical knowledge and application | Heat, energy, work and power; Boyle's and Charles's laws | Demonstration, hands-on activity and guided calculations | Practical quiz, worksheet/report and oral questions |
| 4 | 2 | Practical knowledge and application | Blood glucose monitoring devices (glucometers) | Demonstration, hands-on activity and guided calculations | Practical quiz, worksheet/report and oral questions |
| 5 | 2 | Practical knowledge and application | Parenteral infusion devices and cardiac output measurement | Demonstration, hands-on activity and guided calculations | Practical quiz, worksheet/report and oral questions |
| 6 | 2 | Practical knowledge and application | Implantable cardiac pacemakers | Demonstration, hands-on activity and guided calculations | Practical quiz, worksheet/report and oral questions |
| 7 | 2 | Practical knowledge and application | Electrocardiogram (ECG): electrodes, leads and waveform | Demonstration, hands-on activity and guided calculations | Practical quiz, worksheet/report and oral questions |
| 8 | 2 | Practical knowledge and application | Electroencephalography (EEG): signal acquisition and brain-wave patterns | Demonstration, hands-on activity and guided calculations | Practical quiz, worksheet/report and oral questions |
| 9 | 2 | Practical knowledge and application | Thermal radiation and heat transfer | Demonstration, hands-on activity and guided calculations | Practical quiz, worksheet/report and oral questions |
| 10 | 2 | Practical knowledge and application | X-rays and X-ray spectra | Demonstration, hands-on activity and guided calculations | Practical quiz, worksheet/report and oral questions |
| 11 | 2 | Practical knowledge and application | UV, IR and biological effects of radiation | Demonstration, hands-on activity and guided calculations | Practical quiz, worksheet/report and oral questions |
| 12 | 2 | Practical knowledge and application | Radiotherapy and radioactive iodine | Demonstration, hands-on activity and guided calculations | Practical quiz, worksheet/report and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 13 | 2 | Practical knowledge and application | Magnetic resonance imaging (MRI) | Demonstration, hands-on activity and guided calculations | Practical quiz, worksheet/report and oral questions |
| 14 | 2 | Practical knowledge and application | Computed tomography (CT scan) | Demonstration, hands-on activity and guided calculations | Practical quiz, worksheet/report and oral questions |
| 15 | 2 | Practical knowledge and application | Diffusion and rheology (viscosity measurement) | Demonstration, hands-on activity and guided calculations | Practical quiz, worksheet/report and oral questions |

## 11. Course Evaluation

Practical examinations, laboratory reports, quizzes, worksheets, oral questions, device identification and participation. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Physics for Biology and Medical Students, 2nd ed. |
| Main references (sources) | Schreiner S. Medical Instruments and Devices: Principles and Practices. CRC Press, 2015. |
| Recommended books and references (scientific journals, reports…) | Laboratory manuals, worksheets, device manuals and simulation resources. |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Analytical Chemistry (Practical)**

## 2. Course Code:

PPCS 11

## 3. Semester / Year:

First Semester / First Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

30 practical hours (2 hours per week) / 4 units (3 theoretical + 2 practical hours per week); practical part described

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

Name: Assist. Prof. Dr. Mohamed Hafez
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Provide students with sound chemical principles necessary for the practice of chemical analysis.<br>2. Enable students to judge the accuracy and precision of experimental data.<br>3. Train students in quantitative (volumetric) analysis techniques and the related calculations. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Laboratory experiments and practical demonstrations.<br>2. Theoretical explanation supporting each experiment.<br>3. Seminars, reports, posters and class activities. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge and understanding; subject-specific skills | Review of elementary concepts | Practical laboratory | Evaluation of laboratory skills, discussion, laboratory reports, and oral and written exams |
| 2 | 2 | Knowledge and understanding; subject-specific skills | Laboratory equipment | Practical laboratory | Evaluation of laboratory skills, discussion, laboratory reports, and |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | oral and written exams |
| 3 | 2 | Knowledge and understanding; subject-specific skills | Quantitative methods of analysis | Practical laboratory | Evaluation of laboratory skills, discussion, laboratory reports, and oral and written exams |
| 4 | 2 | Knowledge and understanding; subject-specific skills | Volumetric methods of analysis | Practical laboratory | Evaluation of laboratory skills, discussion, laboratory reports, and oral and written exams |
| 5 | 2 | Knowledge and understanding; subject-specific skills | Calculations in volumetric analysis I | Practical laboratory | Evaluation of laboratory skills, discussion, laboratory reports, and oral and written exams |
| 6 | 2 | Knowledge and understanding; subject-specific skills | Calculations in volumetric analysis II | Practical laboratory | Evaluation of laboratory skills, discussion, laboratory reports, and oral and written exams |
| 7 | 2 | Knowledge and understanding; subject-specific skills | Preparation of 1 N HCl solution | Practical laboratory | Evaluation of laboratory skills, discussion, laboratory reports, and oral and written exams |
| 8 | 2 | Knowledge and understanding; subject-specific skills | Standardization of 1 N HCl solution | Practical laboratory | Evaluation of laboratory skills, discussion, laboratory reports, and oral and written exams |
| 9 | 2 | Knowledge and understanding; subject-specific skills | Standardization of 1 N NaOH solution | Practical laboratory | Evaluation of laboratory skills, discussion, laboratory reports, and oral and written exams |

| | | | | | |
|---|---|---|---|---|---|
| 10 | 2 | Knowledge and understanding; subject-specific skills | Acid–base indicators | Practical laboratory | Evaluation of laboratory skills, discussion, laboratory reports, and oral and written exams |
| 11 | 2 | Knowledge and understanding; subject-specific skills | Acid–base titration calculations | Practical laboratory | Evaluation of laboratory skills, discussion, laboratory reports, and oral and written exams |
| 12 | 2 | Knowledge and understanding; subject-specific skills | Determination of acetic acid in vinegar I | Practical laboratory | Evaluation of laboratory skills, discussion, laboratory reports, and oral and written exams |
| 13 | 2 | Knowledge and understanding; subject-specific skills | Determination of acetic acid in vinegar II | Practical laboratory | Evaluation of laboratory skills, discussion, laboratory reports, and oral and written exams |
| 14 | 2 | Knowledge and understanding; subject-specific skills | Calculation of % acetic acid in vinegar | Practical laboratory | Evaluation of laboratory skills, discussion, laboratory reports, and oral and written exams |
| 15 | 2 | Knowledge and understanding; subject-specific skills | Comprehensive practical review | Practical laboratory | Practical examination |

## 11. Course Evaluation

Midterm and final exams, oral and written exams, laboratory reports and class activities (posters). The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

| 12. Learning and Teaching Resources | |
|---|---|
| Required textbooks (curricular books, if any) | Harris, D. C. Quantitative Chemical Analysis. New York: W. H. Freeman and Co., 2007. |
| Main references (sources) | Vogel, A. I., & Mendham, J. Vogel's Textbook of Quantitative Chemical Analysis. Harlow: Prentice Hall, 2000. |
| Recommended books and references (scientific journals, reports…) | Relevant scientific journals and laboratory manuals in analytical chemistry. |
| Electronic References, Websites | Electronic websites and Internet resources related to analytical chemistry. |

# Course Description Form

## 1. Course Name:

**Medical Terminology**

## 2. Course Code:

TER 11

## 3. Semester / Year:

First Semester / First Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

22/4/2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

15 hours (1 theoretical hour per week) / 1 unit

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

Name: Assist. Lect. Mohammed Shaheed Sachit
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Introduce students to the basic medical terminology used in the health and pharmaceutical fields.<br>2. Enable students to understand and use medical terminology in scientific and professional contexts.<br>3. Develop students' ability to analyse medical terms into their linguistic components (roots, prefixes and suffixes).<br>4. Enhance communication skills using accurate scientific language. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Lectures.<br>2. Group discussions. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Understand the basics of medical terminology, including prefixes and suffixes. | Introduction and body organization | Lectures and group discussions | Quizzes and exams |
| 2 | 1 | Identify the most important terms related to the respiratory system. | Respiratory system | Lectures and group discussions | Quizzes and exams |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 1 | Identify the most important terms related to the urinary system. | Urinary system | Lectures and group discussions | Quizzes and exams |
| 4 | 1 | Identify the most important terms related to the integumentary system. | Integumentary system | Lectures and group discussions | Quizzes and exams |
| 5 | 1 | Identify the most important terms related to the reproductive system. | Reproductive system | Lectures and group discussions | Quizzes and exams |
| 6 | 2 | Identify the most important terms related to the gastrointestinal system. | Gastrointestinal tract | Lectures and group discussions | Quizzes and exams |
| 7 | 2 | Identify the most important terms related to the cardiovascular system. | Heart and cardiovascular system | Lectures and group discussions | Quizzes and exams |
| 8 | 1 | Identify the most important terms related to the female reproductive system. | Gynaecology, pregnancy and childbirth | Lectures and group discussions | Quizzes and exams |
| 9 | 1 | Identify the most important terms related to the visual system. | The eye | Lectures and group discussions | Quizzes and exams |
| 10 | 1 | Identify the most important terms related to the nervous system. | Nervous system and behavioural disorders | Lectures and group discussions | Quizzes and exams |
| 11 | 1 | Identify the most important terms related to the musculoskeletal system. | Musculoskeletal system | Lectures and group discussions | Quizzes and exams |
| 12 | 1 | Identify the most important terms related to the lymphatic and immune systems. | Lymphatic and immune systems | Lectures and group discussions | Quizzes and exams |

## 11. Course Evaluation

Quizzes and final exam. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

| 12. Learning and Teaching Resources | |
|---|---|
| Required textbooks (curricular books, if any) | Edward, C. C. (Ed.). A Short Course in Medical Terminology, 1st ed. |
| Main references (sources) | Stanhope, L., & Turnbull, K. Introduction to Medical Terminology, 1st ed. |
| Recommended books and references (scientific journals, reports…) | Basic Medical Language; Medical Language for Modern Health Care; Mastering Healthcare Terminology; Medical Terminology for Health Care Professionals; Medical Terminology for Dummies. |
| Electronic References, Websites | https://www.goodreads.com/en/book/show/2758424-a-short-course-in-medical-terminology |

# Course Description Form

## 1. Course Name:

**Biostatistics (Mathematics and Biostatistics)**

## 2. Course Code:

MAT 12

## 3. Semester / Year:

First Semester / First Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

30 hours (2 theoretical hours per week) / 2 units

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

Name: Assist. Lect. Hasnain Abdulhamid Athar
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Review the basics of mathematics, such as solving simple equations and percentage applications, and their use in pharmacy.<br>2. Introduce the basic principles of biostatistics.<br>3. Enable students to describe and analyse clinical data and to understand the design of clinical trials.<br>4. Develop skills in calculating and diluting doses. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Lectures using the whiteboard, projector and PowerPoint presentations.<br>2. Thinking and discussion methods, including exploratory thinking.<br>3. Learning through pictures, diagrams, videos and other visual aids.<br>4. Homework on topics related to the course material. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge | Mathematical functions | Whiteboard and projector | Daily quizzes and oral questions |
| 2 | 2 | Knowledge | Fractions and their applications | Whiteboard and projector | Daily quizzes and oral questions |
| 3 | 2 | Knowledge | Percentage and its applications in pharmaceutical calculations | Whiteboard and projector | Daily quizzes and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 4 | 2 | Knowledge | Data plotting in pharmaceutical calculations | Whiteboard and projector | Daily quizzes and oral questions |
| 5 | 2 | Knowledge | Differentiation and integration formulas | Whiteboard and projector | Daily quizzes and oral questions |
| 6 | 2 | Knowledge | Introduction to biostatistics | Whiteboard and projector | Daily quizzes and oral questions |
| 7 | 2 | Knowledge | Data description (numerical data) | Whiteboard and projector | Daily quizzes and oral questions |
| 8 | 2 | Knowledge | Data description (categorical data) | Whiteboard and projector | Daily quizzes and oral questions |
| 9 | 2 | Knowledge | Types of clinical trials | Whiteboard and projector | Daily quizzes and oral questions |
| 10 | 2 | Knowledge | Binomial distribution of data | Whiteboard and projector | Daily quizzes and oral questions |
| 11 | 2 | Knowledge | Principles of data analysis | Whiteboard and projector | Daily quizzes and oral questions |
| 12 | 2 | Knowledge | Parametric tests for data analysis | Whiteboard and projector | Daily quizzes and oral questions |
| 13 | 2 | Knowledge | Non-parametric tests for data analysis | Whiteboard and projector | Daily quizzes and oral questions |
| 14 | 2 | Knowledge | Chi-square test and Fisher's exact test | Whiteboard and projector | Daily quizzes and oral questions |
| 15 | 2 | Knowledge | Correlation and regression | Whiteboard and projector | Daily quizzes and oral questions |

## 11. Course Evaluation

Weekly reports and written and oral exams. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Daniel, W. W., & Cross, C. L. Biostatistics: A Foundation for Analysis in the Health Sciences, 10th ed. |
| Main references (sources) | Daniel, W. W., & Cross, C. L. Biostatistics: A Foundation for Analysis in the Health Sciences, 10th ed. |
| Recommended books and references (scientific journals, reports…) | GraphPad Prism user guide and relevant biostatistics journals. |
| Electronic References, Websites | https://www.graphpad.com/guides/prism/latest/user-guide/index.htm |

# Course Description Form

## 1. Course Name:

**Democracy and Human Rights**

## 2. Course Code:

DEM 15

## 3. Semester / Year:

First Semester / First Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2026

## 5. Available Attendance Forms:

Daily in-person attendance (classroom)

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

30 hours (2 theoretical hours per week × 15 weeks) / 2 units

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

Name: Dr. Salem Ezerjawi
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Define human rights and identify their main characteristics, sources and historical stages of development.<br>2. Understand democracy: its origins, concepts, characteristics, foundations, forms, advantages and limitations.<br>3. Recognize how political rights are practised within democratic systems.<br>4. Understand civil and political rights and the main categories of human rights in international law.<br>5. Become familiar with the Universal Declaration of Human Rights and the international covenants and treaties concerning human rights.<br>6. Discuss women's and children's rights and compare selected religious, Sharia and legal perspectives on rights. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Theoretical lectures supported by PowerPoint presentations.<br>2. Guided discussion, debates and small-group learning.<br>3. Reading activities and case examples. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge, understanding and critical discussion | Definition of democracy: meaning, basic terminology and introductory concepts | Lecture, PowerPoint presentation, guided | Quizzes, oral questions, assignments |

| | | | | | |
|---|---|---|---|---|---|
| | | | | discussion and case examples | and written assessment |
| 2 | 2 | Knowledge, understanding and critical discussion | Origins and different concepts of democracy | Lecture, PowerPoint presentation, guided discussion and case examples | Quizzes, oral questions, assignments and written assessment |
| 3 | 2 | Knowledge, understanding and critical discussion | Characteristics of the democratic system | Lecture, PowerPoint presentation, guided discussion and case examples | Quizzes, oral questions, assignments and written assessment |
| 4 | 2 | Knowledge, understanding and critical discussion | Conditions, foundations and pillars of democracy | Lecture, PowerPoint presentation, guided discussion and case examples | Quizzes, oral questions, assignments and written assessment |
| 5 | 2 | Knowledge, understanding and critical discussion | Types of democracy and democracy in Islam | Lecture, PowerPoint presentation, guided discussion and case examples | Quizzes, oral questions, assignments and written assessment |
| 6 | 2 | Knowledge, understanding and critical discussion | Majority-rule systems: political decision-making and representation | Lecture, PowerPoint presentation, guided discussion and case examples | Quizzes, oral questions, assignments and written assessment |
| 7 | 2 | Knowledge, understanding and critical discussion | Advantages and disadvantages of democracy | Lecture, PowerPoint presentation, guided discussion and case examples | Quizzes, oral questions, assignments and written assessment |
| 8 | 2 | Knowledge, understanding and critical discussion | Common principles and systems of democracy | Lecture, PowerPoint presentation, guided discussion and case examples | Quizzes, oral questions, assignments and written assessment |
| 9 | 2 | Knowledge, understanding and critical discussion | Civil and political rights | Lecture, PowerPoint presentation, guided discussion and case examples | Quizzes, oral questions, assignments and written assessment |
| 10 | 2 | Knowledge, understanding and critical discussion | Types of human rights in international law I | Lecture, PowerPoint presentation, guided discussion and case examples | Quizzes, oral questions, assignments and written assessment |

| | | | | | |
|---|---|---|---|---|---|
| 11 | 2 | Knowledge, understanding and critical discussion | Types of human rights in international law II | Lecture, PowerPoint presentation, guided discussion and case examples | Quizzes, oral questions, assignments and written assessment |
| 12 | 2 | Knowledge, understanding and critical discussion | Universal Declaration of Human Rights | Lecture, PowerPoint presentation, guided discussion and case examples | Quizzes, oral questions, assignments and written assessment |
| 13 | 2 | Knowledge, understanding and critical discussion | Differences in rights across religions | Lecture, PowerPoint presentation, guided discussion and case examples | Quizzes, oral questions, assignments and written assessment |
| 14 | 2 | Knowledge, understanding and critical discussion | Women's and children's rights | Lecture, PowerPoint presentation, guided discussion and case examples | Quizzes, oral questions, assignments and written assessment |
| 15 | 2 | Knowledge, understanding and critical discussion | Women's rights between Sharia and law | Lecture, PowerPoint presentation, guided discussion and case examples | Quizzes, oral questions, assignments and written assessment |

## 11. Course Evaluation

Written examinations, quizzes, assignments, oral questions, presentations, discussion participation and short reports. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Hamid Hanoun. Political Systems (الأنظمة السياسية). |
| Main references (sources) | Hashim Al-Milani. Democracy from the Greeks to the Postmodern World; Dr. Maher Saleh. Human and Child Rights and Democracy. |
| Recommended books and references (scientific journals, reports…) | Relevant legal and human-rights documents, international declarations and conventions. |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Physiology I (Human Biology)**

## 2. Course Code:

PCLS 12

## 3. Semester / Year:

Second Semester / First Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

16/10/2024

## 5. Available Attendance Forms:

Daily in-person attendance

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

Theoretical part: 30 hours as distributed in the weekly plan / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Dr. Lafta Fayez Kadhim
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Introduce the basic concepts of human biology and relate them to the human body in health and disease, including the structure and function of the cell, cell division and human inheritance.<br>2. Provide a comprehensive study of the main body tissues and systems (digestive, circulatory, immune) and the disorders that may affect them.<br>3. Develop practical skills in using the microscope, examining cell and tissue structure and identifying the organs of the human body. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Theoretical lectures using the smart board, pictures and videos that bring the scientific idea closer to the students.<br>2. Problem-based discussion: presenting a specific problem and reaching appropriate solutions through discussion with the students.<br>3. Small-group work in the practical (laboratory) part of the course. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 3 | Understand the basic principles of human biology and its branches. | Introduction and basic principles of human biology; branches of biology | Lectures using references and the smart board | Monthly written and oral examinations |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 4 | Describe the structure, properties and classification of the cell and its organelles. | The cell: structure, properties and classification; cell organelles | Lectures using references and the smart board | Monthly written and oral examinations |
| 3 | 3 | Classify the tissues and describe their structure, properties and functions. | Tissues: connective, epithelial, muscular and nervous tissues | Lectures using references and the smart board | Monthly written and oral examinations |
| 4 | 3 | Identify the main nutrients and their roles in the body. | Nutrition: fats, proteins, carbohydrates, vitamins and minerals | Lectures using references and the smart board | Monthly written and oral examinations |
| 5 | 3 | Describe the structure and function of the upper digestive tract. | Digestive system I: mouth, oesophagus and stomach | Lectures using references and the smart board | Monthly written and oral examinations |
| 6 | 3 | Describe the structure and function of the intestine. | Digestive system II: the intestine | Lectures using references and the smart board | Monthly written and oral examinations |
| 7 | 2 | Explain the systemic and pulmonary circulation and the components of blood. | Circulatory system and blood: systemic and pulmonary circulation; plasma, red blood cells, white blood cells and platelets | Lectures using references and the smart board | Monthly written and oral examinations |
| 8 | 2 | Describe the types of inflammation and the inflammatory mediators. | Inflammation: types of inflammation and inflammatory mediators | Lectures using references and the smart board | Monthly written and oral examinations |
| 9 | 2 | Explain the components of human immunity, including cellular immunity. | Immunity and the blood: human immunity and cellular immunity | Lectures using references and the smart board | Monthly written and oral examinations |
| 10 | 5 | Distinguish between active and passive immunization. | Immunity to disease: active and passive immunization | Lectures using references and the smart board | Monthly written and oral examinations |

## 11. Course Evaluation

Daily written and oral exams, mid-semester and end-of-semester written exams, and practical laboratory skills exams. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Human Biology – Willy Cushwa. |
| Main references (sources) | Human Biology – Willy Cushwa. |
| Recommended books and references (scientific journals, reports…) | Scientific articles available through ResearchGate. |
| Electronic References, Websites | ResearchGate (www.researchgate.net). |

# Course Description Form

## 1. Course Name:

**Physiology I (Human Biology) (Practical)**

## 2. Course Code:

PCLS 12

## 3. Semester / Year:

Second Semester / First Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

16/10/2024

## 5. Available Attendance Forms:

Daily in-person laboratory attendance (small groups)

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

30 practical hours (2 hours per week) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Dr. Lafta Fayez Kadhim
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Define the basic concepts of human biology: the structure and function of cells, cell division and human inheritance.<br>2. Study the tissues and the main body systems and the diseases that may affect them.<br>3. Develop the ability to use laboratory equipment such as the microscope and to identify cells, tissues and organs. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Small-group practical sessions.<br>2. Smart board with pictures and videos.<br>3. Problem presentation and discussion to reach appropriate solutions. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge; experimental skills | The microscope | References and smart board; laboratory practice | Daily written and oral examinations |
| 2 | 2 | Knowledge; experimental skills | The cell: structure, properties, classification and organelles | References and smart board; laboratory practice | Daily written and oral examinations |
| 3 | 2 | Knowledge; experimental skills | Cell division (mitosis) | References and smart board; laboratory practice | Daily written and oral examinations |

| | | | | | |
|---|---|---|---|---|---|
| 4 | 2 | Knowledge; experimental skills | Cell division (meiosis) | References and smart board; laboratory practice | Daily written and oral examinations |
| 5 | 2 | Knowledge; experimental skills | Tissues: simple epithelial tissue | References and smart board; laboratory practice | Daily written and oral examinations |
| 6 | 2 | Knowledge; experimental skills | Skin | References and smart board; laboratory practice | Daily written and oral examinations |
| 7 | 2 | Knowledge; experimental skills | Connective tissue | References and smart board; laboratory practice | Daily written and oral examinations |
| 8 | 2 | Knowledge; experimental skills | Muscular tissue | References and smart board; laboratory practice | Daily written and oral examinations |
| 9 | 2 | Knowledge; experimental skills | Nervous tissue | References and smart board; laboratory practice | Daily written and oral examinations |
| 10 | 2 | Knowledge; experimental skills | Bone and cartilage | References and smart board; laboratory practice | Daily written and oral examinations |
| 11 | 2 | Knowledge; experimental skills | Digestive system (digestion) | References and smart board; laboratory practice | Daily written and oral examinations |
| 12 | 2 | Knowledge; experimental skills | Digestive system (small and large intestine) | References and smart board; laboratory practice | Daily written and oral examinations |
| 13 | 2 | Knowledge; experimental skills | Blood | References and smart board; laboratory practice | Daily written and oral examinations |
| 14 | 2 | Knowledge; experimental skills | The chromosome | References and smart board; laboratory practice | Daily written and oral examinations |
| 15 | 2 | Knowledge; experimental skills | Excretory system | References and smart board; laboratory practice | Daily written and oral examinations |

## 11. Course Evaluation

Daily written and oral exams, mid-semester and final exams, and practical laboratory-skills examinations. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

| 12. Learning and Teaching Resources | |
|---|---|
| Required textbooks (curricular books, if any) | Human Biology (Willy Cushwa). |
| Main references (sources) | — |
| Recommended books and references (scientific journals, reports…) | — |
| Electronic References, Websites | ResearchGate. |

# Course Description Form

## 1. Course Name:

**Pharmaceutical Calculations**

## 2. Course Code:

PPCT 12

## 3. Semester / Year:

Second Semester / First Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2024–2025

## 5. Available Attendance Forms:

Daily in-person attendance

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

30 theoretical hours (2 hours per week) / 3 units (2 theoretical + 2 practical hours per week)

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

Name: Dr. Azher A. Ibrahem
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Enable students to perform the pharmaceutical calculations required in pharmacy practice.<br>2. Enable students to recognize the numbers, abbreviations and unit systems used in medical prescriptions and the relationships between them.<br>3. Enable students to calculate drug doses on different bases and to reduce and enlarge prescription formulas.<br>4. Develop pharmaceutical knowledge and skills in using tools, glassware and devices for compounding prescriptions and pharmaceutical preparations. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Lectures using the smart board and projector.<br>2. Solving mathematical problems and laboratory experiments.<br>3. Writing scientific reports on practical experiments.<br>4. Student–teacher dialogue, seminars and educational posters. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Perform calculations for pharmaceutical dilution. | Changing product concentrations; using concentrated solutions | Board and projector; experiments and problem solving | Daily exam; assessment of practical results |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 2 | Perform calculations for increasing the concentration of pharmaceutical preparations. | Changing product concentrations; using concentrated solutions | Board and projector; experiments and problem solving | Daily exam; assessment of practical results |
| 3 | 2 | Perform calculations for the preparation and use of concentrated stock solutions. | Changing product concentrations; using concentrated solutions | Board and projector; experiments and problem solving | Daily exam; assessment of practical results |
| 4 | 2 | Distinguish between the different terms used for balanced solutions. | Isotonic and buffered (ionically and acidically balanced) solutions | Board and projector; experiments and problem solving | Daily exam; assessment of practical results |
| 5 | 2 | Apply physical and chemical fundamentals to calculations of balanced solutions. | Isotonic and buffered solutions | Board and projector; experiments and problem solving | Daily exam; assessment of practical results |
| 6 | 2 | Apply special calculations for preparing balanced solutions. | Isotonic and buffered solutions | Board and projector; experiments and problem solving | Daily exam; assessment of practical results |
| 7 | 2 | Calculate milliequivalents for different pharmaceutical formulas. | Milligrams, milliequivalents, millimoles and milliosmoles | Board and projector; experiments and problem solving | Daily exam; assessment of practical results |
| 8 | 2 | Convert between milligrams and milliequivalents. | Milligrams, milliequivalents, millimoles and milliosmoles | Board and projector; experiments and problem solving | Daily exam; assessment of practical results |
| 9 | 2 | Solve milliequivalent problems. | Milligrams, milliequivalents, millimoles and milliosmoles | Board and projector; experiments and problem solving | Daily exam; assessment of practical results |
| 10 | 2 | Perform calculations for millimoles and milliosmoles. | Milligrams, milliequivalents, millimoles and milliosmoles | Board and projector; experiments and problem solving | Daily exam; assessment of practical results |
| 11 | 2 | Apply calculations for mixing different concentrations of pharmaceutical forms (alligation). | Changing product concentrations | Board and projector; experiments and problem solving | Daily exam; assessment of practical results |
| 12 | 2 | Perform calculations for intravenous solutions for adults and children. | Intravenous solutions, injections and flow-rate calculations | Board and projector; experiments and problem solving | Daily exam; assessment of practical results |
| 13 | 2 | Perform calculations for additives to intravenous solutions. | Intravenous solutions, injections and flow-rate calculations | Board and projector; experiments | Daily exam; assessment of practical results |

| | | | | | |
|---|---|---|---|---|---|
| | | | | and problem solving | |
| 14 | 2 | Perform calculations for the flow rate of intravenous solutions. | Intravenous solutions, injections and flow-rate calculations | Board and projector; experiments and problem solving | Daily exam; assessment of practical results |
| 15 | 2 | Apply flow-rate tables for intravenous solutions. | Intravenous solutions, injections and flow-rate calculations | Board and projector; experiments and problem solving | Daily exam; assessment of practical results |

## 11. Course Evaluation

Midterm and final exams, short quizzes, small-group discussions, reports and research. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Ansel, H. C. Pharmaceutical Calculations. Wolters Kluwer, 2010. |
| Main references (sources) | Aulton, M. E. Aulton's Pharmaceutics: The Design and Manufacture of Medicines, 3rd ed. Churchill Livingstone–Elsevier. |
| Recommended books and references (scientific journals, reports…) | Relevant pharmaceutics and pharmacy practice journals. |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Organic Chemistry I**

## 2. Course Code:

PPCS 12

## 3. Semester / Year:

Second Semester / First Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

45 theoretical hours (3 hours per week) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Saif Yahya Ahmed
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Enable students to understand the chemistry of carbon and the classification, properties and reactions of organic compounds.<br>2. Understand the basic structure and properties of alkanes, alkenes and alkynes.<br>3. Understand the principles of stereochemistry and the features of aromatic compounds.<br>4. Understand the basic concepts of organic reactions, their classification and mechanisms as a guide to structure determination. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Lectures using the whiteboard and projector, directing students to textbooks, notes and online material.<br>2. Laboratory practice.<br>3. Assignments and research prepared and presented by students in seminars.<br>4. Practical workshops and homework. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 3 | Knowledge and understanding | Introduction: importance of organic chemistry, atomic structure, covalent bonding, hybrid orbitals | Lectures (whiteboard and projector) | Quizzes and reports |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 3 | Knowledge and understanding | Introduction: molecular geometry, polarity, intermolecular forces, physical properties | Lectures (whiteboard and projector) | Quizzes and reports |
| 3 | 3 | Knowledge and understanding | Alkanes: classification, IUPAC nomenclature, physical properties | Lectures (whiteboard and projector) | Quizzes and reports |
| 4 | 3 | Knowledge and understanding | Alkanes: conformations of ethane and cyclohexane; chemical reactions | Lectures (whiteboard and projector) | Quizzes and reports |
| 5 | 3 | Knowledge and understanding | Alkenes and dienes: structure, nomenclature, isomerism, stability | Lectures (whiteboard and projector) | Quizzes and reports |
| 6 | 3 | Knowledge and understanding | Alkenes and dienes: electrophilic addition reactions, oxidation, polymerization | Lectures (whiteboard and projector) | Quizzes and reports |
| 7 | 3 | Knowledge and understanding | Alkynes: structure, nomenclature, acidity, preparation and reactions | Lectures (whiteboard and projector) | Quizzes and reports |
| 8 | 3 | Knowledge and understanding | Cycloalkanes | Lectures (whiteboard and projector) | Quizzes and reports |
| 9 | 3 | Knowledge and understanding | Stereochemistry I: chirality, enantiomers, optical activity | Lectures (whiteboard and projector) | Quizzes and reports |
| 10 | 3 | Knowledge and understanding | Stereochemistry II: R/S configuration, Fischer projection, meso compounds | Lectures (whiteboard and projector) | Quizzes and reports |
| 11 | 3 | Knowledge and understanding | Stereochemistry III: Newman projection, conformations, diastereomers | Lectures (whiteboard and projector) | Quizzes and reports |
| 12 | 3 | Knowledge and understanding | Alkyl halides: classification, preparation, physical properties | Lectures (whiteboard and projector) | Quizzes and reports |
| 13 | 3 | Knowledge and understanding | Alkyl halides: SN1 and SN2 mechanisms and the factors affecting them | Lectures (whiteboard and projector) | Quizzes and reports |
| 14 | 3 | Knowledge and understanding | Alcohols and ethers: structure, nomenclature, physical properties, preparation | Lectures (whiteboard and projector) | Quizzes and reports |
| 15 | 3 | Knowledge and understanding | Alcohols and ethers: chemical reactions, epoxides, pharmaceutical applications | Lectures (whiteboard and projector) | Quizzes and reports |

| 11. Course Evaluation | |
|---|---|
| Periodic exams, reports, seminars, routine homework and final exams. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination. | |
| **12. Learning and Teaching Resources** | |
| Required textbooks (curricular books, if any) | Morrison, R. T., & Boyd, R. N. Organic Chemistry. |
| Main references (sources) | McMurry, J. Organic Chemistry, 8th ed. Thomson Learning, CA, USA. |
| Recommended books and references (scientific journals, reports…) | Molecules (journal); Journal of Medicinal Chemistry. |
| Electronic References, Websites | Distance education and electronic lectures. |

# Course Description Form

## 1. Course Name:

**Organic Chemistry I (Practical)**

## 2. Course Code:

PPCS 12

## 3. Semester / Year:

Second Semester / First Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

30 practical hours (2 hours per week) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Saif Yahya Ahmed
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Enable students to understand carbon chemistry and the classification, properties and reactions of organic compounds.<br>2. Train students to handle laboratory devices and basic organic laboratory techniques safely.<br>3. Develop the ability to analyse and discuss experimental results and write laboratory reports. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Laboratory experiments.<br>2. Seminars and reports.<br>3. Posters and class activities. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge and understanding; subject-specific skills | Laboratory safety and determination of melting point (theory) | Practical laboratory work | Laboratory skills, discussion, laboratory reports, oral and written exams |
| 2 | 2 | Knowledge and understanding; subject-specific skills | Determination of melting point (known sample) | Practical laboratory work | Laboratory skills, discussion, laboratory reports, oral and written exams |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 2 | Knowledge and understanding; subject-specific skills | Determination of melting point (unknown sample and quiz) | Practical laboratory work | Laboratory skills, discussion, laboratory reports, oral and written exams |
| 4 | 2 | Knowledge and understanding; subject-specific skills | Determination of boiling point (theory and known sample) | Practical laboratory work | Laboratory skills, discussion, laboratory reports, oral and written exams |
| 5 | 2 | Knowledge and understanding; subject-specific skills | Determination of boiling point (unknown sample and quiz) | Practical laboratory work | Laboratory skills, discussion, laboratory reports, oral and written exams |
| 6 | 2 | Knowledge and understanding; subject-specific skills | Elemental analysis (theory) | Practical laboratory work | Laboratory skills, discussion, laboratory reports, oral and written exams |
| 7 | 2 | Knowledge and understanding; subject-specific skills | Elemental analysis (known sample) | Practical laboratory work | Laboratory skills, discussion, laboratory reports, oral and written exams |
| 8 | 2 | Knowledge and understanding; subject-specific skills | Elemental analysis (unknown sample and discussion) | Practical laboratory work | Laboratory skills, discussion, laboratory reports, oral and written exams |
| 9 | 2 | Knowledge and understanding; subject-specific skills | Solution and filtration techniques | Practical laboratory work | Laboratory skills, discussion, laboratory reports, oral and written exams |
| 10 | 2 | Knowledge and understanding; subject-specific skills | Recrystallization (theory and known sample) | Practical laboratory work | Laboratory skills, discussion, laboratory reports, oral and written exams |

| | | | | | |
|---|---|---|---|---|---|
| 11 | 2 | Knowledge and understanding; subject-specific skills | Recrystallization (known sample) | Practical laboratory work | Laboratory skills, discussion, laboratory reports, oral and written exams |
| 12 | 2 | Knowledge and understanding; subject-specific skills | Recrystallization (unknown sample and quiz) | Practical laboratory work | Laboratory skills, discussion, laboratory reports, oral and written exams |
| 13 | 2 | Knowledge and understanding; subject-specific skills | Review of practical techniques | Practical laboratory work | Laboratory skills, discussion, laboratory reports, oral and written exams |
| 14 | 2 | Knowledge and understanding; subject-specific skills | Practical assessment | Practical laboratory work | Laboratory skills, discussion, laboratory reports, oral and written exams |
| 15 | 2 | Knowledge and understanding; subject-specific skills | Final practical examination and report discussion | Practical laboratory work | Laboratory skills, discussion, laboratory reports, oral and written exams |

## 11. Course Evaluation

Midterm and final practical exams, oral and written exams, laboratory reports and class activities. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Morrison R. T., Boyd R. N. Organic Chemistry. |
| Main references (sources) | McMurry J. Organic Chemistry, 5th ed. Thomson Learning, 2000. |
| Recommended books and references (scientific journals, reports…) | — |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Computer Sciences**

## 2. Course Code:

CSC 17

## 3. Semester / Year:

Second Semester / First Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

45 hours (3 hours per week: 1 theoretical + 2 practical) / 2 units (1 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Maryam Raheem
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Introduce the core concepts of computer systems, operating systems and computer applications.<br>2. Introduce programming fundamentals, algorithms, data representation and problem-solving techniques.<br>3. Develop logical thinking and analytical skills through practical computer work.<br>4. Enable students to use Microsoft Word, Excel and PowerPoint effectively in academic and professional work. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Theoretical lectures using PowerPoint presentations.<br>2. Practical demonstrations and laboratory activities.<br>3. Interactive classroom discussions and teamwork activities.<br>4. Homework assignments, projects and research tasks. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 3 | Knowledge; practical skills | Introduction to computers and operating systems | Whiteboard and PowerPoint presentations; laboratory practice | Group discussion, oral exams and assignments |
| 2 | 3 | Knowledge; practical skills | Introduction to Microsoft Office 2010 | Whiteboard and PowerPoint presentations; | Group discussion, oral exams and assignments |

| | | | | | |
|---|---|---|---|---|---|
| | | | | laboratory practice | |
| 3 | 3 | Knowledge; practical skills | Creating and saving documents in Microsoft Word | Whiteboard and PowerPoint presentations; laboratory practice | Group discussion, oral exams and assignments |
| 4 | 3 | Knowledge; practical skills | Formatting text, fonts and paragraphs | Whiteboard and PowerPoint presentations; laboratory practice | Group discussion, oral exams and assignments |
| 5 | 3 | Knowledge; practical skills | Inserting tables, pictures and shapes | Whiteboard and PowerPoint presentations; laboratory practice | Group discussion, oral exams and assignments |
| 6 | 3 | Knowledge; practical skills | Page setup and printing | Whiteboard and PowerPoint presentations; laboratory practice | Group discussion, oral exams and assignments |
| 7 | 3 | Knowledge; practical skills | Headers, footers and page numbers | Whiteboard and PowerPoint presentations; laboratory practice | Group discussion, oral exams and assignments |
| 8 | 3 | Knowledge; practical skills | Spell check, templates and cover pages | Whiteboard and PowerPoint presentations; laboratory practice | Group discussion, oral exams and assignments |
| 9 | 3 | Knowledge; practical skills | Introduction to Microsoft Excel | Whiteboard and PowerPoint presentations; laboratory practice | Group discussion, oral exams and assignments |
| 10 | 3 | Knowledge; practical skills | Data entry and working with cells | Whiteboard and PowerPoint presentations; laboratory practice | Group discussion, oral exams and assignments |
| 11 | 3 | Knowledge; practical skills | Basic calculations and functions | Whiteboard and PowerPoint presentations; laboratory practice | Group discussion, oral exams and assignments |
| 12 | 3 | Knowledge; practical skills | Formatting and creating charts | Whiteboard and PowerPoint presentations; laboratory practice | Group discussion, oral exams and assignments |
| 13 | 3 | Knowledge; practical skills | Introduction to PowerPoint | Whiteboard and PowerPoint presentations; laboratory practice | Group discussion, oral exams and assignments |

| | | | | | |
|---|---|---|---|---|---|
| 14 | 3 | Knowledge; practical skills | Creating slides and designing presentations | Whiteboard and PowerPoint presentations; laboratory practice | Group discussion, oral exams and assignments |
| 15 | 3 | Knowledge; practical skills | Inserting pictures, effects and animations | Whiteboard and PowerPoint presentations; laboratory practice | Group discussion, oral exams and assignments |

## 11. Course Evaluation

Midterm and final examinations, practical tests, classroom participation and presentations, assignments and projects. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Shelly G. B., Vermaat M. E. Shelly Cashman Series: Microsoft Office 2010. Cengage Learning, 2011. |
| Main references (sources) | Cox J., Lambert J. Microsoft Office 2010 Step by Step. Microsoft Press, 2010. |
| Recommended books and references (scientific journals, reports…) | Shelly G. B., Cashman T. J., Vermaat M. E. Microsoft Word 2010 Complete. Cengage Learning, 2011; Microsoft Office 2010 Product Guide. |
| Electronic References, Websites | Microsoft Press Store: books, eBooks and online resources. |

# Course Description Form

## 1. Course Name:

**Organic Chemistry II**

## 2. Course Code:

PPCS 23

## 3. Semester / Year:

First Semester / Second Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

45 theoretical hours (3 hours per week) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Ahmed M. Motlk
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Enable students to understand the chemistry of aromatic compounds and the classification, properties and reactions of aromatic organic compounds.<br>2. Study the synthesis and properties of benzene and arenes, carboxylic acids and their derivatives, amines, aldehydes, ketones and phenols.<br>3. Understand the basic concepts of aromatic organic reactions, their classification and mechanisms as a guide to structure determination. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Lectures using the whiteboard and projector, directing students to textbooks, notes and online material.<br>2. Laboratory practice.<br>3. Assignments and research prepared and presented by students in seminars.<br>4. Practical workshops and homework. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 3 | Knowledge | Aromatic hydrocarbons | Board and display screen | Daily examination, oral questions and discussion |
| 2–3 | 6 | Knowledge | Carboxylic acids | Board and display screen | Daily examination, oral questions, |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | discussion and homework |
| 4 | 3 | Knowledge | Carboxylic acid derivatives I | Board and display screen | Daily examination, oral questions, discussion and homework |
| 5 | 3 | Knowledge | Carboxylic acid derivatives II | Board and display screen | Daily examination, oral questions, discussion and homework |
| 6 | 3 | Knowledge | Functional derivatives of carboxylic acids | Board and display screen | Daily examination, oral questions, discussion and homework |
| 7–8 | 6 | Knowledge | Amines I | Board and display screen | Daily examination, oral questions, discussion and homework |
| 9 | 3 | Knowledge | Amines II | Board and display screen | Daily examination, oral questions, discussion and homework |
| 10–11 | 6 | Knowledge | Aldehydes | Board and display screen | Daily examination, oral questions, discussion and homework |
| 12 | 3 | Knowledge | Ketones | Board and display screen | Daily examination and oral questions |
| 13 | 3 | Knowledge | Phenols I | Board and display screen | Daily examination and oral questions |
| 14–15 | 6 | Knowledge | Phenols II | Board and display screen | Daily examination and oral questions |

## 11. Course Evaluation

Periodic exams, reports, seminars, routine homework and final exams. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

| 12. Learning and Teaching Resources | |
|---|---|
| Required textbooks (curricular books, if any) | Morrison, R. T., & Boyd, R. N. Organic Chemistry. |
| Main references (sources) | McMurry, J. Organic Chemistry, 5th ed. Thomson Learning, CA, USA, 2000. |
| Recommended books and references (scientific journals, reports…) | Molecules (journal); Journal of Medicinal Chemistry. |
| Electronic References, Websites | Distance education and electronic lectures. |

# Course Description Form

## 1. Course Name:

**Organic Chemistry II (Practical)**

## 2. Course Code:

PPCS 23

## 3. Semester / Year:

First Semester / Second Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

30 practical hours (2 hours per week) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Saif Yahya Ahmed
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Equip students with essential organic chemistry laboratory skills, including safe handling of chemicals and use of equipment.<br>2. Determine the physical properties of organic compounds.<br>3. Apply basic purification and separation techniques (crystallization, filtration, distillation, extraction and refluxing). |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Practical laboratory sessions (hands-on experiments).<br>2. Demonstrations of techniques and equipment.<br>3. Guided step-by-step procedures and group work.<br>4. Discussion of results and problem-solving exercises. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge; practical skills | Laboratory safety rules | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 2 | 2 | Knowledge; practical skills | Determination of melting point – known sample | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 3 | 2 | Knowledge; practical skills | Determination of melting point – unknown sample | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |

| | | | | | |
|---|---|---|---|---|---|
| 4 | 2 | Knowledge; practical skills | Determination of boiling point – known sample | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 5 | 2 | Knowledge; practical skills | Determination of boiling point – unknown sample | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 6 | 2 | Knowledge; practical skills | Purification by crystallization | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 7 | 2 | Knowledge; practical skills | Isolation and vacuum filtration | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 8 | 2 | Knowledge; practical skills | Distillation I – simple distillation | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 9 | 2 | Knowledge; practical skills | Distillation II – practical application | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 10 | 2 | Knowledge; practical skills | Fractional distillation | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 11 | 2 | Knowledge; practical skills | Extraction I | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 12 | 2 | Knowledge; practical skills | Extraction II – practical application | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 13 | 2 | Knowledge; practical skills | Refluxing | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 14 | 2 | Knowledge; practical skills | Integrated practical applications | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 15 | 2 | Knowledge; practical skills | Comprehensive practical review and assessment | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |

## 11. Course Evaluation

Practical laboratory performance, laboratory reports and written assignments, quizzes, final practical/written examination and adherence to safety rules. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

| 12. Learning and Teaching Resources | |
|---|---|
| Required textbooks (curricular books, if any) | Vogel's Textbook of Practical Organic Chemistry. |
| Main references (sources) | Mann F. G., Saunders B. C. Practical Organic Chemistry; Pavia, Lampman, Kriz & Engel. Organic Chemistry Laboratory Techniques. |
| Recommended books and references (scientific journals, reports…) | Gilbert J. C., Martin S. F. Experimental Organic Chemistry. |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Medical Microbiology I**

## 2. Course Code:

PCLS 24

## 3. Semester / Year:

First Semester / Second Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

33 theoretical hours (2 hours per week, as distributed in the weekly plan) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Dr. Muntadher Hameed Thwaini
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Develop an understanding of the fundamental principles of medical microbiology and the role of microorganisms in human health and disease.<br>2. Describe the classification, morphology, pathogenicity and transmission of medically important microorganisms.<br>3. Explain host–microbe interactions, host defence mechanisms and the basic laboratory methods used to identify and diagnose infectious agents.<br>4. Highlight the importance of infection prevention, antimicrobial agents, sterilization, disinfection and public-health control measures. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Theoretical lectures using the whiteboard and PowerPoint presentations.<br>2. Group discussion, scientific posters and interactive classroom activities.<br>3. Field visits to hospital laboratories.<br>4. Homework and research assignments to develop analytical and critical thinking. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge | Importance and history of microbiology | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 2 | Knowledge | Anatomy of bacteria: surface appendages, capsule, cell wall of Gram-positive and Gram-negative bacteria, cytoplasmic membrane | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 3 | 2 | Knowledge | Bacterial physiology: physical and chemical growth determinants, growth curves and bacterial reproduction | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 4 | 2 | Knowledge | Bacterial genetics: genetic elements, mutation, transformation, conjugation and transduction | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 5 | 2 | Knowledge | Recombinant DNA biotechnology | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 6 | 2 | Knowledge | Sporulation and germination | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 7 | 3 | Knowledge | Sterilization: chemical and physical methods | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 8 | 2 | Knowledge | Chemotherapy | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 9 | 2 | Knowledge | Morphology, staining and classification of bacteria | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 10 | 2 | Knowledge | Staphylococci; Streptococcus pyogenes; Streptococcus pneumoniae | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 11 | 2 | Knowledge | Aerobic spore-forming bacteria: Bacillus species (B. anthracis, B. subtilis, B. cereus) | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 12 | 2 | Knowledge | Clostridium perfringens, C. tetani and C. botulinum | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 13 | 2 | Knowledge | Corynebacterium diphtheriae | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 14 | 2 | Knowledge | Propionibacterium acnes; Listeria | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |

| | | | | | |
|---|---|---|---|---|---|
| 15 | 2 | Knowledge | Mycobacterium tuberculosis; M. leprae | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 16 | 2 | Knowledge | Chlamydiae; Actinomycetes | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |

## 11. Course Evaluation

Midterm and final examinations, oral examinations, classroom activities and homework assignments. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Medical Microbiology I (course textbook). |
| Main references (sources) | Medical Microbiology I (course textbook). |
| Recommended books and references (scientific journals, reports…) | Relevant medical microbiology journals. |
| Electronic References, Websites | https://www.pathelective.com/ |

# Course Description Form

## 1. Course Name:

**Physical Pharmacy I**

## 2. Course Code:

PPCT 23

## 3. Semester / Year:

First Semester / Second Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

46 theoretical hours (3 hours per week, as distributed in the weekly plan) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Dr. Firas Ghafil Abbas
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Provide basic information about matter and its states.<br>2. Explain the principles of solubility and the types of solutions, including electrolyte and non-electrolyte solutions.<br>3. Explain ionic equilibria and buffered and isotonic systems and their applications in pharmacy.<br>4. Develop skills in solving the mathematical problems related to the course. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Theoretical lectures using the smart board.<br>2. Educational seminars and posters.<br>3. Problem-solving exercises. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 3 | Describe intermolecular binding forces and the gaseous state. | States of matter: binding forces between molecules; the gaseous state | Smart board | Monthly and daily examinations and discussion |
| 2 | 3 | Describe the solid, liquid-crystalline and supercritical fluid states. | States of matter: solids and the crystalline state; liquid crystals; supercritical fluids | Smart board | Monthly and daily examinations and discussion |
| 3 | 3 | Apply the phase rule and thermal analysis. | States of matter: phase equilibria and the phase | Smart board | Monthly and daily |

| | | | | | |
|---|---|---|---|---|---|
| | | | rule; thermal analysis; solid dispersions | | examinations and discussion |
| 4 | 4 | Classify solutions and use concentration expressions. | Solutions of non-electrolytes: physical properties, types of solutions, concentration expressions | Smart board | Monthly and daily examinations and discussion |
| 5 | 3 | Explain colligative properties and their use in molecular-weight determination. | Solutions of non-electrolytes: ideal and real solutions; colligative properties | Smart board | Monthly and daily examinations and discussion |
| 6 | 3 | Explain the theories of electrolyte dissociation. | Solutions of electrolytes: properties; theory of dissociation; strong electrolytes | Smart board | Monthly and daily examinations and discussion |
| 7 | 3 | Calculate ionic strength and apply the Debye–Hückel theory. | Solutions of electrolytes: ionic strength; Debye–Hückel theory; colligative coefficients | Smart board | Monthly and daily examinations and discussion |
| 8 | 3 | Explain solvent–solute interactions and liquid–liquid solubility. | Solubility and distribution: solvent–solute interactions; solubility of liquids in liquids | Smart board | Monthly and daily examinations and discussion |
| 9 | 3 | Explain the solubility of solids in liquids. | Solubility and distribution: solubility of solids in liquids | Smart board | Monthly and daily examinations and discussion |
| 10 | 3 | Distinguish thermodynamic and kinetic solubility. | Solubility and distribution: thermodynamic and kinetic solubility; poor aqueous solubility | Smart board | Monthly and daily examinations and discussion |
| 11 | 3 | Measure solubility and explain the distribution of solutes between immiscible solvents. | Solubility and distribution: measuring solubility; partition between immiscible solvents | Smart board | Monthly and daily examinations and discussion |
| 12 | 3 | Explain acid–base theories and the classification of solvents. | Ionic equilibria: Brønsted–Lowry and Lewis theories; ionization; classification of solvents | Smart board | Monthly and daily examinations and discussion |
| 13 | 3 | Calculate pH and acidity constants. | Ionic equilibria: acid–base equilibria; calculation of pH and acidity constants | Smart board | Monthly and daily examinations and discussion |
| 14 | 3 | Apply the buffer equation and calculate buffer capacity. | Buffered and isotonic solutions: the buffer equation; buffer capacity | Smart board | Monthly and daily examinations and discussion |
| 15 | 3 | Explain buffers in pharmaceutical and biological systems. | Buffered and isotonic solutions: buffers in pharmaceutical and biological systems | Smart board | Monthly and daily examinations and discussion |

| 11. Course Evaluation | |
|---|---|
| Midterm and final exams, oral and written exams, classroom activities and posters. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination. | |
| **12. Learning and Teaching Resources** | |
| Required textbooks (curricular books, if any) | Martin's Physical Pharmacy and Pharmaceutical Sciences, 7th ed. |
| Main references (sources) | Martin's Physical Pharmacy and Pharmaceutical Sciences, 7th ed. |
| Recommended books and references (scientific journals, reports…) | Relevant physical pharmacy and pharmaceutical sciences journals. |
| Electronic References, Websites | https://pharmatech-rx.com/category/physical-pharmacy/; https://pharmdecks.com/modules/drug-delivery-and-biopharmaceutics/lesson/solubility-dissolution/; Purdue University General Chemistry Help (pH and pOH calculations). |

# Course Description Form

## 1. Course Name:

**Physiology II**

## 2. Course Code:

PPCL 21

## 3. Semester / Year:

First Semester / Second Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

45 theoretical hours (3 hours per week) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Aqeel Qays Abd Uljaleel
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Enable students to understand the basic principles of the physiological functions of the different tissues and organs of the human body.<br>2. Teach students how to evaluate these functions.<br>3. Correlate these functions with normal and abnormal conditions.<br>4. Emphasize the role of homeostatic and haemodynamic changes and integrate them into the overall physiological status. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Discussion and dialogue method.<br>2. Problem-solving (troubleshooting) approach.<br>3. Seminars.<br>4. Blackboard and screen presentations. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 3 | Knowledge | Review of the general and cellular basis of medical physiology and the body systems | Blackboard and screen presentations | Daily exams and oral questions |
| 2 | 3 | Knowledge | Physiology of muscles | Blackboard and screen presentations | Daily exams and oral questions |
| 3–4 | 6 | Knowledge | Physiology of nerves: nerve cells | Blackboard and screen presentations | Daily exams and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 5–6 | 6 | Knowledge | Physiology of nerves: synaptic transmission | Blackboard and screen presentations | Daily exams and oral questions |
| 7 | 3 | Knowledge | Respiration: respiratory zones | Blackboard and screen presentations | Daily exams and oral questions |
| 8 | 3 | Knowledge | Respiration: gas transport between the lungs and tissues | Blackboard and screen presentations | Daily exams and oral questions |
| 9 | 3 | Knowledge | Introduction to renal physiology | Blackboard and screen presentations | Daily exams and oral questions |
| 10 | 3 | Knowledge | Tubuloglomerular feedback and glomerulotubular balance | Blackboard and screen presentations | Daily exams and oral questions |
| 11–12 | 6 | Knowledge | Cardiovascular system | Blackboard and screen presentations | Daily exams and oral questions |
| 13 | 3 | Knowledge | Origin and spread of cardiac excitation; mechanical events of the cardiac cycle and cardiac output | Blackboard and screen presentations | Daily exams and oral questions |
| 14–15 | 6 | Knowledge | Local regulatory mechanisms: hypertension, heart failure and angina pectoris | Blackboard and screen presentations | Daily exams and oral questions |

## 11. Course Evaluation

Weekly reports, oral assessment, practical performance evaluation and written tests. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Guyton, A. C. Textbook of Medical Physiology, latest edition. |
| Main references (sources) | Ganong, W. F. Review of Medical Physiology, 2005. |
| Recommended books and references (scientific journals, reports…) | Relevant physiology journals. |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Physiology II (Practical)**

## 2. Course Code:

PPCL 21

## 3. Semester / Year:

First Semester / Second Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

30 practical hours (2 hours per week) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Aqeel Qays Abd-Uljaleel
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Recognize the methods of counting white blood cells and understand their functions in the immune system.<br>2. Count red blood cells and platelets and understand their roles in oxygen transport and blood clotting.<br>3. Measure the erythrocyte sedimentation rate (ESR) and use it as a marker of inflammatory conditions.<br>4. Study the regulation of blood glucose by insulin.<br>5. Understand kidney function in blood purification and fluid and electrolyte balance.<br>6. Conduct experiments that illustrate the physiology of vision. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Discussion and dialogue.<br>2. Troubleshooting and problem-solving.<br>3. Seminars. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1–2 | 4 | Knowledge; practical skills | Total white blood cell count | Blackboard and screen presentations; laboratory practice | Daily exams and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 3–4 | 4 | Knowledge; practical skills | Differential white blood cell count | Blackboard and screen presentations; laboratory practice | Daily exams and oral questions |
| 5–6 | 4 | Knowledge; practical skills | Red blood cell count | Blackboard and screen presentations; laboratory practice | Daily exams and oral questions |
| 7–8 | 4 | Knowledge; practical skills | Platelet count | Blackboard and screen presentations; laboratory practice | Daily exams and oral questions |
| 9–10 | 4 | Knowledge; practical skills | Erythrocyte sedimentation rate (ESR) | Blackboard and screen presentations; laboratory practice | Daily exams and oral questions |
| 11 | 2 | Knowledge; practical skills | Blood glucose monitoring | Blackboard and screen presentations; laboratory practice | Daily exams and oral questions |
| 12–13 | 4 | Knowledge; practical skills | Renal physiology | Blackboard and screen presentations; laboratory practice | Daily exams and oral questions |
| 14–15 | 4 | Knowledge; practical skills | Experiments on vision | Blackboard and screen presentations; laboratory practice | Daily exams and oral questions |

## 11. Course Evaluation

Weekly reports and laboratory work, oral assessment and practical performance, written tests and a group practical project. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Kale S. R. et al. Practical Human Anatomy and Physiology (Haematology), 8th ed. Nirali Prakashan. |
| Main references (sources) | Marieb E. N. et al. Human Anatomy and Physiology Laboratory Manual, 8th ed. Benjamin Cummings, 2005. |
| Recommended books and references (scientific journals, reports…) | — |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Organic Chemistry III**

## 2. Course Code:

PPCS 24

## 3. Semester / Year:

Second Semester / Second Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2023–2024

## 5. Available Attendance Forms:

Daily in-person attendance

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

42 theoretical hours (as distributed in the weekly plan) / 3 units (2 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Ahmed M. Motlk
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Understand the synthesis and properties of heterocyclic compounds.<br>2. Understand the chemistry, classification, properties and reactions of aromatic heterocyclic compounds.<br>3. Understand the basic structure and features of furan, pyrrole, thiophene and other heterocyclic aromatic compounds.<br>4. Use heterocyclic reaction mechanisms as a guide in structure determination. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Lectures using the whiteboard and projector screen.<br>2. Directing students to textbooks, notes and online material.<br>3. Assignments and research presented by students in seminars. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 3 | Knowledge | Heterocyclic systems: classes and general structures | Board and display screen | Daily exams, oral questions, discussion and homework |
| 2 | 3 | Knowledge | Five-membered ring heterocycles | Board and display screen | Daily exams, oral questions, discussion and homework |
| 3 | 3 | Knowledge | Sources of pyrrole, furan and thiophene | Board and display screen | Daily exams, oral questions, |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | discussion and homework |
| 4 | 3 | Knowledge | Electrophilic aromatic substitution reactions of pyrrole, furan and thiophene | Board and display screen | Daily exams, oral questions, discussion and homework |
| 5–6 | 6 | Knowledge | Six-membered aromatic heterocycles | Board and display screen | Daily exams, oral questions, discussion and homework |
| 7–8 | 6 | Knowledge | Saturated five-membered heterocycles | Board and display screen | Daily exams, oral questions, discussion and homework |
| 9 | 3 | Knowledge | Saturated five-membered heterocycles | Board and display screen | Daily exams, oral questions, discussion and homework |
| 10–11 | 6 | Knowledge | Heterocycles with two or three heteroatoms | Board and display screen | Daily exams, oral questions, discussion and homework |
| 13 | 3 | Knowledge | Heterocycles with two or three heteroatoms | Board and display screen | Daily exams, oral questions, discussion and homework |
| 14 | 3 | Knowledge | Condensed heterocycles | Board and display screen | Daily exams, oral questions, discussion and homework |
| 15 | 3 | Knowledge | Condensed heterocycles | Board and display screen | Daily exams, oral questions, discussion and homework |

## 11. Course Evaluation

Periodic exams, reports, seminars, routine homework and final exams. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Morrison R. T., Boyd R. N. Organic Chemistry, latest ed. |
| Main references (sources) | McMurry J. Organic Chemistry, latest ed.; Acheson R. M. An Introduction to the Chemistry of Heterocyclic Compounds. |
| Recommended books and references (scientific journals, reports…) | Molecules; Journal of Medicinal Chemistry. |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Organic Chemistry III (Practical)**

## 2. Course Code:

PPCS 24

## 3. Semester / Year:

Second Semester / Second Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

30 practical hours (2 hours per week) / 3 units (2 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Saif Yahya Ahmed
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Develop students' ability to identify organic compounds using qualitative tests.<br>2. Understand functional groups, solubility behaviour and the chemical behaviour of organic compounds.<br>3. Analyse experimental results safely and accurately to classify unknown compounds. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Practical laboratory sessions (hands-on experiments).<br>2. Demonstrations of techniques and equipment.<br>3. Guided step-by-step procedures and group work.<br>4. Discussion of results and problem-solving exercises. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge; practical skills | Laboratory safety rules | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 2 | 2 | Knowledge; practical skills | Determination of solubility class I | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 3 | 2 | Knowledge; practical skills | Determination of solubility class II | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 4 | 2 | Knowledge; practical skills | Identification of alcohols I | PowerPoint presentations | Practical performance, |

| | | | | | |
|---|---|---|---|---|---|
| | | | | and practical experiments | written reports and quizzes |
| 5 | 2 | Knowledge; practical skills | Identification of alcohols II | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 6 | 2 | Knowledge; practical skills | Identification of phenols | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 7 | 2 | Knowledge; practical skills | Identification of aldehydes and ketones I | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 8 | 2 | Knowledge; practical skills | Identification of aldehydes and ketones II | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 9 | 2 | Knowledge; practical skills | Identification of carboxylic acids I | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 10 | 2 | Knowledge; practical skills | Identification of carboxylic acids II | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 11 | 2 | Knowledge; practical skills | Properties of esters | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 12 | 2 | Knowledge; practical skills | Preparation of esters | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 13 | 2 | Knowledge; practical skills | Properties and preparation of soap | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 14 | 2 | Knowledge; practical skills | Identification of amines | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |
| 15 | 2 | Knowledge; practical skills | Comprehensive qualitative organic analysis | PowerPoint presentations and practical experiments | Practical performance, written reports and quizzes |

## 11. Course Evaluation

Practical laboratory performance, laboratory reports and written assignments, quizzes, final practical/written examination and adherence to safety rules. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Vogel's Textbook of Practical Organic Chemistry. |

| | |
|---|---|
| Main references (sources) | Mann F. G., Saunders B. C. Practical Organic Chemistry; Pavia, Lampman, Kriz & Engel. Organic Chemistry Laboratory Techniques. |
| Recommended books and references (scientific journals, reports…) | Gilbert J. C., Martin S. F. Experimental Organic Chemistry. |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Medical Microbiology II**

## 2. Course Code:

PCLS 25

## 3. Semester / Year:

Second Semester / Second Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

33 theoretical hours (2 hours per week, as distributed in the weekly plan) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Dr. Muntadher Hameed Thwaini
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Develop an understanding of the fundamental principles of medical microbiology, including the classification, morphology, pathogenicity and transmission of medically important parasites and viruses.<br>2. Explain the relationship between microorganisms and human disease and the host defence (innate and adaptive immune) mechanisms.<br>3. Introduce the basic laboratory methods used for the identification and diagnosis of infectious agents.<br>4. Highlight infection prevention, antimicrobial and antiviral agents, sterilization, disinfection and public health control measures. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Theoretical lectures.<br>2. Scientific posters and interactive classroom activities.<br>3. Field visits to hospital laboratories.<br>4. Homework assignments (coursework). |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge | Amoebae | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 2 | Knowledge | Flagellates | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 3 | 2 | Knowledge | Ciliates | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 4 | 2 | Knowledge | Sporozoa | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 5 | 2 | Knowledge | Cestodes | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 6 | 2 | Knowledge | Trematodes | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 7 | 3 | Knowledge | Nematodes | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 8 | 2 | Knowledge | Introduction to virology | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 9 | 2 | Knowledge | Reproduction of viruses | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 10 | 2 | Knowledge | Antiviral therapy | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 11 | 2 | Knowledge | Innate immune response | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 12 | 2 | Knowledge | Cytokines | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 13 | 2 | Knowledge | Adaptive immune response | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 14 | 2 | Knowledge | Antibodies and antigens: characteristic features | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 15 | 2 | Knowledge | Complement system | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |

| | | | | | |
|---|---|---|---|---|---|
| 16 | 2 | Knowledge | Hypersensitivity reactions | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |

## 11. Course Evaluation

Midterm and final examinations, oral examinations, classroom activities and homework assignments. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Medical Microbiology II (approved course textbook). |
| Main references (sources) | — |
| Recommended books and references (scientific journals, reports…) | — |
| Electronic References, Websites | https://www.pathelective.com/ |

# Course Description Form

## 1. Course Name:

**Medical Microbiology II (Practical)**

## 2. Course Code:

PCLS 25

## 3. Semester / Year:

Second Semester / Second Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

31 practical hours (2 hours per week, as distributed in the weekly plan) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Dr. Muntadher Hameed Thwaini
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Develop proficiency in microscopic examination and recognition of the morphological characteristics of medically important parasites.<br>2. Understand the classification, life cycles and transmission of intestinal, blood and tissue protozoa and helminths.<br>3. Acquire skills in specimen handling and the laboratory methods used for the diagnosis of parasitic infections. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Laboratory sessions with microscopy.<br>2. Scientific posters and interactive activities.<br>3. Field visits to hospital laboratories.<br>4. Homework assignments. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge; practical skills | Introduction and classification of human parasites | Whiteboard, PowerPoint presentations and microscopy | Group discussion, oral exams and assignments |
| 2 | 2 | Knowledge; practical skills | Intestinal protozoa: Entamoeba histolytica | Whiteboard, PowerPoint presentations and microscopy | Group discussion, oral exams and assignments |
| 3 | 2 | Knowledge; practical skills | Commensal amoebae: Entamoeba coli, | Whiteboard, PowerPoint | Group discussion, oral |

| | | | | | |
|---|---|---|---|---|---|
| | | | Endolimax nana, Iodamoeba bütschlii | presentations and microscopy | exams and assignments |
| 4 | 2 | Knowledge; practical skills | Flagellates of the digestive tract: Giardia lamblia, Chilomastix mesnili | Whiteboard, PowerPoint presentations and microscopy | Group discussion, oral exams and assignments |
| 5 | 2 | Knowledge; practical skills | Flagellates of the genital tract: Trichomonas vaginalis; ciliates: Balantidium coli | Whiteboard, PowerPoint presentations and microscopy | Group discussion, oral exams and assignments |
| 6 | 2 | Knowledge; practical skills | Flagellates of blood and tissues: Leishmania donovani, L. tropica | Whiteboard, PowerPoint presentations and microscopy | Group discussion, oral exams and assignments |
| 7 | 3 | Knowledge; practical skills | Trypanosoma gambiense, T. rhodesiense and T. cruzi | Whiteboard, PowerPoint presentations and microscopy | Group discussion, oral exams and assignments |
| 8 | 2 | Knowledge; practical skills | Malaria parasites: life cycle of Plasmodium; P. vivax and P. falciparum | Whiteboard, PowerPoint presentations and microscopy | Group discussion, oral exams and assignments |
| 9 | 2 | Knowledge; practical skills | Plasmodium malariae and P. ovale | Whiteboard, PowerPoint presentations and microscopy | Group discussion, oral exams and assignments |
| 10 | 2 | Knowledge; practical skills | Toxoplasma gondii; Cestoda: Taenia saginata and T. solium | Whiteboard, PowerPoint presentations and microscopy | Group discussion, oral exams and assignments |
| 11 | 2 | Knowledge; practical skills | Hymenolepis nana, Echinococcus granulosus and E. multilocularis | Whiteboard, PowerPoint presentations and microscopy | Group discussion, oral exams and assignments |
| 12 | 2 | Knowledge; practical skills | Trematoda: life cycle of Schistosoma; S. japonicum, S. mansoni, S. haematobium | Whiteboard, PowerPoint presentations and microscopy | Group discussion, oral exams and assignments |
| 13 | 2 | Knowledge; practical skills | Nematoda: Trichuris trichiura, Enterobius vermicularis | Whiteboard, PowerPoint presentations and microscopy | Group discussion, oral exams and assignments |
| 14 | 2 | Knowledge; practical skills | Ascaris lumbricoides, Ancylostoma duodenale | Whiteboard, PowerPoint presentations and microscopy | Group discussion, oral exams and assignments |
| 15 | 2 | Knowledge; practical skills | Methods of diagnosis of parasites | Whiteboard, PowerPoint presentations and microscopy | Group discussion, oral exams and assignments |

## 11. Course Evaluation

Midterm and final practical examinations, oral examinations, laboratory activities and homework assignments. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

| 12. Learning and Teaching Resources | |
|---|---|
| Required textbooks (curricular books, if any) | Medical Microbiology II (approved course textbook). |
| Main references (sources) | — |
| Recommended books and references (scientific journals, reports…) | — |
| Electronic References, Websites | https://www.pathelective.com/ |

# Course Description Form

## 1. Course Name:

**Physical Pharmacy II**

## 2. Course Code:

PPCT 24

## 3. Semester / Year:

Second Semester / Second Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

45 theoretical hours (3 hours per week) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Dr. Ammar Sahib Abdulameer
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Understand drug complexes in pharmacy.<br>2. Understand drug kinetics and stability.<br>3. Learn diffusion and interfacial phenomena.<br>4. Learn the rheological properties of matter under different kinds of stress.<br>5. Learn colloidal dispersions, micromeritics and the different types of polymers and their applications in pharmacy. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Teaching through lectures using the smart screen.<br>2. Seminars and posters.<br>3. Solving mathematical problems and interpreting plots related to physical pharmacy. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 3 | Knowledge | Complexes | Smart screen presentations | Daily exams and oral questions |
| 2 | 3 | Knowledge | Complexes | Smart screen presentations | Daily exams and oral questions |
| 3 | 3 | Knowledge | Diffusion phenomena | Smart screen presentations | Daily exams and oral questions |
| 4 | 3 | Knowledge | Diffusion phenomena | Smart screen presentations | Daily exams and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 5 | 3 | Knowledge | Chemical kinetics and stability | Smart screen presentations | Daily exams and oral questions |
| 6 | 3 | Knowledge | Chemical kinetics and stability | Smart screen presentations | Daily exams and oral questions |
| 7 | 3 | Knowledge | Interfacial phenomena | Smart screen presentations | Daily exams and oral questions |
| 8 | 3 | Knowledge | Interfacial phenomena | Smart screen presentations | Daily exams and oral questions |
| 9 | 3 | Knowledge | Rheology | Smart screen presentations | Daily exams and oral questions |
| 10 | 3 | Knowledge | Rheology | Smart screen presentations | Daily exams and oral questions |
| 11 | 3 | Knowledge | Colloidal dispersions | Smart screen presentations | Daily exams and oral questions |
| 12 | 3 | Knowledge | Colloidal dispersions | Smart screen presentations | Daily exams and oral questions |
| 13 | 3 | Knowledge | Micromeritics | Smart screen presentations | Daily exams and oral questions |
| 14 | 3 | Knowledge | Micromeritics | Smart screen presentations | Daily exams and oral questions |
| 15 | 3 | Knowledge | Polymers | Smart screen presentations | Daily exams and oral questions |

## 11. Course Evaluation

Mid-term and final exams, written and oral tests, seminars and posters. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Ministry of Higher Education reference curriculum. |
| Main references (sources) | Martin's Physical Pharmacy and Pharmaceutical Sciences, 7th ed., 2017. |
| Recommended books and references (scientific journals, reports…) | Aulton's Pharmaceutics: The Design and Manufacture of Medicines, 6th ed., 2022. |
| Electronic References, Websites | — |

# Course Description Form

| 1. Course Name: |
|---|
| **Pharmacognosy I** |
| **2. Course Code:** |
| PPCG 21 |
| **3. Semester / Year:** |
| Second Semester / Second Stage – Academic Year 2025–2026 |
| **4. Description Preparation Date:** |
| 2025–2026 |
| **5. Available Attendance Forms:** |
| Daily in-person attendance |
| **6. Number of Credit Hours (Total) / Number of Units (Total)** |
| 45 theoretical hours (3 hours per week) / 4 units (3 theoretical + 2 practical hours per week) |
| **7. Course administrator's name (mention all, if more than one name)** |
| Name: Assist. Prof. Dr. Suhad Humadi<br>Email: |

**8. Course Objectives**

| | |
|---|---|
| **Course Objectives** | 1. Learn the basics and principles of pharmacognosy and phytochemistry, from the beginnings of this science to its present developments.<br>2. Study plant nomenclature, taxonomy, morphology and the collection of medicinal plants, and the roles of medicinal plants and their active constituents.<br>3. Learn the general methods used for the extraction, separation, isolation and identification of bioactive natural products.<br>4. Learn the quality control and evaluation of herbal materials. |

**9. Teaching and Learning Strategies**

| | |
|---|---|
| **Strategy** | 1. Theoretical lectures.<br>2. Seminars and reports.<br>3. Posters and classroom activities.<br>4. Field visits to herbal centres and the botanical garden. |

**10. Course Structure**

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

| | | | | | |
|---|---|---|---|---|---|
| 1 | 3 | Know ledge | General introduction: the scope of pharmacognosy, definitions and basic principles | Blackboard and display screen | Daily exams and oral questions |
| 2 | 3 | Know ledge | Drugs from natural sources; crude drugs; official and non-official drugs | Blackboard and display screen | Daily exams and oral questions |
| 3 | 3 | Know ledge | Classification of natural products | Blackboard and display screen | Daily exams and oral questions |
| 4 | 2 | Know ledge | Plant nomenclature and taxonomy | Blackboard and display screen | Daily exams and oral questions |
| 5 | 2 | Know ledge | Production of crude drugs: cultivation, collection, drying and storage | Blackboard and display screen | Daily exams and oral questions |
| 6 | 2 | Know ledge | Deterioration of crude natural products | Blackboard and display screen | Daily exams and oral questions |
| 7 | 3 | Know ledge | Quality control: macroscopical, physical, chemical, biological and spectroscopical evaluation of natural products | Blackboard and display screen | Daily exams and oral questions |
| 8 | 3 | Know ledge | Phytochemical investigation of herbal products: extraction, separation and isolation, and characterization of constituents | Blackboard and display screen | Daily exams and oral questions |
| 9 | 3 | Know ledge | Separation techniques: introduction, mechanisms of separation and classification | Blackboard and display screen | Daily exams and oral questions |
| 10 | 3 | Know ledge | Paper chromatography | Blackboard and display screen | Daily exams and oral questions |
| 11 | 3 | Know ledge | Thin-layer chromatography | Blackboard and display screen | Daily exams and oral questions |
| 12 | 3 | Know ledge | Column chromatography | Blackboard and display screen | Daily exams and oral questions |
| 13 | 3 | Know ledge | Ion-exchange and gel filtration chromatography | Blackboard and display screen | Daily exams and oral questions |
| 14 | 3 | Know ledge | Gas chromatography | Blackboard and display screen | Daily exams and oral questions |
| 15 | 3 | Know ledge | High-performance liquid chromatography | Blackboard and display screen | Daily exams and oral questions |
| 16 | 3 | Know ledge | Electrophoresis and affinity chromatography | Blackboard and display screen | Daily exams and oral questions |

## 11. Course Evaluation

| | |
|---|---|
| Mid-semester and final exams, oral exams, classroom activities and assignments. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination. | |
| **12. Learning and Teaching Resources** | |
| Required textbo (curricular books, if a | Trease and Evans Pharmacognosy, 16th ed., 2009. |
| Main referen (sources) | Shah B. Textbook of Pharmacognosy and Phytochemistry, 2010; Adamovics J. A. Chromatographic Analysis of Pharmaceuticals, 2nd ed. |
| Recommended books and references (scientific journals, reports…) | Workshops and visits to herbal shops and the medicinal garden. |
| Electronic Referenc Websites | https://www.researchgate.net/publication/236229645_Modern_extraction_methods_for_preparation_of_bioactive_plant_extracts |

# Course Description Form

## 1. Course Name:

**Pharmacognosy I (Practical)**

## 2. Course Code:

PPCG 21

## 3. Semester / Year:

Second Semester / Second Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

30 practical hours (2 hours per week) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Ahmed Abdul-Wahab
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Learn the basics and principles of pharmacognosy and phytochemistry and the methods of examining and classifying plants.<br>2. Identify the sources of natural products and crude drugs and study plant components and cellular tissues by microscopy.<br>3. Acquire skills in the general methods of extraction, separation and identification of active constituents of herbal materials. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Laboratory experiments.<br>2. Seminars and reports.<br>3. Field visits to herbal centres and the botanical garden. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge and laboratory skills | General introduction and plant nomenclature | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 2 | 2 | Knowledge and laboratory skills | Micro-measurement and magnification | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 3 | 2 | Knowledge and laboratory skills | Microscopical identification of crude drugs and cell contents | Laboratory experiment | Laboratory skills, lab reports, oral |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | and written exams |
| 4 | 2 | Knowledge and laboratory skills | Extraction techniques (conventional techniques) | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 5 | 2 | Knowledge and laboratory skills | Experiments on extraction of alkaloids | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 6 | 2 | Knowledge and laboratory skills | Experiments on extraction of flavonoids | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 7 | 2 | Knowledge and laboratory skills | Separation techniques | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 8 | 2 | Knowledge and laboratory skills | Chromatography | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 9 | 2 | Knowledge and laboratory skills | Paper chromatography (circular and horizontal) | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 10 | 2 | Knowledge and laboratory skills | Paper chromatography (ascending) | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 11 | 2 | Knowledge and laboratory skills | Introduction to thin-layer chromatography | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 12 | 2 | Knowledge and laboratory skills | TLC on microscope slides | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 13 | 2 | Knowledge and laboratory skills | Partition chromatography for the separation of volatile oils | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 14 | 2 | Knowledge and laboratory skills | Effect of the activity of adsorbents on Rf values | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |

| | | | | | |
|---|---|---|---|---|---|
| 15 | 2 | Knowledge and laboratory skills | Column chromatography and other types of chromatography (HPLC) | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |

## 11. Course Evaluation

Mid-semester and final exams, oral exams, classroom activities and assignments, and assessment of student work during experiments. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Evans W. C. Trease and Evans Pharmacognosy, 16th ed., 2009. |
| Main references (sources) | Pharmacognosy Laboratory Manual. |
| Recommended books and references (scientific journals, reports…) | — |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Inorganic Pharmaceutical Chemistry**

## 2. Course Code:

PPCS 35

## 3. Semester / Year:

First Semester / Third Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

2 theoretical hours per week / 3 units (2 theoretical + 2 practical hours per week)

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

Name: Ahmed Sabeeh Mohammed
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Acquire knowledge of the fundamental theories and applications of inorganic chemistry in the pharmaceutical context.<br>2. Understand atomic and molecular structure and the principles of complexation in pharmaceuticals.<br>3. Evaluate the biological and pharmaceutical roles of essential, trace and non-essential ions.<br>4. Gain comprehensive knowledge of inorganic therapeutic agents, including gastrointestinal, topical and dental agents, radiopharmaceuticals and radio-opaque contrast media. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Interactive lectures on atomic structure, complexation and the physiological roles of inorganic ions.<br>2. Structural visualization using molecular software (e.g., PyMOL) to examine metal complexes and trace elements.<br>3. Clinical case discussions on the therapeutic uses and mechanisms of inorganic agents.<br>4. Problem-solving sessions on the toxicity of non-essential ions and the chemistry of gastrointestinal agents. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Understand the scope and importance of | Introduction to the course | Lectures and discussion | Quizzes |

| | | | | | |
|---|---|---|---|---|---|
| | | inorganic chemistry in pharmacy. | | | |
| 2 | 2 | Explain atomic structure and the basics of chemical complexation. | Atomic and molecular structure; complexation | Lectures and problem solving | Quizzes and exams |
| 3 | 2 | Apply complexation principles to pharmaceutical formulations. | Atomic and molecular structure; complexation (continued) | Lectures and discussion | Online quiz |
| 4 | 2 | Identify the physiological roles of essential and trace ions. | Essential and trace ions | Lectures | Quizzes and exams |
| 5 | 2 | Understand the impact and toxicity of non-essential ions in the body. | Non-essential ions | Lectures and case studies | Quizzes |
| 6 | 2 | Describe the mechanism and clinical use of acidifying agents. | Gastrointestinal agents: acidifying agents | Lectures and demonstrations | Quizzes and exams |
| 7 | 2 | Classify antacids and explain their chemical mechanisms. | Antacids | Lectures and problem solving | Quizzes |
| 8 | 2 | Evaluate the applications of protective adsorbents and topical agents. | Protective adsorbents; topical agents | Lectures and discussion | Exams |
| 9 | 2 | Assess comprehensive understanding of weeks 1–8. | Review and midterm examination | Review sessions | Midterm exam |
| 10 | 2 | Explain the pharmaceutical applications of dental agents and radiopharmaceuticals. | Dental agents; radiopharmaceutical preparations | Lectures and examples | Quizzes and exams |
| 11 | 2 | Deepen understanding of radiopharmaceutical dispensing and safety. | Radiopharmaceuticals (continued) | Lectures | Quizzes |
| 12 | 2 | Understand the chemical properties and uses of contrast media in imaging. | Radio-opaque and contrast media | Lectures and visual aids | Exams |
| 13 | 2 | Review the core course concepts. | Review | Discussion | Participation |
| 14 | 2 | Prepare for the final assessment. | Final preparation | Problem solving | Final exam |

## 11. Course Evaluation

Written midterm and final examinations, regular quizzes, assignments on clinical scenarios (trace-element deficiency, heavy-metal toxicity) and class participation. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

| 12. Learning and Teaching Resources | |
|---|---|
| Required textbooks (curricular books, if any) | Block, J. H., Roche, E. B., Soine, T. O., & Wilson, C. O. Inorganic Medicinal and Pharmaceutical Chemistry. |
| Main references (sources) | Delgado, J. N., & Remers, W. A. (Eds.). Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, latest edition. |
| Recommended books and references (scientific journals, reports…) | Journal of Inorganic Biochemistry; European Journal of Medicinal Chemistry. Software: PyMOL for molecular visualization. |
| Electronic References, Websites | PubChem; DrugBank; ChemSpider. |

# Course Description Form

## 1. Course Name:

**Inorganic Pharmaceutical Chemistry (Practical)**

## 2. Course Code:

PPCS 35

## 3. Semester / Year:

First Semester / Third Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2026

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

30 practical hours (2 hours per week) / 3 units (2 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Ahmed Mohamed Jawad
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Prepare competent pharmacists able to study the chemical and physical properties and biological effectiveness of drugs.<br>2. Teach the appropriate and safe methods of dealing with chemicals, glassware and devices.<br>3. Teach the techniques used to identify and assay different chemicals.<br>4. Teach the techniques and methods used in preparing different chemicals. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Laboratory experiments (known and unknown samples).<br>2. Reports.<br>3. Scientific research. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge of course objectives; laboratory skills | Preparation and standardization of 1 N HCl (known sample) | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 2 | 2 | Knowledge of course objectives; laboratory skills | Preparation and standardization of 1 N HCl (unknown sample) | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 2 | Knowledge of course objectives; laboratory skills | Preparation and standardization of 1 N NaOH (known sample) | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 4 | 2 | Knowledge of course objectives; laboratory skills | Preparation and standardization of 1 N NaOH (unknown sample) | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 5 | 2 | Knowledge of course objectives; laboratory skills | Assay of citric acid (known sample) | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 6 | 2 | Knowledge of course objectives; laboratory skills | Assay of citric acid (unknown sample) | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 7 | 2 | Knowledge of course objectives; laboratory skills | Assay of NaOH (known sample) | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 8 | 2 | Knowledge of course objectives; laboratory skills | Assay of NaOH (unknown sample) | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 9 | 2 | Knowledge of course objectives; laboratory skills | Assay of sodium benzoate (known sample) | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 10 | 2 | Knowledge of course objectives; laboratory skills | Assay of borax (known sample) | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 11 | 2 | Knowledge of course objectives; laboratory skills | Assay of borax (known sample) | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 12 | 2 | Knowledge of course objectives; laboratory skills | Assay of magnesium hydroxide (known sample) | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 13 | 2 | Knowledge of course objectives; laboratory skills | Assay of magnesium hydroxide (known sample) | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 14 | 2 | Knowledge of course objectives; laboratory skills | Assay of ammoniated mercury (unknown sample) | Whiteboard, projector screen and | Daily exam, oral questions and reports |

| | | | | | |
|---|---|---|---|---|---|
| | | | | laboratory experiment | |
| 15 | 2 | Knowledge of course objectives; laboratory skills | Assay of ammoniated mercury (unknown sample) | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |

## 11. Course Evaluation

Practical experiments (unknown samples), oral and written exams, and laboratory reports. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Laboratory handbook for practical pharmaceutical chemistry. |
| Main references (sources) | Block, Roche, Soine and Wilson. Inorganic Medicinal and Pharmaceutical Chemistry, latest ed. |
| Recommended books and references (scientific journals, reports…) | — |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Pharmacognosy II**

## 2. Course Code:

PPCG 32

## 3. Semester / Year:

First Semester / Third Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

45 theoretical hours (3 hours per week) / 3 units according to the study plan (2 theoretical + 2 practical hours per week)

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

Name: Assist. Prof. Dr. Suhad Humadi
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Develop an understanding of the active constituents of plants: their chemical structures, biosynthesis in the plant and medicinal effects on the human body.<br>2. Classify secondary metabolites (glycosides, flavonoids, tannins, lignans, resins, etc.) according to their structures and biosynthetic pathways.<br>3. Analyse how plant constituents interact with biological systems and with conventional drugs (herb–drug interactions).<br>4. Highlight the importance of plant-derived substances in health and disease, with examples of plants used in complementary and alternative medicine, and introduce the applications of plant tissue culture. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Theoretical lectures using the whiteboard and PowerPoint presentations.<br>2. Group discussion, scientific posters and interactive classroom activities.<br>3. Field visits to herbal medicine centres, herbal shops and botanical gardens.<br>4. Homework and research assignments to develop analytical and critical thinking. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 3 | Knowledge | Introduction: general biosynthetic pathways of secondary metabolites (acetate | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |

| | | | | | |
|---|---|---|---|---|---|
| | | | and shikimic acid pathways) | | |
| 2 | 3 | Knowledge | Glycosides: chemistry and classification, physical and chemical properties, pharmacological effects | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 3 | 3 | Knowledge | Cardioactive glycosides | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 4 | 3 | Knowledge | Anthracene glycosides | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 5 | 3 | Knowledge | Saponin glycosides | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 6 | 3 | Knowledge | Phenolic glycosides | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 7 | 3 | Knowledge | Flavonoid glycosides | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 8 | 3 | Knowledge | Aldehyde and alcohol glycosides | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 9 | 3 | Knowledge | Lactone glycosides: coumarins and chromones | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 10 | 3 | Knowledge | Isothiocyanate and cyanophore (cyanogenic) glycosides | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 11 | 3 | Knowledge | Tannins | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 12 | 3 | Knowledge | Lignans and flavonolignans | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 13 | 3 | Knowledge | Resins and resin combinations | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 14 | 3 | Knowledge | Toxic plants | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |

| | | | | | |
|---|---|---|---|---|---|
| 15 | 3 | Knowledge | Applications of plant tissue culture in pharmacognosy and medicinal products | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |

## 11. Course Evaluation

Midterm and final examinations, oral examinations, classroom activities and homework assignments. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Evans, W. C. Trease and Evans Pharmacognosy, 16th ed., 2009; Tyler's Pharmacognosy, 9th ed. |
| Main references (sources) | Shah, B. Textbook of Pharmacognosy and Phytochemistry, 2010; Aniszewski, T. Alkaloids – Secrets of Life, 2007. |
| Recommended books and references (scientific journals, reports…) | Pharmacognosy and Phytochemistry: Principles, Techniques, and Clinical Applications (Wiley, 2025); Huang, L. (Ed.). Molecular Pharmacognosy, 2nd ed., 2019. |
| Electronic References, Websites | https://pharmabookbank.wordpress.com/wp-content/uploads/2019/03/14.2.pharmacognosy-by-biren-shahavinash-seth-1.pdf |

# Course Description Form

## 1. Course Name:

**Pharmacognosy II (Practical)**

## 2. Course Code:

PPCG 32

## 3. Semester / Year:

First Semester / Third Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

30 practical hours (2 hours per week) / 3 units (2 theoretical + 2 practical hours per week)

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

Name: MSc. Mohammed Jasim; MSc. Ahmed Abdul-Wahab Ali
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Provide hands-on experience in the extraction and identification of active constituents from medicinal plants.<br>2. Familiarize students with the preparation of plant materials and the selection and application of appropriate extraction and separation methods.<br>3. Extract and identify the different classes of glycosides, tannins and volatile oils from their plant sources using chemical tests and TLC.<br>4. Relate laboratory findings to the active constituents present in medicinal plants. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Laboratory experiments.<br>2. Seminars and reports.<br>3. Field visits to herbal centres and the botanical garden. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge and laboratory skills | Introduction to glycosides | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 2 | 2 | Knowledge and laboratory skills | Extraction of cardioactive glycosides | Laboratory experiment | Laboratory skills, lab reports, oral |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | and written exams |
| 3 | 2 | Knowledge and laboratory skills | Identification of cardioactive glycosides | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 4 | 2 | Knowledge and laboratory skills | Extraction of anthraquinone glycosides | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 5 | 2 | Knowledge and laboratory skills | Identification of anthraquinone glycosides | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 6 | 2 | Knowledge and laboratory skills | Extraction of saponin glycosides | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 7 | 2 | Knowledge and laboratory skills | Identification of saponin glycosides | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 8 | 2 | Knowledge and laboratory skills | Extraction of flavonoid glycosides | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 9 | 2 | Knowledge and laboratory skills | Identification of flavonoid glycosides | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 10 | 2 | Knowledge and laboratory skills | Extraction of tannins | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 11 | 2 | Knowledge and laboratory skills | Identification of tannins | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 12 | 2 | Knowledge and laboratory skills | Extraction of volatile oils | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 13 | 2 | Knowledge and laboratory skills | Identification of volatile oils | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |

| | | | | | |
|---|---|---|---|---|---|
| 14 | 2 | Knowledge and laboratory skills | Identification of known compounds by chemical tests | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |
| 15 | 2 | Knowledge and laboratory skills | Identification of known compounds by TLC | Laboratory experiment | Laboratory skills, lab reports, oral and written exams |

## 11. Course Evaluation

Mid-semester and final exams, oral exams, classroom activities and assignments, and assessment of student work during experiments. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Evans W. C. Trease and Evans Pharmacognosy, 16th ed., 2009. |
| Main references (sources) | Robbers J. E., Speedie M. K., Tyler V. E. Pharmacognosy and Pharmacobiotechnology, 1996. |
| Recommended books and references (scientific journals, reports…) | Pharmacognosy Laboratory Manual. |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Pharmaceutical Technology**

## 2. Course Code:

PPCT 35

## 3. Semester / Year:

First Semester / Third Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

45 theoretical hours (3 hours per week) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Dr. Firas Ghafil Abbas
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Study the fundamentals of pharmaceutical preformulation, including solubility, partitioning, powder and compaction properties.<br>2. Learn the principles of preparing liquid dosage forms: solutions and suspensions.<br>3. Learn the principles of preparing aerosols, foams and parenteral dosage forms.<br>4. Develop an understanding of storage, packaging and labelling practices for these dosage forms to ensure quality and patient safety. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Theoretical lectures using the smart board.<br>2. Educational seminars and posters.<br>3. Discussion of preparation and preformulation methods. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 3 | Explain the concept of preformulation, solubility and molecular dissociation. | Preformulation: concept, solubility, molecular dissociation | Smart board | Monthly and daily examinations and discussion |
| 2 | 3 | Explain partitioning, dissolution rate and hygroscopicity. | Preformulation: partitioning, dissolution rate, hygroscopicity | Smart board | Monthly and daily examinations and discussion |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 3 | Describe physical form, powder and compaction properties. | Preformulation: physical form, powder properties, compaction properties | Smart board | Monthly and daily examinations and discussion |
| 4 | 3 | Describe solvents for liquid preparations and the preparation of oral solutions. | Solutions: solvents, preparation of solutions, oral solutions | Smart board | Monthly and daily examinations and discussion |
| 5 | 3 | Describe syrups, elixirs, tinctures and topical solutions. | Solutions: syrups, elixirs, tinctures, topical solutions | Smart board | Monthly and daily examinations and discussion |
| 6 | 3 | Describe vaginal, rectal, dental and non-aqueous solutions and extraction methods. | Solutions: vaginal, rectal and dental solutions; non-aqueous solutions; extraction methods | Smart board | Monthly and daily examinations and discussion |
| 7 | 3 | Explain the reasons for suspensions, their desired features and sedimentation rate. | Suspensions: rationale, desired features, sedimentation rate | Smart board | Monthly and daily examinations and discussion |
| 8 | 3 | Explain the dispersed phase, dispersion medium, rheology and preparation of suspensions. | Suspensions: dispersed phase, dispersion medium, rheology, preparation | Smart board | Monthly and daily examinations and discussion |
| 9 | 3 | Describe sustained-release suspensions, compounding, packaging and dry powders for suspension. | Suspensions: sustained release, extemporaneous compounding, packaging and storage, dry powders | Smart board | Monthly and daily examinations and discussion |
| 10 | 3 | Explain aerosol principles, systems, containers, valves and metered-dose inhalers. | Aerosols: types, advantages, principle, systems, container and valve, MDIs, filling | Smart board | Monthly and daily examinations and discussion |
| 11 | 3 | Describe the packaging, labelling, use and examples of aerosols; types and preparation of foams. | Aerosols and foams: packaging, labelling, administration, topical aerosols, foams | Smart board | Monthly and daily examinations and discussion |
| 12 | 3 | Describe injections, parenteral routes and solvents and vehicles for injections. | Parenterals: injections, routes, official types, solvents and vehicles | Smart board | Monthly and daily examinations and discussion |
| 13 | 3 | Explain colligative properties of injections and sterilization methods. | Parenterals: colligative properties, sterilization, validation of sterility | Smart board | Monthly and daily examinations and discussion |
| 14 | 3 | Describe the industrial preparation, packaging, labelling and storage of injections. | Parenterals: industrial preparation, packaging, labelling, storage | Smart board | Monthly and daily examinations and discussion |
| 15 | 3 | Distinguish small- and large-volume parenterals and irrigation and dialysis solutions. | Parenterals: SVPs and LVPs, special considerations, irrigation and dialysis solutions | Smart board | Monthly and daily examinations and discussion |

## 11. Course Evaluation

Midterm and final exams, oral and written exams, classroom activities and posters. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Aulton's Pharmaceutics: The Design and Manufacture of Medicines, 6th ed., 2022; Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, 11th ed., 2017. |
| Main references (sources) | American Pharmacy. |
| Recommended books and references (scientific journals, reports…) | Relevant pharmaceutical technology journals. |
| Electronic References, Websites | https://pensatechpharma.com/areas-of-expertise/preformulation/; https://www.pharmaexcipients.com/excipients-for-parenterals/ |

# Course Description Form

## 1. Course Name:

**Pathophysiology**

## 2. Course Code:

PCLS 37

## 3. Semester / Year:

First Semester / Third Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

30 theoretical hours (2 hours per week) / 4 units according to the study plan (3 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Ali Abdulwahid Mohammed Ali Al-Bayer
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Understand how diseases begin and progress in the body and the functional changes that occur in organs as a result of injury or illness.<br>2. Describe basic pathophysiological concepts at the cellular level: injury, defence mechanisms, adaptation, mutation and cell proliferation.<br>3. Enable students to interpret the clinical signs and symptoms of a patient on the basis of the underlying biological and chemical changes. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Lectures using the whiteboard and projector, with pictures and diagrams.<br>2. Thinking and discussion method; student–teacher dialogue.<br>3. Learning through videos and visual aids; role-play scenarios.<br>4. Exploratory thinking and discussion of real-life situations. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge | General introduction to pathophysiology | Whiteboard and projector | Daily quizzes and oral questions |
| 2 | 2 | Knowledge | Water and electrolytes | Whiteboard and projector | Daily quizzes and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 2 | Knowledge | Cell injury and degeneration | Whiteboard and projector | Daily quizzes and oral questions |
| 4 | 2 | Knowledge | Disorders of the respiratory system | Whiteboard and projector | Daily quizzes and oral questions |
| 5 | 2 | Knowledge | Disorders of the cardiovascular system I | Whiteboard and projector | Daily quizzes and oral questions |
| 6 | 2 | Knowledge | Disorders of the cardiovascular system II | Whiteboard and projector | Daily quizzes and oral questions |
| 7 | 2 | Knowledge | Disorders of the renal system and liver | Whiteboard and projector | Daily quizzes and oral questions |
| 8 | 2 | Knowledge | Disorders of the gastrointestinal tract | Whiteboard and projector | Daily quizzes and oral questions |
| 9 | 2 | Knowledge | Disorders of the central nervous system I | Whiteboard and projector | Daily quizzes and oral questions |
| 10 | 2 | Knowledge | Disorders of the central nervous system II | Whiteboard and projector | Daily quizzes and oral questions |
| 11 | 2 | Knowledge | Disorders of the reproductive system | Whiteboard and projector | Daily quizzes and oral questions |
| 12 | 2 | Knowledge | Disorders of the musculoskeletal system | Whiteboard and projector | Daily quizzes and oral questions |
| 13 | 2 | Knowledge | Disorders of the endocrine system | Whiteboard and projector | Daily quizzes and oral questions |
| 14 | 2 | Knowledge | Growth disturbances | Whiteboard and projector | Daily quizzes and oral questions |
| 15 | 2 | Knowledge | Inflammation, thrombosis and neoplasia | Whiteboard and projector | Daily quizzes and oral questions |

## 11. Course Evaluation

Weekly reports and written and oral exams. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

| 12. Learning and Teaching Resources | |
|---|---|
| Required textbooks (curricular books, if any) | Greene, R. J., & Harris, N. D. Pathology and Therapeutics for Pharmacists: A Basis for Clinical Pharmacy Practice, 3rd ed. Pharmaceutical Press, 2008. |
| Main references (sources) | Greene, R. J., & Harris, N. D. Pathology and Therapeutics for Pharmacists, 3rd ed., 2008. |
| Recommended books and references (scientific journals, reports…) | Pathophysiology (MDPI journal). |
| Electronic References, Websites | https://www.mdpi.com/journal/pathophysiology; https://www.medscape.com/pathology; https://accesspharmacy.mhmedical.com/ |

# Course Description Form

## 1. Course Name:

**Pathophysiology (Practical)**

## 2. Course Code:

PCLS 37

## 3. Semester / Year:

First Semester / Third Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

30 practical hours (2 hours per week) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Ali Abdul-Wahid Mohammed Ali Al-Bair (م.م. علي عبد الواحد محمدعلي البير)
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Understand how diseases initiate and progress and the functional changes that occur in organs as a result of injury or illness.<br>2. Enable students to interpret the clinical signs and symptoms of a patient on the basis of the underlying biological and chemical changes.<br>3. Describe the functional and histological impairment of the body's organs and the clinical manifestations of different diseases. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Pictures, diagrams, videos and visual aids.<br>2. Thinking and discussion method.<br>3. Role-play (acted clinical scenes) and exploratory thinking. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge | General introduction to pathophysiology | Whiteboard and projector screen | Daily quizzes and oral questions |
| 2 | 2 | Knowledge | Water and electrolytes | Whiteboard and projector screen | Daily quizzes and oral questions |
| 3 | 2 | Knowledge | Cell injury and degenerations | Whiteboard and projector screen | Daily quizzes and oral questions |
| 4 | 2 | Knowledge | Disorders of the respiratory system | Whiteboard and projector screen | Daily quizzes and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 5 | 2 | Knowledge | Disorders of the cardiovascular system – part 1 | Whiteboard and projector screen | Daily quizzes and oral questions |
| 6 | 2 | Knowledge | Disorders of the cardiovascular system – part 2 | Whiteboard and projector screen | Daily quizzes and oral questions |
| 7 | 2 | Knowledge | Disorders of the renal system and liver disorders | Whiteboard and projector screen | Daily quizzes and oral questions |
| 8 | 2 | Knowledge | Disorders of the gastrointestinal tract | Whiteboard and projector screen | Daily quizzes and oral questions |
| 9 | 2 | Knowledge | Disorders of the central nervous system – part 1 | Whiteboard and projector screen | Daily quizzes and oral questions |
| 10 | 2 | Knowledge | Disorders of the central nervous system – part 2 | Whiteboard and projector screen | Daily quizzes and oral questions |
| 11 | 2 | Knowledge | Disorders of the reproductive system | Whiteboard and projector screen | Daily quizzes and oral questions |
| 12 | 2 | Knowledge | Disorders of the musculoskeletal system | Whiteboard and projector screen | Daily quizzes and oral questions |
| 13 | 2 | Knowledge | Disorders of the endocrine system | Whiteboard and projector screen | Daily quizzes and oral questions |
| 14 | 2 | Knowledge | Growth disturbances | Whiteboard and projector screen | Daily quizzes and oral questions |
| 15 | 2 | Knowledge | Inflammation, thrombosis and neoplasia | Whiteboard and projector screen | Daily quizzes and oral questions |

## 11. Course Evaluation

Weekly reports and written and oral examinations. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Greene R. J., Harris N. D. Pathology and Therapeutics for Pharmacists: A Basis for Clinical Pharmacy Practice, 3rd ed. Pharmaceutical Press, 2008. |
| Main references (sources) | — |
| Recommended books and references (scientific journals, reports…) | Pathophysiology (MDPI journal). |
| Electronic References, Websites | https://www.medscape.com/pathology; https://accesspharmacy.mhmedical.com/ |

# Course Description Form

## 1. Course Name:

**Organic Pharmaceutical Chemistry I**

## 2. Course Code:

PPCS 36

## 3. Semester / Year:

Second Semester / Third Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

45 theoretical hours (as distributed in the weekly plan) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Ahmed Sabeeh Mohammed
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Acquire knowledge of fundamental theories, laws and their applications in organic chemistry in the pharmaceutical context.<br>2. Learn the structure of chemical compounds, including their chemical and physical properties, chemical reactions and spectroscopic analysis.<br>3. Understand drug design and development, including the physicochemical and structural features that influence ADME and drug–target binding.<br>4. Establish structure–activity relationships and understand the pathways of drug metabolism. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Lectures delivering the core concepts and principles of organic pharmaceutical chemistry.<br>2. Interactive problem-solving sessions.<br>3. Case studies of drug molecules, molecular models and computational (QSAR/molecular modelling) demonstrations. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 4 | Understand drug distribution principles and factors affecting it | Drug distribution | Lectures, discussions, case studies | Quizzes, problem-solving |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 3 | Explain the acid–base properties of drugs and their impact on drug behaviour | Acid–base properties | Lectures, problem-solving | Quizzes, exams |
| 3 | 3 | Apply statistical methods to predict pharmacological activity | Statistical prediction of pharmacological activity | Lectures, computational exercises | Online quiz |
| 4 | 2 | Develop QSAR models for predicting drug activity | QSAR models | Lectures, model-building exercises | Project, online quiz |
| 5 | 1 | Understand the use of molecular modelling in drug design | Molecular modelling (computer-aided drug design) | Lectures, demonstrations | Quizzes, participation |
| 6 | 1 | Describe the forces involved in drug–receptor interactions | Drug–receptor interaction: forces involved | Lectures, discussions | Quizzes, exams |
| 7 | 2 | Explain the importance of steric features of drugs | Steric features of drugs | Lectures, model viewing | Quizzes |
| 8 | 1 | Explain the impact of optical isomerism on biological activity | Optical isomerism and biological activity | Lectures, examples | Quizzes, exams |
| 9 | 1 | Understand the role of calculated conformation in drug activity | Calculated conformation | Lectures, computational chemistry software | Online quiz |
| 10 | 1 | Apply 3D-QSAR and use relevant databases | Three-dimensional QSAR and databases | Lectures, software demonstrations | Exams |
| 11 | 1 | Explain isosterism and its application in drug design | Isosterism | Lectures, discussions | Quizzes |
| 12 | 1 | Describe the events subsequent to drug–receptor interaction | Drug–receptor interaction and subsequent events | Lectures, diagrams, flowcharts | Quizzes, exams |
| 13–14 | 24 | Understand the pathways of drug metabolism, the role of cytochrome P450 and phase II reactions; identify factors affecting drug metabolism | General pathways of drug metabolism: sites of biotransformation; cytochrome P450 mono-oxygenases; oxidative, reductive and hydrolytic reactions; phase II reactions | Lectures, discussions, metabolic pathway mapping, case studies | Quizzes, exams, problem-solving and presentations |

## 11. Course Evaluation

Written (closed- and open-book) examinations, quizzes, problem-solving assignments and oral presentations. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

| 12. Learning and Teaching Resources | |
|---|---|
| Required textbooks (curricular books, if any) | Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry. Delgado J. N., Remers W. A. (Eds.), latest ed. |
| Main references (sources) | — |
| Recommended books and references (scientific journals, reports…) | Molecular modelling and QSAR software. |
| Electronic References, Websites | CAS, ChemSpider and PubChem databases. |

# Course Description Form

## 1. Course Name:

**Organic Pharmaceutical Chemistry I (Practical)**

## 2. Course Code:

PPCS 36

## 3. Semester / Year:

Second Semester / Third Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2026

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

30 practical hours (2 hours per week) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Ahmed Mohamed Kmkm
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Prepare competent pharmacists able to study the chemical and physical properties and biological effectiveness of drugs.<br>2. Teach the appropriate and safe methods of dealing with chemicals, glassware and devices.<br>3. Teach the techniques used to identify and assay different chemicals (oxidation–reduction titrations).<br>4. Teach the techniques and methods used in preparing different chemicals. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Laboratory experiments (known and unknown samples).<br>2. Reports.<br>3. Scientific research. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge of course objectives; laboratory skills | Preparation and standardization of KMnO4 | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 2 | 2 | Knowledge of course objectives; laboratory skills | Preparation and standardization of KMnO4 | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 2 | Knowledge of course objectives; laboratory skills | Unknown sample | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 4 | 2 | Knowledge of course objectives; laboratory skills | Assay of H2O2 | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 5 | 2 | Knowledge of course objectives; laboratory skills | Unknown sample | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 6 | 2 | Knowledge of course objectives; laboratory skills | Assay of ferrous sulfate | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 7 | 2 | Knowledge of course objectives; laboratory skills | Unknown sample | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 8 | 2 | Knowledge of course objectives; laboratory skills | Preparation and standardization of sodium oxalate (Na2C2O4) | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 9 | 2 | Knowledge of course objectives; laboratory skills | Unknown sample | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 10 | 2 | Knowledge of course objectives; laboratory skills | Assay of copper sulfate | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 11 | 2 | Knowledge of course objectives; laboratory skills | Assay of copper sulfate | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 12 | 2 | Knowledge of course objectives; laboratory skills | Assay of chlorinated lime | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 13 | 2 | Knowledge of course objectives; laboratory skills | Assay of chlorinated lime | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |
| 14 | 2 | Knowledge of course objectives; laboratory skills | Preparation and assay of Lugol's solution | Whiteboard, projector screen and | Daily exam, oral questions and reports |

| | | | | | |
|---|---|---|---|---|---|
| | | | | laboratory experiment | |
| 15 | 2 | Knowledge of course objectives; laboratory skills | Preparation and assay of Lugol's solution | Whiteboard, projector screen and laboratory experiment | Daily exam, oral questions and reports |

## 11. Course Evaluation

Practical experiments (unknown samples), oral and written exams, and laboratory reports. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Laboratory handbook for practical pharmaceutical chemistry. |
| Main references (sources) | Block, Roche, Soine and Wilson. Inorganic Medicinal and Pharmaceutical Chemistry, latest ed. |
| Recommended books and references (scientific journals, reports…) | — |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Pharmacology I**

## 2. Course Code:

PPCL 33

## 3. Semester / Year:

Second Semester / Third Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

45 theoretical hours (3 hours per week) / 3 units

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

Name: Assist. Lect. Rami Thamer Kareem (م.م. رامي ثامر كريم)
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Know the names of the different drugs and how they act within the human body.<br>2. Understand the clinical applications of medications.<br>3. Recognize the possible side effects of medications and drug–drug interactions.<br>4. Link clinical information together and relate medicines to practice in pharmacies and hospitals. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Thinking and discussion method.<br>2. Exploratory lectures supported by multimedia (images, charts and videos).<br>3. Group discussion at the end of each lecture. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 3 | Knowledge | Introduction to pharmacology – pharmacokinetics | Whiteboard and projector screen | Daily quizzes and oral questions |
| 2 | 3 | Knowledge | Pharmacodynamics | Whiteboard and projector screen | Daily quizzes and oral questions |
| 3 | 3 | Knowledge | Introduction to the autonomic nervous system | Whiteboard and projector screen | Daily quizzes and oral questions |
| 4 | 3 | Knowledge | Cholinergic agonists | Whiteboard and projector screen | Daily quizzes and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 5 | 3 | Knowledge | Cholinergic antagonists | Whiteboard and projector screen | Daily quizzes and oral questions |
| 6 | 3 | Knowledge | Adrenergic agonists | Whiteboard and projector screen | Daily quizzes and oral questions |
| 7 | 3 | Knowledge | Adrenergic antagonists | Whiteboard and projector screen | Daily quizzes and oral questions |
| 8 | 3 | Knowledge | Principles of antimicrobial therapy | Whiteboard and projector screen | Daily quizzes and oral questions |
| 9 | 3 | Knowledge | Cell wall inhibitors | Whiteboard and projector screen | Daily quizzes and oral questions |
| 10 | 3 | Knowledge | Protein synthesis inhibitors | Whiteboard and projector screen | Daily quizzes and oral questions |
| 11 | 3 | Knowledge | Quinolones, folic acid antagonists and urinary tract antiseptics | Whiteboard and projector screen | Daily quizzes and oral questions |
| 12 | 3 | Knowledge | Antimycobacterial drugs | Whiteboard and projector screen | Daily quizzes and oral questions |
| 13 | 3 | Knowledge | Antiprotozoal drugs and anthelmintics | Whiteboard and projector screen | Daily quizzes and oral questions |
| 14 | 3 | Knowledge | Antifungal drugs | Whiteboard and projector screen | Daily quizzes and oral questions |
| 15 | 3 | Knowledge | Antiviral drugs | Whiteboard and projector screen | Daily quizzes and oral questions |

## 11. Course Evaluation

Question-and-answer sessions, weekly quizzes and homework assignments. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Lippincott Illustrated Reviews: Pharmacology, 7th ed. |
| Main references (sources) | — |
| Recommended books and references (scientific journals, reports…) | — |
| Electronic References, Websites | Lippincott Illustrated Reviews: Pharmacology, 7e – Health Library. |

# Course Description Form

## 1. Course Name:

**Pharmaceutical and Cosmetic Preparation (Pharmaceutical Technology II)**

## 2. Course Code:

PPCT 36

## 3. Semester / Year:

Second Semester / Third Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2024–2025

## 5. Available Attendance Forms:

Daily in-person attendance

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

47 theoretical hours (3 hours per week, as distributed in the weekly plan) / 4 units (3 theoretical + 2 practical hours per week)

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

Name:
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Teach basic information about different dosage forms (emulsions, suppositories, topical preparations, capsules, aerosols and powders) in terms of their raw materials, compositions, methods of preparation, stability and storage.<br>2. Enable students to identify the technological rules used in preparing dosage forms on a small scale in the laboratory and pharmacy.<br>3. Identify and describe potential incompatibilities that may occur in pharmaceutical preparations. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Theoretical lectures using the smart board.<br>2. Educational seminars and posters.<br>3. Extracting the required information from approved sources. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 3 | Knowledge | Emulsions: introduction, definition, types, classification, disadvantages and theory of emulsions | Smart board | Daily and monthly exams and discussion |
| 2 | 4 | Knowledge | Emulsions: emulsifying agents (properties, types, calculation of SAA | Smart board | Daily and monthly exams and discussion |

| | | | | | |
|---|---|---|---|---|---|
| | | | concentration), small- and large-scale methods of emulsification | | |
| 3 | 3 | Knowledge | Emulsions: stability, storage and preservation | Smart board | Daily and monthly exams and discussion |
| 4 | 3 | Knowledge | Suppositories: ideal properties, types of bases and suppository moulds | Smart board | Daily and monthly exams and discussion |
| 5 | 3 | Knowledge | Suppositories: determination of the amount of base, vaginal inserts, packaging and storage | Smart board | Daily and monthly exams and discussion |
| 6 | 4 | Knowledge | Semisolids: ideal properties of ointments, types of ointment bases (USP) and their comparison | Smart board | Daily and monthly exams and discussion |
| 7 | 3 | Knowledge | Semisolids: selection of ointment base, preparation and compendial requirements; ophthalmic ointments, creams and gels | Smart board | Daily and monthly exams and discussion |
| 8 | 3 | Knowledge | Powders and granules: definition, uses, characterization, particle size and shape, flowability, comminution and blending | Smart board | Daily and monthly exams and discussion |
| 9 | 3 | Knowledge | Powders and granules: problems of size reduction, medicated powders, dispensing; granules and effervescent granules | Smart board | Daily and monthly exams and discussion |
| 10 | 3 | Knowledge | Capsules: definition, advantages, types, hard gelatin capsules (shell composition, manufacture and filling) | Smart board | Daily and monthly exams and discussion |
| 11 | 3 | Knowledge | Capsules: enteric-coated capsules, counting, storage and evaluation | Smart board | Daily and monthly exams and discussion |
| 12–13 | 6 | Knowledge | Aerosols and foams: definition, advantages and components of aerosols; pharmaceutical foams | Smart board | Daily and monthly exams and discussion |
| 14–15 | 6 | Knowledge | Pharmaceutical incompatibility: physical and chemical incompatibility | Smart board | Daily and monthly exams and discussion |

| 11. Course Evaluation | |
|---|---|
| Midterm and final exams, oral and written exams, classroom activities and posters. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination. | |
| **12. Learning and Teaching Resources** | |
| Required textbooks (curricular books, if any) | Allen L. V. Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, 10th ed. |
| Main references (sources) | Aulton M. E. Aulton's Pharmaceutics: The Design and Manufacture of Medicines. Churchill Livingstone–Elsevier. |
| Recommended books and references (scientific journals, reports…) | — |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Pharmaceutical and Cosmetic Preparation (Pharmaceutical Technology II) (Practical)**

## 2. Course Code:

PPCT 36

## 3. Semester / Year:

Second Semester / Third Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2026

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

30 practical hours (2 hours per week) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Kareem Khudhair Obayes
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Teach the basic principles of preparing different dosage forms according to their raw materials, contents, preparation methods, stability, storage and uses.<br>2. Enable students to prepare and store different pharmaceutical and cosmetic preparations on a small scale.<br>3. Define and study changes in characteristics and properties resulting from incompatibility between ingredients. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Smart board presentations.<br>2. Practical experiments.<br>3. Writing scientific reports on the experiments. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge; practical skills | Emulsions: definition, types, classification and theory | Smart board and practical experiments | Daily written and oral examinations |
| 2 | 2 | Knowledge; practical skills | Suppositories: properties, bases and moulds | Smart board and practical experiments | Daily written and oral examinations |
| 3 | 2 | Knowledge; practical skills | Semisolids: preparation of ointment | Smart board and practical experiments | Daily written and oral examinations |
| 4 | 2 | Knowledge; practical skills | Semisolids: preparation of cream | Smart board and practical experiments | Daily written and oral examinations |

| | | | | | |
|---|---|---|---|---|---|
| 5 | 2 | Knowledge; practical skills | Semisolids: preparation of gel | Smart board and practical experiments | Daily written and oral examinations |
| 6 | 2 | Knowledge; practical skills | Semisolids: preparation of emulgel | Smart board and practical experiments | Daily written and oral examinations |
| 7 | 2 | Knowledge; practical skills | Preparation of powders | Smart board and practical experiments | Daily written and oral examinations |
| 8 | 2 | Knowledge; practical skills | Preparation of granules | Smart board and practical experiments | Daily written and oral examinations |
| 9 | 2 | Knowledge; practical skills | Capsules: preparation of filled hard gelatin capsules | Smart board and practical experiments | Daily written and oral examinations |
| 10 | 2 | Knowledge; practical skills | Pharmaceutical aerosols and foams | Smart board and practical experiments | Daily written and oral examinations |
| 11 | 2 | Knowledge; practical skills | Pastes: preparation and quality evaluation | Smart board and practical experiments | Daily written and oral examinations |
| 12 | 2 | Knowledge; practical skills | Incompatibility: physical and chemical | Smart board and practical experiments | Daily written and oral examinations |
| 13 | 2 | Knowledge; practical skills | Shampoo: preparation and quality evaluation | Smart board and practical experiments | Daily written and oral examinations |
| 14 | 2 | Knowledge; practical skills | Effervescent granules | Smart board and practical experiments | Daily written and oral examinations |
| 15 | 2 | Knowledge; practical skills | Soap: preparation and quality evaluation | Smart board and practical experiments | Daily written and oral examinations |

## 11. Course Evaluation

Midterm and final exams, quizzes, small-group discussions, practical report evaluation and class activities (posters). The practical grade is distributed according to daily preparation, oral and written exams and laboratory reports.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Allen L. V. Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, 10th ed. |
| Main references (sources) | Aulton M. E. Aulton's Pharmaceutics: The Design and Manufacture of Medicines. Churchill Livingstone–Elsevier. |
| Recommended books and references (scientific journals, reports…) | — |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Biochemistry II (Practical)**

## 2. Course Code:

PCLS 38

## 3. Semester / Year:

Second Semester / Third Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

26 practical hours (2 hours per week) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Anas Adnan
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Integrate the key concepts of the core topics of biochemistry: structure and metabolism.<br>2. Understand the chemical structure and function of the biomolecules present in living organisms.<br>3. Acquire analytical biochemistry skills through the laboratory examination of urine, CSF, blood and gastric juice. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Discussion and dialogue.<br>2. Troubleshooting and problem-solving.<br>3. Seminars and laboratory experiments. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge; experimental skills | General urine examination: physical properties | Blackboard, screen presentations and laboratory experiment | Daily exams and oral questions |
| 2 | 2 | Knowledge; experimental skills | General urine examination: chemical properties; protein and sugar in urine | Blackboard, screen presentations and laboratory experiment | Daily exams and oral questions |
| 3 | 2 | Knowledge; experimental skills | General urine examination: ketone bodies (Rothera test), bile salts (Hay's test) and bilirubin | Blackboard, screen presentations and laboratory experiment | Daily exams and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 4 | 2 | Knowledge; experimental skills | Cerebrospinal fluid analysis: glucose | Blackboard, screen presentations and laboratory experiment | Daily exams and oral questions |
| 5 | 2 | Knowledge; experimental skills | Cerebrospinal fluid analysis: chloride | Blackboard, screen presentations and laboratory experiment | Daily exams and oral questions |
| 6 | 2 | Knowledge; experimental skills | Cerebrospinal fluid analysis: proteins | Blackboard, screen presentations and laboratory experiment | Daily exams and oral questions |
| 7 | 2 | Knowledge; experimental skills | Serum calcium measurement | Blackboard, screen presentations and laboratory experiment | Daily exams and oral questions |
| 8 | 2 | Knowledge; experimental skills | Blood inorganic phosphate measurement | Blackboard, screen presentations and laboratory experiment | Daily exams and oral questions |
| 9 | 2 | Knowledge; experimental skills | Serum total proteins (quantitative analysis) | Blackboard, screen presentations and laboratory experiment | Daily exams and oral questions |
| 10 | 2 | Knowledge; experimental skills | Estimation of blood urea | Blackboard, screen presentations and laboratory experiment | Daily exams and oral questions |
| 11 | 2 | Knowledge; experimental skills | Measurement of serum uric acid | Blackboard, screen presentations and laboratory experiment | Daily exams and oral questions |
| 12 | 2 | Knowledge; experimental skills | Measurement of serum ascorbic acid | Blackboard, screen presentations and laboratory experiment | Daily exams and oral questions |
| 13 | 2 | Knowledge; experimental skills | Gastric juice analysis: free hydrochloric acid | Blackboard, screen presentations and laboratory experiment | Daily exams and oral questions |

## 11. Course Evaluation

Weekly reports and laboratory work, oral assessment and practical performance, written tests and a group practical project. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

| 12. Learning and Teaching Resources | |
|---|---|
| Required textbooks (curricular books, if an | Gerczei T., Pattison S. Biochemistry Laboratory Manual for Undergraduates: An Inquiry-Based Approach. |
| Main references (sources) | — |
| Recommended books and references (scientific journals, reports…) | — |
| Electronic References, Websites | https://www.youtube.com/@haneenhaleemshablawi2361 |

# Course Description Form

## 1. Course Name:

**Pharmacology II**

## 2. Course Code:

PPCL 44

## 3. Semester / Year:

First Semester / Fourth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

37 theoretical hours (2–3 hours per week, as distributed in the weekly plan) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Lect. Dr. Mahmood Jasem Jawad
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Know the drugs used for gastrointestinal, central nervous system and cardiovascular disorders: their names, mechanisms of action and clinical uses.<br>2. Recognize the adverse effects of these drugs on patients.<br>3. Understand drug–drug, drug–food and drug–disease interactions.<br>4. Link pharmacological knowledge to practice in community and hospital pharmacies. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Thinking and discussion method; student–teacher dialogue.<br>2. Exploratory (inquiry-based) lectures using the whiteboard and projector.<br>3. Weekly reports and discussion of results. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge | Gastrointestinal drugs | Whiteboard and projector | Daily quizzes and oral questions |
| 2 | 2 | Knowledge | Drugs for gastro-oesophageal reflux disease (GERD) and vomiting | Whiteboard and projector | Daily quizzes and oral questions |
| 3 | 2 | Knowledge | Laxatives and therapy for constipation | Whiteboard and projector | Daily quizzes and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 4 | 2 | Knowledge | Antipsychotic drugs | Whiteboard and projector | Daily quizzes and oral questions |
| 5 | 2 | Knowledge | Drugs for neurodegenerative diseases | Whiteboard and projector | Daily quizzes and oral questions |
| 6 | 3 | Knowledge | Antidepressants | Whiteboard and projector | Daily quizzes and oral questions |
| 7 | 3 | Knowledge | Opioids | Whiteboard and projector | Daily quizzes and oral questions |
| 8 | 2 | Knowledge | Anxiolytic and hypnotic drugs | Whiteboard and projector | Daily quizzes and oral questions |
| 9 | 3 | Knowledge | Antiepileptic drugs | Whiteboard and projector | Daily quizzes and oral questions |
| 10 | 3 | Knowledge | General and local anaesthetics | Whiteboard and projector | Daily quizzes and oral questions |
| 11 | 2 | Knowledge | CNS stimulants | Whiteboard and projector | Daily quizzes and oral questions |
| 12 | 3 | Knowledge | Antihypertensive drugs | Whiteboard and projector | Daily quizzes and oral questions |
| 13 | 2 | Knowledge | Antianginal drugs | Whiteboard and projector | Daily quizzes and oral questions |
| 14 | 3 | Knowledge | Treatment of heart failure | Whiteboard and projector | Daily quizzes and oral questions |
| 15 | 3 | Knowledge | Antiarrhythmic drugs | Whiteboard and projector | Daily quizzes and oral questions |

## 11. Course Evaluation

Weekly reports, examinations and research. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Lippincott Illustrated Reviews: Pharmacology, 7th ed. |
| Main references (sources) | Lippincott Illustrated Reviews: Pharmacology, 7th ed. |
| Recommended books and references (scientific journals, reports…) | Relevant pharmacology journals. |
| Electronic References, Websites | https://youtu.be/4gYSkghN8EY |

# Course Description Form

## 1. Course Name:

**Organic Pharmaceutical Chemistry II**

## 2. Course Code:

PPCS 47

## 3. Semester / Year:

First Semester / Fourth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

43 theoretical hours (as distributed in the weekly plan) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Ahmed M. Motlk
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Provide an in-depth study of the medicinal chemistry and pharmacology of major drug classes acting on key physiological systems.<br>2. Explain structure–activity relationships (SAR), mechanisms of action at specific receptors and the therapeutic applications of autonomic, CNS, cardiovascular, antihistaminic and anti-inflammatory agents.<br>3. Develop the ability to predict the effects of chemical modification on potency and toxicity, and to predict likely metabolic pathways and toxic metabolites.<br>4. Introduce rational drug design, including prodrug strategies to overcome poor solubility or low gastric stability. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Theoretical lectures using the whiteboard and PowerPoint presentations.<br>2. Group discussion, scientific posters and interactive classroom activities.<br>3. Homework and research assignments to develop analytical and critical thinking. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge | Cholinergic agents; cholinergic receptors and their subtypes | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |

| | | | | | |
|---|---|---|---|---|---|
| 2–3 | 5 | Knowledge | Cholinergic agonists: stereochemistry and SAR; products; cholinesterase inhibitors | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 4 | 5 | Knowledge | Cholinergic blocking agents: SAR; solanaceous alkaloids and analogues; synthetic cholinergic blockers; ganglionic and neuromuscular blocking agents | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 5–7 | 9 | Knowledge | Adrenergic agents: neurotransmitters and receptors; drugs affecting adrenergic neurotransmission; sympathomimetic agents; adrenergic receptor antagonists | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 8–9 | 5 | Knowledge | CNS depressants: benzodiazepines and related compounds, barbiturates, centrally acting muscle relaxants, antipsychotics, anticonvulsants; CNS stimulants | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 10–11 | 5 | Knowledge | Drugs affecting the renin–angiotensin pathway; calcium channel blockers; vasodilators | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 12–13 | 7 | Knowledge | Antihistamines: SAR at H1 receptors, first- and second-generation and dual-acting antihistamines; H2 antagonists | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 14–15 | 5 | Knowledge | Cyclooxygenases and NSAIDs: therapeutic classification and SAR | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |

## 11. Course Evaluation

Midterm and final examinations, oral examinations, classroom activities and homework assignments. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

| 12. Learning and Teaching Resources | |
|---|---|
| Required textbooks (curricular books, if any) | Lemke, T. L., Williams, D. A., Roche, V. F., & Zito, S. W. Foye's Principles of Medicinal Chemistry, 7th ed. |
| Main references (sources) | Block, J. H., & Beale, J. M. Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, 12th ed.; Patrick, G. L. An Introduction to Medicinal Chemistry, 7th ed. |
| Recommended books and references (scientific journals, reports…) | Relevant medicinal chemistry journals. |
| Electronic References, Websites | Websites and databases of pharmaceutical molecules. |

# Course Description Form

## 1. Course Name:

**Clinical Pharmacy I**

## 2. Course Code:

PCPC 42

## 3. Semester / Year:

First Semester / Fourth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

37 theoretical hours (2 hours per week, as distributed in the weekly plan) / 3 units (2 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Dr. Muntadher Hameed Thwaini
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Develop an understanding of the principles of clinical pharmacy, focusing on the safe, effective and rational use of medicines in patient care.<br>2. Apply pharmacotherapeutic knowledge to prevent, identify and resolve drug-related problems, considering patient-specific factors such as age, disease state, organ function and concurrent therapy.<br>3. Enable students to manage common minor ailments in community pharmacy, including appropriate selection of over-the-counter (OTC) medicines and referral.<br>4. Highlight the role of the clinical pharmacist in optimizing outcomes through evidence-based decisions, medication monitoring, patient counselling and interprofessional collaboration. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Theoretical lectures using the whiteboard and PowerPoint presentations.<br>2. Clinical case scenarios, group discussion, scientific posters and interactive activities.<br>3. Field visits to community pharmacies.<br>4. Homework and research assignments. |

## 10. Course Structure

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

| | | | | | |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge | Introduction to community pharmacy | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 2 | 2 | Knowledge | Respiratory problems: cough and the common cold | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 3 | 2 | Knowledge | Respiratory problems: allergic rhinitis, otitis media, laryngitis and pharyngitis | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 4 | 2 | Knowledge | Gastrointestinal problems: diarrhoea, constipation and heartburn | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 5 | 2 | Knowledge | Gastrointestinal problems: indigestion, irritable bowel syndrome and haemorrhoids | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 6 | 2 | Knowledge | Paediatric care: oral thrush, pinworms and head lice | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 7 | 3 | Knowledge | Skin conditions: acne, scabies, psoriasis and hair loss | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 8 | 2 | Knowledge | Skin conditions: fungal infections, eczema and dermatitis, dandruff, cold sores, corns and calluses | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 9 | 2 | Knowledge | Women's health: cystitis, vaginal thrush, primary dysmenorrhoea and premenstrual syndrome | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 10 | 2 | Knowledge | CNS-related problems: headache, insomnia, motion sickness, nausea and vomiting | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 11 | 2 | Knowledge | Eye and ENT problems | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 12 | 2 | Knowledge | Oral hygiene and mouth ulcers | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 13 | 2 | Knowledge | Obesity and body-weight control | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |

| | | | | | |
|---|---|---|---|---|---|
| 14 | 2 | Knowledge | Pain and musculoskeletal disorders | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 15 | 2 | Knowledge | Nicotine replacement therapy (NRT) | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 16 | 2 | Knowledge | Dietary supplements | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 17 | 2 | Knowledge | Update on the reclassification of OTC drugs (simvastatin, tamsulosin and azithromycin) | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 18 | 2 | Knowledge | Medication adherence and medication errors | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |

## 11. Course Evaluation

Midterm and final examinations, oral examinations, classroom activities and homework assignments. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Community Pharmacy, 6th ed., 2026; Symptoms in the Pharmacy: A Guide to the Management of Common Illnesses and Disease Prevention, 6th ed. |
| Main references (sources) | Waterfield, J. Community Pharmacy Handbook, 1st ed. |
| Recommended books and references (scientific journals, reports…) | FIP education resources and relevant clinical pharmacy journals. |
| Electronic References, Websites | https://www.fip.org/fip-education |

# Course Description Form

## 1. Course Name:

**Clinical Pharmacy I (Practical)**

## 2. Course Code:

PCPC 42

## 3. Semester / Year:

First Semester / Fourth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

33 practical hours (2 hours per week, as distributed in the weekly plan) / 3 units (2 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Dr. Muntadher Hameed Thwaini
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Develop an understanding of the principles of clinical pharmacy, focusing on the safe, effective and rational use of medications in patient care.<br>2. Apply pharmacotherapeutic knowledge to prevent, identify and resolve drug-related problems, considering patient-specific factors.<br>3. Highlight the role of the pharmacist in optimizing outcomes through evidence-based decisions, monitoring, patient counselling and interprofessional collaboration.<br>4. Manage common minor illnesses and over-the-counter (OTC) medications in community pharmacy practice. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Interactive practical sessions with clinical case scenarios.<br>2. Scientific posters and classroom activities.<br>3. Field visits to community pharmacies.<br>4. Homework assignments (coursework). |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge; practical skills | Communication with patients | Whiteboard, PowerPoint presentations and case scenarios | Group discussion, oral exams and assignments |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 2 | Knowledge; practical skills | Respiratory system in practice (part I): cough | Whiteboard, PowerPoint presentations and case scenarios | Group discussion, oral exams and assignments |
| 3 | 2 | Knowledge; practical skills | Respiratory system in practice (part II): common cold | Whiteboard, PowerPoint presentations and case scenarios | Group discussion, oral exams and assignments |
| 4 | 2 | Knowledge; practical skills | GIT in practice (part I): constipation | Whiteboard, PowerPoint presentations and case scenarios | Group discussion, oral exams and assignments |
| 5 | 2 | Knowledge; practical skills | GIT problems: indigestion, IBS and haemorrhoids | Whiteboard, PowerPoint presentations and case scenarios | Group discussion, oral exams and assignments |
| 6 | 2 | Knowledge; practical skills | GIT in practice (part II): diarrhoea and IBS | Whiteboard, PowerPoint presentations and case scenarios | Group discussion, oral exams and assignments |
| 7 | 3 | Knowledge; practical skills | GIT in practice (part III): GERD and indigestion | Whiteboard, PowerPoint presentations and case scenarios | Group discussion, oral exams and assignments |
| 8 | 2 | Knowledge; practical skills | Skin conditions in practice (part I): hair loss, cold sore and athlete's foot | Whiteboard, PowerPoint presentations and case scenarios | Group discussion, oral exams and assignments |
| 9 | 2 | Knowledge; practical skills | Skin conditions in practice (part II): dandruff, eczema and mouth ulcer | Whiteboard, PowerPoint presentations and case scenarios | Group discussion, oral exams and assignments |
| 10 | 2 | Knowledge; practical skills | Skin conditions in practice (part III): warts and scabies | Whiteboard, PowerPoint presentations and case scenarios | Group discussion, oral exams and assignments |
| 11 | 2 | Knowledge; practical skills | Paediatrics in practice: oral thrush, colic, pinworm and napkin rash | Whiteboard, PowerPoint presentations and case scenarios | Group discussion, oral exams and assignments |
| 12 | 2 | Knowledge; practical skills | Minor eye disorders in practice | Whiteboard, PowerPoint presentations and case scenarios | Group discussion, oral exams and assignments |
| 13 | 2 | Knowledge; practical skills | CNS: insomnia, motion sickness, obesity and | Whiteboard, PowerPoint presentations | Group discussion, oral |

| | | | | | |
|---|---|---|---|---|---|
| | | | nicotine replacement therapy (NRT) | and case scenarios | exams and assignments |
| 14 | 2 | Knowledge; practical skills | Drug information sources for the pharmacist | Whiteboard, PowerPoint presentations and case scenarios | Group discussion, oral exams and assignments |
| 15 | 2 | Knowledge; practical skills | Update on the reclassification of OTC drugs | Whiteboard, PowerPoint presentations and case scenarios | Group discussion, oral exams and assignments |
| 16 | 2 | Knowledge; practical skills | Collective practice | Whiteboard, PowerPoint presentations and case scenarios | Group discussion, oral exams and assignments |

## 11. Course Evaluation

Midterm and final examinations, oral examinations, classroom activities and homework assignments. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Waterfield J. Community Pharmacy Handbook, 1st ed. |
| Main references (sources) | Community Pharmacy, 6th ed., 2026; Symptoms in the Pharmacy: A Guide to the Management of Common Illnesses and Disease Prevention, 6th ed. |
| Recommended books and references (scientific journals, reports…) | — |
| Electronic References, Websites | https://www.fip.org/fip-education |

# Course Description Form

## 1. Course Name:

**Biopharmaceutics**

## 2. Course Code:

PPCT 47

## 3. Semester / Year:

First Semester / Fourth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

45 theoretical hours (3 hours per week) / 3 units according to the study plan (2 theoretical + 2 practical hours per week)

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

Name: Ammar Sahib Abdulameer, PhD
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Understand the behaviour of drugs in the body, including the effect of dose, rate of absorption and duration of action.<br>2. Calculate pharmacokinetic parameters and derive the mathematical equations that describe drug behaviour after different routes of administration.<br>3. Understand the physiological and formulation factors that affect drug absorption, bioavailability and bioequivalence.<br>4. Apply pharmacokinetic principles to multiple-dose regimens and dosage adjustment in renal disease. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Lectures using the blackboard and screen presentations.<br>2. Teamwork and problem-solving with pharmacokinetic data and plots.<br>3. Quizzes, seminars and posters. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 3 | Knowledge | Introduction to the pharmaceutical sciences and biopharmaceutics | Blackboard and screen presentations | Daily exams and oral questions |
| 2 | 3 | Knowledge | Mathematical review and pharmacokinetic terminology | Blackboard and screen presentations | Daily exams and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 3 | Knowledge | Physiological factors related to drug absorption | Blackboard and screen presentations | Daily exams and oral questions |
| 4 | 3 | Knowledge | Factors affecting oral drug absorption | Blackboard and screen presentations | Daily exams and oral questions |
| 5 | 3 | Knowledge | Intravenous bolus: one-compartment model | Blackboard and screen presentations | Daily exams and oral questions |
| 6 | 3 | Knowledge | Intravenous bolus: multicompartment models | Blackboard and screen presentations | Daily exams and oral questions |
| 7 | 3 | Knowledge | Pharmacokinetics of drug absorption | Blackboard and screen presentations | Daily exams and oral questions |
| 8 | 3 | Knowledge | Pharmacokinetics of drug distribution and protein binding | Blackboard and screen presentations | Daily exams and oral questions |
| 9 | 3 | Knowledge | Drug elimination and clearance I | Blackboard and screen presentations | Daily exams and oral questions |
| 10 | 3 | Knowledge | Drug elimination and clearance II | Blackboard and screen presentations | Daily exams and oral questions |
| 11 | 3 | Knowledge | Pharmacokinetics of intravenous infusion | Blackboard and screen presentations | Daily exams and oral questions |
| 12 | 3 | Knowledge | Bioavailability and bioequivalence | Blackboard and screen presentations | Daily exams and oral questions |
| 13 | 3 | Knowledge | Non-linear pharmacokinetics | Blackboard and screen presentations | Daily exams and oral questions |
| 14 | 3 | Knowledge | Multiple-dose regimens | Blackboard and screen presentations | Daily exams and oral questions |
| 15 | 3 | Knowledge | Dosage adjustment in renal disease | Blackboard and screen presentations | Daily exams and oral questions |

## 11. Course Evaluation

Midterm and final exams, written and oral tests, seminars and posters. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Shargel, L., Wu-Pong, S., & Yu, A. B. C. Applied Biopharmaceutics and Pharmacokinetics, 6th ed. |
| Main references (sources) | Shargel, L., Wu-Pong, S., & Yu, A. B. C. Applied Biopharmaceutics and Pharmacokinetics, 6th ed. |
| Recommended books and references (scientific journals, reports…) | Relevant biopharmaceutics and pharmacokinetics journals. |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Biopharmaceutics (Practical)**

## 2. Course Code:

PPCT 47

## 3. Semester / Year:

First Semester / Fourth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

30 practical hours (2 hours per week) / 3 units (2 theoretical + 2 practical hours per week)

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

Name: Dr. Ammar Sahib Abdulameer
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Understand drug behaviour in the body: dose effects, absorption rates and duration of drug action.<br>2. Develop practical skills in laboratory instruments and software-based data analysis.<br>3. Calculate pharmacokinetic parameters and derive the equations that describe drug behaviour after different routes of administration. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Discussion and dialogue.<br>2. Teamwork in laboratory and computer sessions.<br>3. Quizzes and exams. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge; practical and computer skills | Introduction to biopharmaceutics | Laptops, blackboard and screen presentations | Daily exams, oral and computer-based questions |
| 2 | 2 | Knowledge; practical and computer skills | Introduction to Microsoft Excel for pharmacokinetic applications | Laptops, blackboard and screen presentations | Daily exams, oral and computer-based questions |
| 3 | 2 | Knowledge; practical and computer skills | Zero-order kinetics | Laptops, blackboard and | Daily exams, oral and |

| | | | | | |
|---|---|---|---|---|---|
| | | | | screen presentations | computer-based questions |
| 4 | 2 | Knowledge; practical and computer skills | First-order kinetics | Laptops, blackboard and screen presentations | Daily exams, oral and computer-based questions |
| 5 | 2 | Knowledge; practical and computer skills | Area under the curve | Laptops, blackboard and screen presentations | Daily exams, oral and computer-based questions |
| 6 | 2 | Knowledge; practical and computer skills | Drug clearance | Laptops, blackboard and screen presentations | Daily exams, oral and computer-based questions |
| 7 | 2 | Knowledge; practical and computer skills | IV bolus kinetics | Laptops, blackboard and screen presentations | Daily exams, oral and computer-based questions |
| 8 | 2 | Knowledge; practical and computer skills | Calculation of pharmacokinetic parameters by the residual method | Laptops, blackboard and screen presentations | Daily exams, oral and computer-based questions |
| 9 | 2 | Knowledge; practical and computer skills | Oral absorption kinetics | Laptops, blackboard and screen presentations | Daily exams, oral and computer-based questions |
| 10 | 2 | Knowledge; practical and computer skills | UV–Vis spectrophotometry | Laptops, blackboard and screen presentations | Daily exams, oral and computer-based questions |
| 11 | 2 | Knowledge; practical and computer skills | Bioavailability calculations | Laptops, blackboard and screen presentations | Daily exams, oral and computer-based questions |
| 12 | 2 | Knowledge; practical and computer skills | Volume of distribution calculations | Laptops, blackboard and screen presentations | Daily exams, oral and computer-based questions |
| 13 | 2 | Knowledge; practical and computer skills | Methods for constructing standard curves | Laptops, blackboard and screen presentations | Daily exams, oral and computer-based questions |
| 14 | 2 | Knowledge; practical and computer skills | Multiple IV doses | Laptops, blackboard and screen presentations | Daily exams, oral and computer-based questions |

| | | | | | |
|---|---|---|---|---|---|
| 15 | 2 | Knowledge; practical and computer skills | Dissolution of oral tablets | Laptops, blackboard and screen presentations | Daily exams, oral and computer-based questions |

## 11. Course Evaluation

Continuous evaluation of individual work over the laboratory sessions, written tests and software-based tests. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Laboratory Manual of Practical Biopharmaceutics adopted by the department. |
| Main references (sources) | — |
| Recommended books and references (scientific journals, reports…) | — |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Public Health**

## 2. Course Code:

PCLS 49

## 3. Semester / Year:

First Semester / Fourth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

30 theoretical hours (2 hours per week) / 2 units

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

Name: Dr. Balsam Ghazi Hassan Al-Kassar
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Enable students to understand the principles of public health: preventing disease, promoting health and prolonging life through the organized efforts of society.<br>2. Describe the predisposing factors, prevention and control of common infectious diseases affecting the gastrointestinal, skin, respiratory and cardiovascular systems.<br>3. Introduce the International Classification of Diseases (ICD-10).<br>4. Explain the basics of innate and adaptive immunity, autoimmune disease and immune deficiency. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Lectures using the blackboard and screen presentations.<br>2. Discussion and dialogue method; problem-solving.<br>3. Seminars and group projects. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge | Introduction to public health | Blackboard and screen presentations | Daily exams and oral questions |
| 2 | 2 | Knowledge | General topics in public health | Blackboard and screen presentations | Daily exams and oral questions |
| 3 | 2 | Knowledge | International Classification of Diseases (ICD-10) | Blackboard and screen presentations | Daily exams and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 4 | 2 | Knowledge | Predisposing factors for infectious diseases | Blackboard and screen presentations | Daily exams and oral questions |
| 5 | 2 | Knowledge | Goals of studying public health | Blackboard and screen presentations | Daily exams and oral questions |
| 6 | 2 | Knowledge | Gastrointestinal diseases | Blackboard and screen presentations | Daily exams and oral questions |
| 7 | 2 | Knowledge | Skin diseases | Blackboard and screen presentations | Daily exams and oral questions |
| 8 | 2 | Knowledge | Respiratory diseases | Blackboard and screen presentations | Daily exams and oral questions |
| 9 | 2 | Knowledge | Cardiovascular diseases | Blackboard and screen presentations | Daily exams and oral questions |
| 10 | 2 | Knowledge | Prevention and control of infectious diseases | Blackboard and screen presentations | Daily exams and oral questions |
| 11 | 2 | Knowledge | Immunity | Blackboard and screen presentations | Daily exams and oral questions |
| 12 | 2 | Knowledge | Innate and adaptive immunity | Blackboard and screen presentations | Daily exams and oral questions |
| 13 | 2 | Knowledge | T and B cells and the complement system | Blackboard and screen presentations | Daily exams and oral questions |
| 14 | 2 | Knowledge | Autoimmune diseases | Blackboard and screen presentations | Daily exams and oral questions |
| 15 | 2 | Knowledge | Immune deficiency diseases | Blackboard and screen presentations | Daily exams and oral questions |

## 11. Course Evaluation

Weekly reports, oral assessment, written tests and a group project. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Lucas, A. O., & Gilles, H. M. (Eds.). Short Textbook of Public Health Medicine for the Tropics, 4th ed. |
| Main references (sources) | Lucas, A. O., & Gilles, H. M. (Eds.). Short Textbook of Public Health Medicine for the Tropics, 4th ed. |
| Recommended books and references (scientific journals, reports…) | Relevant public health journals. |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Pharmacology III**

## 2. Course Code:

PPCL 45

## 3. Semester / Year:

Second Semester / Fourth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

32 theoretical hours (2 hours per week, as distributed in the weekly plan) / 2 units

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

Name: Lect. Dr. Mahmood Jasem Jawad
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Know the drugs acting on the endocrine system, inflammation and bone, cancer, the respiratory system, blood and lipids: their names, mechanisms of action and clinical uses.<br>2. Recognize the adverse effects of these drugs on patients.<br>3. Understand drug–drug, drug–food and drug–disease interactions.<br>4. Link pharmacological knowledge to practice in community and hospital pharmacies. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Thinking and discussion method; student–teacher dialogue.<br>2. Exploratory (inquiry-based) lectures using the whiteboard and projector.<br>3. Weekly reports and discussion of results. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge | Pituitary and hypothalamic hormones | Whiteboard and projector | Daily quizzes and oral questions |
| 2 | 2 | Knowledge | Thyroid hormones | Whiteboard and projector | Daily quizzes and oral questions |
| 3 | 2 | Knowledge | Oestrogens and androgens | Whiteboard and projector | Daily quizzes and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 4 | 2 | Knowledge | Progestogens and contraceptives | Whiteboard and projector | Daily quizzes and oral questions |
| 5 | 2 | Knowledge | Adrenal hormones | Whiteboard and projector | Daily quizzes and oral questions |
| 6 | 2 | Knowledge | Drugs used in the treatment of gout | Whiteboard and projector | Daily quizzes and oral questions |
| 7 | 2 | Knowledge | Non-steroidal anti-inflammatory drugs (NSAIDs) | Whiteboard and projector | Daily quizzes and oral questions |
| 8 | 2 | Knowledge | Drugs used in the treatment of osteoporosis | Whiteboard and projector | Daily quizzes and oral questions |
| 9 | 2 | Knowledge | Antirheumatic drugs: traditional DMARDs and biological therapies in rheumatoid arthritis | Whiteboard and projector | Daily quizzes and oral questions |
| 10 | 2 | Knowledge | Insulin and oral hypoglycaemic drugs | Whiteboard and projector | Daily quizzes and oral questions |
| 11 | 2 | Knowledge | Principles of cancer chemotherapy | Whiteboard and projector | Daily quizzes and oral questions |
| 12 | 4 | Knowledge | Anticancer drugs | Whiteboard and projector | Daily quizzes and oral questions |
| 13 | 2 | Knowledge | Drugs for disorders of the respiratory system | Whiteboard and projector | Daily quizzes and oral questions |
| 14 | 2 | Knowledge | Drugs affecting the blood | Whiteboard and projector | Daily quizzes and oral questions |
| 15 | 2 | Knowledge | Antihyperlipidaemic drugs | Whiteboard and projector | Daily quizzes and oral questions |

## 11. Course Evaluation

Weekly reports, examinations and research. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Lippincott Illustrated Reviews: Pharmacology, 7th ed. |
| Main references (sources) | Lippincott Illustrated Reviews: Pharmacology, 7th ed. |
| Recommended books and references (scientific journals, reports…) | Relevant pharmacology journals. |
| Electronic References, Websites | https://youtu.be/N0ri0gAIXwM |

# Course Description Form

## 1. Course Name:

**Organic Pharmaceutical Chemistry III**

## 2. Course Code:

PPCS 48

## 3. Semester / Year:

Second Semester / Fourth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

49 theoretical hours (as distributed in the weekly plan) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Ahmed M. Motlk
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Cover the medicinal chemistry and pharmacology of chemotherapeutic agents, from traditional antineoplastic drugs to modern biotherapeutics.<br>2. Provide an in-depth analysis of the major antibacterial classes, including β-lactams, aminoglycosides, tetracyclines, macrolides and sulfonamides.<br>3. Give an overview of the chemistry and mechanisms of antiviral and antifungal agents.<br>4. Develop skills in SAR analysis, metabolic prediction and rational (prodrug) drug design. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Theoretical lectures using the whiteboard and PowerPoint presentations.<br>2. Group discussion, scientific posters and interactive classroom activities.<br>3. Homework and research assignments to develop analytical and critical thinking. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1–4 | 15 | Knowledge | Antineoplastic agents: alkylating agents, antimetabolites, antibiotics, plant products and miscellaneous compounds | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |

| | | | | | |
|---|---|---|---|---|---|
| 5–7 | 5 | Knowledge | Hormones and related compounds; future antineoplastic agents; monoclonal antibodies; gene therapy of cancer | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 8–10 | 5 | Knowledge | β-Lactam antibiotics: penicillins, β-lactamase inhibitors, cephalosporins and monobactams | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 11–12 | 9 | Knowledge | Aminoglycosides and chloramphenicol; tetracyclines; macrolides; lincomycins and polypeptides | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 13 | 3 | Knowledge | Sulfonamides: chemistry, nomenclature, mechanism of action, resistance, toxicity, metabolism, protein binding, distribution and SAR; sulfones | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 14–15 | 6 | Knowledge | Antiviral agents: inhibitors of viral attachment and penetration, nucleic-acid replication inhibitors, HIV protease, reverse transcriptase and integrase inhibitors | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |
| 16–18 | 6 | Knowledge | Antifungal agents: biochemical targets, polyene membrane disruptors, ergosterol biosynthesis inhibitors, echinocandins and miscellaneous drugs | Whiteboard and PowerPoint presentations | Group discussion, oral exams and assignments |

## 11. Course Evaluation

Midterm and final examinations, oral examinations, classroom activities and homework assignments. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

| 12. Learning and Teaching Resources | |
|---|---|
| Required textbooks (curricular books, if any) | Lemke, T. L., Williams, D. A., Roche, V. F., & Zito, S. W. Foye's Principles of Medicinal Chemistry, 7th ed. |
| Main references (sources) | Block, J. H., & Beale, J. M. Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, 12th ed.; Patrick, G. L. An Introduction to Medicinal Chemistry, 7th ed. |
| Recommended books and references (scientific journals, reports…) | Relevant medicinal chemistry journals. |
| Electronic References, Websites | Websites and databases of pharmaceutical molecules. |

# Course Description Form

## 1. Course Name:

**General Toxicology**

## 2. Course Code:

PPCL 46

## 3. Semester / Year:

Second Semester / Fourth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

7/4/2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

30 theoretical hours (2 hours per week) / 3 units (2 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Mohammed Shaheed Sachit
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Study the principles of exposure to chemical and environmental agents, their sources, mechanisms of toxicity and the hazards they pose to humans.<br>2. Enable students to recognize the degree and severity of toxicity, including the lethal dose (LD50), and the kinetics and dynamics of toxic substances.<br>3. Describe the toxic responses of the major organs and the toxic effects of metals and pesticides.<br>4. Enable students to understand the measures needed to protect living organisms from suspected toxic hazards, including elimination methods and antidotes. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Discussion and thinking-based learning; student–teacher dialogue.<br>2. Exploratory (inquiry-based) lectures using the blackboard and projector.<br>3. Weekly reports and discussion sessions. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge | Introduction: general considerations; host and environmental factors affecting toxicity | Blackboard and projector | Daily exams and oral questions |
| 2 | 2 | Knowledge | Mechanisms of toxicity | Blackboard and projector | Daily exams and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 2 | Knowledge | Carcinogenesis and mutagenesis I | Blackboard and projector | Daily exams and oral questions |
| 4 | 2 | Knowledge | Carcinogenesis and mutagenesis II | Blackboard and projector | Daily exams and oral questions |
| 5 | 2 | Knowledge | Toxic responses of the liver I | Blackboard and projector | Daily exams and oral questions |
| 6 | 2 | Knowledge | Toxic responses of the liver II | Blackboard and projector | Daily exams and oral questions |
| 7 | 2 | Knowledge | Toxic responses of the kidney I | Blackboard and projector | Daily exams and oral questions |
| 8 | 2 | Knowledge | Toxic responses of the kidney II | Blackboard and projector | Daily exams and oral questions |
| 9 | 2 | Knowledge | Toxic responses of the respiratory system | Blackboard and projector | Daily exams and oral questions |
| 10 | 2 | Knowledge | Toxic responses of the heart and vascular system I | Blackboard and projector | Daily exams and oral questions |
| 11 | 2 | Knowledge | Toxic responses of the heart and vascular system II | Blackboard and projector | Daily exams and oral questions |
| 12 | 2 | Knowledge | Toxic effects of metals I | Blackboard and projector | Daily exams and oral questions |
| 13 | 2 | Knowledge | Toxic effects of metals II | Blackboard and projector | Daily exams and oral questions |
| 14 | 2 | Knowledge | Toxic effects of pesticides I | Blackboard and projector | Daily exams and oral questions |
| 15 | 2 | Knowledge | Toxic effects of pesticides II | Blackboard and projector | Daily exams and oral questions |

## 11. Course Evaluation

Weekly reports, examinations, research, discussion sessions and presentations. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Klaassen, C. D. (Ed.). Casarett and Doull's Toxicology: The Basic Science of Poisons, latest edition. |
| Main references (sources) | Klaassen, C. D. (Ed.). Casarett and Doull's Toxicology: The Basic Science of Poisons, latest edition. |
| Recommended books and references (scientific journals, reports…) | Relevant toxicology journals. |
| Electronic References, Websites | https://chemistry.com.pk/books/casarett-doulls-toxicology-the-basic-science-of-poisons-9e/ |

# Course Description Form

## 1. Course Name:

**General Toxicology (Practical)**

## 2. Course Code:

PPCL 46

## 3. Semester / Year:

Second Semester / Fourth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

30 practical hours (2 hours per week) / 3 units (2 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Muntadher Zyara
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Study exposure to chemical and environmental agents, their sources, mechanisms of toxicity and the dangers they pose to humans.<br>2. Recognize the degree and severity of toxicity, the lethal dose (LD50) and the target-organ toxic responses.<br>3. Understand the measures needed to protect living organisms from suspected toxic hazards. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Discussion and thinking style.<br>2. Laboratory screening tests and case discussions.<br>3. Exploratory lectures. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge; practical skills | Laboratory principles of toxicological screening | Whiteboard, PowerPoint presentations and laboratory tests | Group discussion, oral exams and assignments |
| 2 | 2 | Knowledge; practical skills | Evaluation of drug toxicity in humans | Whiteboard, PowerPoint presentations and laboratory tests | Group discussion, oral exams and assignments |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 2 | Knowledge; practical skills | Over-the-counter drugs: cases of acetaminophen and salicylate poisoning | Whiteboard, PowerPoint presentations and laboratory tests | Group discussion, oral exams and assignments |
| 4 | 2 | Knowledge; practical skills | Evaluation of urine salicylates | Whiteboard, PowerPoint presentations and laboratory tests | Group discussion, oral exams and assignments |
| 5 | 2 | Knowledge; practical skills | Cardiac glycoside toxicity: digitalis | Whiteboard, PowerPoint presentations and laboratory tests | Group discussion, oral exams and assignments |
| 6 | 2 | Knowledge; practical skills | Urine analysis of toxins and chemicals | Whiteboard, PowerPoint presentations and laboratory tests | Group discussion, oral exams and assignments |
| 7 | 2 | Knowledge; practical skills | Cases of toxicity with foods and dietary supplements | Whiteboard, PowerPoint presentations and laboratory tests | Group discussion, oral exams and assignments |
| 8 | 2 | Knowledge; practical skills | Toxic effects of pesticides | Whiteboard, PowerPoint presentations and laboratory tests | Group discussion, oral exams and assignments |
| 9 | 2 | Knowledge; practical skills | Toxic effects of metals | Whiteboard, PowerPoint presentations and laboratory tests | Group discussion, oral exams and assignments |
| 10 | 2 | Knowledge; practical skills | Toxic responses of the heart and vascular system | Whiteboard, PowerPoint presentations and laboratory tests | Group discussion, oral exams and assignments |
| 11 | 2 | Knowledge; practical skills | Toxic responses of the respiratory system | Whiteboard, PowerPoint presentations and laboratory tests | Group discussion, oral exams and assignments |
| 12 | 2 | Knowledge; practical skills | Toxic responses of the kidney | Whiteboard, PowerPoint presentations and laboratory tests | Group discussion, oral exams and assignments |
| 13 | 2 | Knowledge; practical skills | Toxic responses of the liver | Whiteboard, PowerPoint presentations and laboratory tests | Group discussion, oral exams and assignments |
| 14 | 2 | Knowledge; practical skills | Carcinogenesis and mutagenesis | Whiteboard, PowerPoint presentations | Group discussion, oral |

| | | | | | |
|---|---|---|---|---|---|
| | | | | and laboratory tests | exams and assignments |
| 15 | 2 | Knowledge; practical skills | Seminars | Whiteboard, PowerPoint presentations and laboratory tests | Group discussion, oral exams and assignments |

## 11. Course Evaluation

Weekly reports, examination grades, discussion sessions and presentations. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Laboratory Manual of Practical Toxicology adopted by the department. |
| Main references (sources) | — |
| Recommended books and references (scientific journals, reports…) | — |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Industrial Pharmacy I**

## 2. Course Code:

PPCT 48

## 3. Semester / Year:

Second Semester / Fourth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2024–2025

## 5. Available Attendance Forms:

Daily in-person attendance

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

39 theoretical hours (2–3 hours per week, as distributed in the weekly plan) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Dr. Firas Ghafil Abbas
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Teach the unit operations required before preparing pharmaceutical dosage forms: mixing, milling, drying, clarification and filtration.<br>2. Explain sterilization methods, their mechanisms and validation.<br>3. Teach the principles of developing, formulating, producing and controlling the quality of sterile products. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Theoretical lectures using the smart board.<br>2. Educational seminars and posters.<br>3. Discussion of manufacturing processes and their selection. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 3 | Describe fluid mixing, flow characteristics and mixing mechanisms. | Pharmaceutical processing: mixing | Smart board | Daily and monthly exams and discussion |
| 2 | 3 | Compare mixing equipment and batch versus continuous mixing; select a mixer. | Pharmaceutical processing: mixing | Smart board | Daily and monthly exams and discussion |
| 3 | 3 | Explain solid-mixing theory, particulate variables, forces and mechanisms. | Pharmaceutical processing: mixing | Smart board | Daily and monthly exams and discussion |

| | | | | | |
|---|---|---|---|---|---|
| 4 | 3 | Explain the applications of milling, particle-size measurement and the theory and energy of comminution. | Pharmaceutical processing: milling | Smart board | Daily and monthly exams and discussion |
| 5 | 3 | Compare types of mills, factors influencing milling and selection of milling techniques. | Pharmaceutical processing: milling | Smart board | Daily and monthly exams and discussion |
| 6 | 3 | Define drying and its purposes; explain humidity measurement and drying theory. | Pharmaceutical processing: drying | Smart board | Daily and monthly exams and discussion |
| 7 | 3 | Classify dryers and describe the drying of solids and specialized drying methods. | Pharmaceutical processing: drying | Smart board | Daily and monthly exams and discussion |
| 8 | 2 | Explain filtration theory, filter media, filter aids and method selection. | Clarification and filtration | Smart board | Daily and monthly exams and discussion |
| 9 | 2 | Distinguish non-sterile and sterile filtration and integrity testing. | Clarification and filtration | Smart board | Daily and monthly exams and discussion |
| 10 | 2 | Describe commercial and laboratory filtration equipment and systems. | Clarification and filtration | Smart board | Daily and monthly exams and discussion |
| 11 | 2 | Explain validation of sterilization methods and microbial death kinetics. | Sterilization | Smart board | Daily and monthly exams and discussion |
| 12 | 2 | Compare thermal and non-thermal methods of sterilization. | Sterilization | Smart board | Daily and monthly exams and discussion |
| 13 | 2 | Explain the mechanisms and evaluation of sterilization. | Sterilization | Smart board | Daily and monthly exams and discussion |
| 14 | 3 | Describe the development and formulation of sterile products. | Sterile dosage forms | Smart board | Daily and monthly exams and discussion |
| 15 | 3 | Describe the production, processing and quality control of sterile products. | Sterile dosage forms | Smart board | Daily and monthly exams and discussion |

## 11. Course Evaluation

Midterm and final exams, oral and written exams, classroom activities and posters. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

| 12. Learning and Teaching Resources | |
|---|---|
| Required textbooks (curricular books, if any) | Lachman, L., Lieberman, H. A., & Kanig, J. L. The Theory and Practice of Industrial Pharmacy. |
| Main references (sources) | Aulton, M. E. Aulton's Pharmaceutics: The Design and Manufacture of Medicines, 3rd ed. Churchill Livingstone–Elsevier. |
| Recommended books and references (scientific journals, reports…) | Relevant industrial pharmacy and pharmaceutical technology journals. |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Industrial Pharmacy I (Practical)**

## 2. Course Code:

PPCT 48

## 3. Semester / Year:

Second Semester / Fourth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

30 practical hours (2 hours per week) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Attaa Sattar Dawood
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Establish the foundations and concepts of industrial pharmacy and pharmaceutical manufacturing.<br>2. Identify the raw materials and equipment used in drug manufacturing.<br>3. Emphasize the role of the manufacturing process in producing appropriate and effective dosage forms. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Explaining concepts theoretically and applying them practically.<br>2. Discussion and dialogue.<br>3. Troubleshooting and study circles. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1–2 | 4 | Knowledge; practical skills | Mixing of pharmaceutical materials: solid–solid, liquid–liquid and solid–liquid mixing | Whiteboard, PowerPoint presentations and laboratory experiment | Daily exams and oral questions |
| 3–4 | 4 | Knowledge; practical skills | Powder flow: angle of repose, Carr's index and Hausner ratio | Whiteboard, PowerPoint presentations and laboratory experiment | Daily exams and oral questions |
| 5 | 2 | Knowledge; practical skills | Powder density: tapped density | Whiteboard, PowerPoint presentations and laboratory experiment | Daily exams and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 6–7 | 4 | Knowledge; practical skills | Particle size analysis: sieving method | Whiteboard, PowerPoint presentations and laboratory experiment | Daily exams and oral questions |
| 8–9 | 4 | Knowledge; practical skills | Effervescent granules: fusion method | Whiteboard, PowerPoint presentations and laboratory experiment | Daily exams and oral questions |
| 10–11 | 4 | Knowledge; practical skills | Effervescent granules: wet method | Whiteboard, PowerPoint presentations and laboratory experiment | Daily exams and oral questions |
| 12–13 | 4 | Knowledge; practical skills | Drying: preparation of wet granules and moisture content (MC%) calculation | Whiteboard, PowerPoint presentations and laboratory experiment | Daily exams and oral questions |
| 14–15 | 4 | Knowledge; practical skills | Filtration and clarification (dialysis membrane and Büchner funnel) | Whiteboard, PowerPoint presentations and laboratory experiment | Daily exams and oral questions |

## 11. Course Evaluation

Weekly reports and laboratory work, oral assessment and practical performance evaluation, and written tests. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Aulton's Pharmaceutics: The Design and Manufacture of Medicines, 6th ed., 2022. |
| Main references (sources) | Allen L. V. Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, 11th ed., 2017. |
| Recommended books and references (scientific journals, reports…) | Scientific journals and papers related to industrial pharmacy. |
| Electronic References, Websites | https://youtu.be/NF1kzeHoQ6w; https://youtu.be/k-3DoyKy0zE |

# Course Description Form

## 1. Course Name:

**Organic Pharmaceutical Chemistry IV**

## 2. Course Code:

PPCS 59

## 3. Semester / Year:

First Semester / Fifth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

30 theoretical hours (2 hours per week) / 2 units

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

Name: Assist. Lect. Ahmed M. Motlk
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Give students knowledge of prodrugs and their classification, synthesis, biotransformation and formulation to improve drug action and reduce adverse effects.<br>2. Explain the principles of chemical drug-delivery systems, polymeric drugs and drug targeting to deliver the drug to its specific site of action.<br>3. Introduce combinatorial chemistry, the construction and encoding of combinatorial libraries, and the isolation, purification and detection of library products.<br>4. Introduce computer-aided drug design tools such as molecular docking and molecular dynamics. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Lectures using the whiteboard and projector, directing students to textbooks, notes and online material.<br>2. Assignments and research prepared and presented by students in seminars.<br>3. Practical workshops and homework. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge and understanding | Prodrug concepts | Lectures (whiteboard and projector) | Quizzes and reports |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 2 | Knowledge and understanding | Covalent bonds and types of prodrugs | Lectures (whiteboard and projector) | Quizzes and reports |
| 3 | 2 | Knowledge and understanding | Chemical delivery systems | Lectures (whiteboard and projector) | Quizzes and reports |
| 4 | 2 | Knowledge and understanding | Polymeric drugs | Lectures (whiteboard and projector) | Quizzes and reports |
| 5 | 2 | Knowledge and understanding | Drug targeting I | Lectures (whiteboard and projector) | Quizzes and reports |
| 6–7 | 4 | Knowledge and understanding | Drug targeting II: active groups | Lectures (whiteboard and projector) | Quizzes and reports |
| 8–9 | 4 | Knowledge and understanding | Combinatorial chemistry I | Lectures (whiteboard and projector) | Quizzes and reports |
| 10 | 2 | Knowledge and understanding | Combinatorial chemistry II: the SAR concept | Lectures (whiteboard and projector) | Quizzes and reports |
| 11–13 | 6 | Knowledge and understanding | Isolation, purification and detection of combinatorial products | Lectures (whiteboard and projector) | Quizzes and reports |
| 14–15 | 4 | Knowledge and understanding | Encoding combinatorial libraries | Lectures (whiteboard and projector) | Quizzes and reports |

## 11. Course Evaluation

Periodic exams, reports, seminars, routine homework and final exams. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry. |
| Main references (sources) | Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry. |
| Recommended books and references (scientific journals, reports…) | Molecules (journal); Journal of Medicinal Chemistry. |
| Electronic References, Websites | Distance education and electronic lectures. |

# Course Description Form

## 1. Course Name:

**Industrial Pharmacy II**

## 2. Course Code:

PPCT 59

## 3. Semester / Year:

First Semester / Fifth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

45 theoretical hours (3 hours per week × 15 weeks) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Assist. Prof. Dr. Salam Waheed Ahjel
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Understand modern pharmaceutical manufacturing methods and processes and the industrial production requirements of the major dosage forms.<br>2. Understand tablet manufacture, evaluation, coating and coating technologies.<br>3. Understand industrial capsule technologies, including hard capsules, soft capsules and microencapsulation.<br>4. Understand the manufacture of liquid and semisolid dosage forms and develop the professional skills required in pharmaceutical manufacturing facilities. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Theoretical lectures, PowerPoint presentations and board explanation.<br>2. Educational videos and visual examples.<br>3. Seminars, reports and classroom discussion.<br>4. Laboratory demonstrations and industrial visits where applicable. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 3 | Knowledge | Solid dosage forms: tablets | PowerPoint presentations, board explanation, visual examples and class discussion | Quizzes, oral questions, discussion and assignments |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 3 | Knowledge | Tablet evaluation | PowerPoint presentations, board explanation, visual examples and class discussion | Quizzes, oral questions, discussion and assignments |
| 3 | 3 | Knowledge | Tablet coating | PowerPoint presentations, board explanation, visual examples and class discussion | Quizzes, oral questions, discussion and assignments |
| 4 | 3 | Knowledge | Tablet-coating techniques | PowerPoint presentations, board explanation, visual examples and class discussion | Quizzes, oral questions, discussion and assignments |
| 5 | 3 | Knowledge | Capsules: introduction | PowerPoint presentations, board explanation, visual examples and class discussion | Quizzes, oral questions, discussion and assignments |
| 6 | 3 | Knowledge | Industrial capsule technologies | PowerPoint presentations, board explanation, visual examples and class discussion | Quizzes, oral questions, discussion and assignments |
| 7 | 3 | Knowledge | Hard and soft capsules | PowerPoint presentations, board explanation, visual examples and class discussion | Quizzes, oral questions, discussion and assignments |
| 8 | 3 | Knowledge | Soft-capsule manufacturing techniques | PowerPoint presentations, board explanation, visual examples and class discussion | Quizzes, oral questions, discussion and assignments |
| 9 | 3 | Knowledge | Microcapsules and microencapsulation | PowerPoint presentations, board explanation, visual examples and class discussion | Quizzes, oral questions, discussion and assignments |
| 10 | 3 | Knowledge | Liquid dosage forms | PowerPoint presentations, board | Quizzes, oral questions, |

| | | | | | |
|---|---|---|---|---|---|
| | | | | explanation, visual examples and class discussion | discussion and assignments |
| 11 | 3 | Knowledge | Semisolid dosage forms | PowerPoint presentations, board explanation, visual examples and class discussion | Quizzes, oral questions, discussion and assignments |
| 12 | 3 | Knowledge | Tablet evaluation: reinforcement and applications | PowerPoint presentations, board explanation, visual examples and class discussion | Quizzes, oral questions, discussion and assignments |
| 13 | 3 | Knowledge | Tablet coating and coating techniques: reinforcement and review | PowerPoint presentations, board explanation, visual examples and class discussion | Quizzes, oral questions, discussion and assignments |
| 14 | 3 | Knowledge | Capsule technologies: reinforcement of hard- and soft-capsule manufacturing | PowerPoint presentations, board explanation, visual examples and class discussion | Quizzes, oral questions, discussion and assignments |
| 15 | 3 | Knowledge | Integrated review: tablets, capsules, microcapsules, liquid and semisolid dosage forms | PowerPoint presentations, board explanation, visual examples and class discussion | Quizzes, oral questions, discussion and assignments |

## 11. Course Evaluation

Written examinations, short quizzes, oral questions, homework, reports and classroom discussion. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Lachman, L., Lieberman, H. A., & Kanig, J. L. The Theory and Practice of Industrial Pharmacy. |
| Main references (sources) | Lachman, L., Lieberman, H. A., & Kanig, J. L. The Theory and Practice of Industrial Pharmacy. |
| Recommended books and references (scientific journals, reports…) | Scientific journals, educational videos and pharmaceutical manufacturing resources. |
| Electronic References, Websites | Relevant pharmaceutical manufacturing websites. |

# Course Description Form

## 1. Course Name:

**Industrial Pharmacy II (Practical)**

## 2. Course Code:

PPCT 59

## 3. Semester / Year:

First Semester / Fifth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

30 practical hours (2 hours per week) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Attaa Sattar Dawood
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Study the methods of manufacturing different dosage forms.<br>2. Identify the methods of evaluating medicines and ensuring their effectiveness.<br>3. Emphasize the importance of packaging, filling and stability testing of different dosage forms. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Explaining concepts theoretically and applying them practically.<br>2. Discussion and dialogue.<br>3. Troubleshooting and study circles. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1–2 | 4 | Knowledge; practical skills | Direct compression method for the preparation of tablets | Blackboard, display screen and laboratory experiment | Daily exams and oral questions |
| 3–4 | 4 | Knowledge; practical skills | Wet granulation method for the preparation of tablets | Blackboard, display screen and laboratory experiment | Daily exams and oral questions |
| 5 | 2 | Knowledge; practical skills | Evaluation of tablets (part 1) | Blackboard, display screen and laboratory experiment | Daily exams and oral questions |
| 6 | 2 | Knowledge; practical skills | Evaluation of tablets (part 2) | Blackboard, display screen | Daily exams and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| | | | | and laboratory experiment | |
| 7 | 2 | Knowledge; practical skills | Preparation of capsules | Blackboard, display screen and laboratory experiment | Daily exams and oral questions |
| 8 | 2 | Knowledge; practical skills | Evaluation of capsules | Blackboard, display screen and laboratory experiment | Daily exams and oral questions |
| 9 | 2 | Knowledge; practical skills | Sustained-release dosage forms: preparation and characterization | Blackboard, display screen and laboratory experiment | Daily exams and oral questions |
| 10–11 | 4 | Knowledge; practical skills | Capsule dosage form: preparation and evaluation | Blackboard, display screen and laboratory experiment | Daily exams and oral questions |
| 12 | 2 | Knowledge; practical skills | Accelerated stability testing: effect of temperature and moisture on formulation stability | Blackboard, display screen and laboratory experiment | Daily exams and oral questions |
| 13 | 2 | Knowledge; practical skills | Calibration curve of salicylic acid | Blackboard, display screen and laboratory experiment | Daily exams and oral questions |
| 14–15 | 4 | Knowledge; practical skills | Hydrolysis of acetylsalicylic acid solution in phosphate buffer | Blackboard, display screen and laboratory experiment | Daily exams and oral questions |

## 11. Course Evaluation

Weekly reports and laboratory work, oral assessment and practical performance evaluation, and written tests. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Aulton's Pharmaceutics: The Design and Manufacture of Medicines, 6th ed., 2022. |
| Main references (sources) | Allen L. V. Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, 11th ed., 2017. |
| Recommended books and references (scientific journals, reports…) | Scientific journals and papers related to industrial pharmacy. |
| Electronic References, Websites | https://youtu.be/yoUTuITOnmU |

# Course Description Form

## 1. Course Name:

**Clinical Chemistry (Practical)**

## 2. Course Code:

PCLS 510

## 3. Semester / Year:

First Semester / Fifth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2024–2025

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

26 practical hours (2 hours per week, as distributed in the weekly plan) / 4 units (3 theoretical + 2 practical hours per week)

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

Name: Dr. Azher A. Ibrahem
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Introduce advanced topics in clinical chemistry.<br>2. Provide the clinical and practical skills needed to perform and interpret clinical chemistry laboratory tests.<br>3. Evaluate liver and kidney function, ion metabolism, acid–base disorders and endocrine function in the laboratory.<br>4. Train students to collect and handle biological samples and to interpret results with their units. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Laboratory experiments.<br>2. Seminars and reports.<br>3. Posters and class activities.<br>4. External resources via Google Classroom. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge; laboratory skills | Disorders of carbohydrate metabolism: hyperglycaemia, diabetes, hypoglycaemia; oral glucose tolerance test | Laboratory experiments | Daily exams, oral questions, discussion and homework |
| 2 | 2 | Knowledge; laboratory skills | Lipid metabolism disorders: triglycerides, | Laboratory experiments | Daily exams, oral questions, |

| | | | | | |
|---|---|---|---|---|---|
| | | | total cholesterol and HDL-c | | discussion and homework |
| 3 | 2 | Knowledge; laboratory skills | Kidney function tests: blood urea and creatinine | Laboratory experiments | Daily exams, oral questions, discussion and homework |
| 4 | 2 | Knowledge; laboratory skills | Liver function tests: bilirubin, ALT and AST | Laboratory experiments | Daily exams, oral questions, discussion and homework |
| 5 | 2 | Knowledge; laboratory skills | Diagnostic enzymes: alkaline phosphatase and CK | Laboratory experiments | Daily exams, oral questions, discussion and homework |
| 6–7 | 4 | Knowledge; laboratory skills | Endocrine glands: hypothalamic, pituitary and adrenal disorders; hypopituitarism | Laboratory experiments | Daily exams, oral questions, discussion and homework |
| 9–10 | 4 | Knowledge; laboratory skills | Reproductive endocrinology: male and female gonadal disorders; biochemical evaluation in pregnancy | Laboratory experiments | Daily exams, oral questions, discussion and homework |
| 11 | 2 | Knowledge; laboratory skills | Tumour markers | Laboratory experiments | Daily exams, oral questions, discussion and homework |
| 12 | 2 | Knowledge; laboratory skills | Drug interactions with laboratory tests | Laboratory experiments | Daily exams, oral questions, discussion and homework |
| 13 | 2 | Knowledge; laboratory skills | Calcium metabolism disorders | Laboratory experiments | Daily exams, oral questions, discussion and homework |
| 14 | 2 | Knowledge; laboratory skills | Acid–base disorders | Laboratory experiments | Daily exams, oral questions, discussion and homework |

## 11. Course Evaluation

Oral and written exams, laboratory reports and class activities (posters). The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Crook M. A. Clinical Chemistry and Metabolic Medicine, 8th ed., 2013. |
| Main references (sources) | Kaplan L. A., Pesce A. J. Clinical Chemistry, 5th ed., 2009. |
| Recommended books and references (scientific journals, reports…) | — |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Clinical Toxicology**

## 2. Course Code:

PPCL 57

## 3. Semester / Year:

First Semester / Fifth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

22 theoretical hours (2 hours per week, as distributed in the weekly plan) / 3 units (2 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Rami Thamer Kareem
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Know the common poisons: their names, sources, uses and mechanisms of toxicity.<br>2. Recognize the toxic effects of drugs in overdose and the biological interactions of poisons with body tissues.<br>3. Know the initial evaluation and management of the poisoned patient, including the clinical use of antidotes.<br>4. Prepare pharmacists to work in poison control centres and hospital emergency departments. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Thinking and discussion method; student–teacher dialogue.<br>2. Exploratory (inquiry-based) lectures using the whiteboard and projector.<br>3. Weekly reports and discussion of results. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge | Initial evaluation and management of the poisoned patient, including paediatric poisoning and special considerations in geriatric patients | Whiteboard and projector | Daily quizzes and oral questions |
| 2 | 2 | Knowledge | Drug toxicity: over-the-counter drugs; caffeine | Whiteboard and projector | Daily quizzes and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 2 | Knowledge | Theophylline; antihistamines and decongestants; NSAIDs; vitamins | Whiteboard and projector | Daily quizzes and oral questions |
| 4 | 2 | Knowledge | Prescription medications: cardiovascular drugs (beta-blockers, ACE inhibitors, digoxin, calcium channel blockers, antiarrhythmics); hypoglycaemic drugs | Whiteboard and projector | Daily quizzes and oral questions |
| 5 | 2 | Knowledge | Opioids; CNS depressants; tricyclic antidepressants; anticholinergics; phenothiazines; CNS stimulants | Whiteboard and projector | Daily quizzes and oral questions |
| 6 | 2 | Knowledge | Drugs of abuse: opioids and cocaine | Whiteboard and projector | Daily quizzes and oral questions |
| 7 | 2 | Knowledge | Drugs of abuse: phencyclidine, marijuana and lysergic acid diethylamide | Whiteboard and projector | Daily quizzes and oral questions |
| 8 | 2 | Knowledge | Chemical and environmental toxins: hydrocarbons and household toxins | Whiteboard and projector | Daily quizzes and oral questions |
| 9 | 2 | Knowledge | Antiseptics, disinfectants, camphor and moth repellents | Whiteboard and projector | Daily quizzes and oral questions |
| 10 | 2 | Knowledge | Botanical and plant-derived toxins: herbal preparations | Whiteboard and projector | Daily quizzes and oral questions |
| 11 | 2 | Knowledge | Toxic plants and poisonous mushrooms | Whiteboard and projector | Daily quizzes and oral questions |

## 11. Course Evaluation

Weekly reports, examinations and research. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Goldfrank's Toxicologic Emergencies, 9th ed., 2011. |
| Main references (sources) | Goldfrank's Toxicologic Emergencies, 9th ed., 2011. |
| Recommended books and references (scientific journals, reports…) | Relevant clinical toxicology journals and poison-control guidelines. |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Clinical Toxicology (Practical)**

## 2. Course Code:

PPCL 57

## 3. Semester / Year:

First Semester / Fifth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

22/4/2026

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

32 practical hours (2 hours per week, as distributed in the weekly plan) / 3 units (2 theoretical + 2 practical hours per week)

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

Name: Assist. Lect. Mohammed Shaheed Sachit
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Study exposure to chemical and environmental agents, their sources, mechanisms of toxicity and the dangers they pose to humans.<br>2. Recognize the kinetics and dynamics of toxic substances, the methods of their elimination and the outcome of antidote use.<br>3. Identify common poisons in biological samples and evaluate clinical toxicity cases.<br>4. Understand the measures needed to protect living organisms from suspected toxic hazards. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Discussion and thinking style.<br>2. Laboratory screening tests.<br>3. Exploratory lectures and case evaluation. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge; practical skills | Laboratory principles of toxicological screening | Blackboard, projector and laboratory tests | Daily exams and oral questions |
| 2 | 2 | Knowledge; practical skills | Over-the-counter drugs: cases of acetaminophen and salicylate poisoning | Blackboard, projector and laboratory tests | Daily exams and oral questions |
| 3 | 2 | Knowledge; practical skills | Evaluation of urine salicylates | Blackboard, projector and laboratory tests | Daily exams and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 4 | 4 | Knowledge; practical skills | Urine analysis of toxins and chemicals | Blackboard, projector and laboratory tests | Daily exams and oral questions |
| 5 | 2 | Knowledge; practical skills | Cardiac glycoside toxicity: digitalis | Blackboard, projector and laboratory tests | Daily exams and oral questions |
| 6 | 2 | Knowledge; practical skills | Cases of toxicity with foods | Blackboard, projector and laboratory tests | Daily exams and oral questions |
| 7 | 2 | Knowledge; practical skills | Cases of toxicity with dietary supplements | Blackboard, projector and laboratory tests | Daily exams and oral questions |
| 8 | 2 | Knowledge; practical skills | Identification of common poisons in biological samples: arsenic | Blackboard, projector and laboratory tests | Daily exams and oral questions |
| 9 | 2 | Knowledge; practical skills | Identification of common poisons in biological samples: strychnine | Blackboard, projector and laboratory tests | Daily exams and oral questions |
| 10 | 2 | Knowledge; practical skills | Identification of common poisons in biological samples: cyanide | Blackboard, projector and laboratory tests | Daily exams and oral questions |
| 11 | 2 | Knowledge; practical skills | Identification of common poisons in biological samples: phenothiazine derivatives and barbiturates | Blackboard, projector and laboratory tests | Daily exams and oral questions |
| 12 | 2 | Knowledge; practical skills | Evaluation of toxicity cases with antiparkinsonian drugs – part 1 | Blackboard, projector and laboratory tests | Daily exams and oral questions |
| 13 | 2 | Knowledge; practical skills | Evaluation of toxicity cases with antiparkinsonian drugs – part 2 | Blackboard, projector and laboratory tests | Daily exams and oral questions |
| 14 | 2 | Knowledge; practical skills | Evaluation of drug toxicity in humans – part 1 | Blackboard, projector and laboratory tests | Daily exams and oral questions |
| 15 | 2 | Knowledge; practical skills | Evaluation of drug toxicity in humans – part 2 | Blackboard, projector and laboratory tests | Daily exams and oral questions |

## 11. Course Evaluation

Weekly reports, examination grades, discussion sessions and presentations. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

| 12. Learning and Teaching Resources | |
|---|---|
| Required textbooks (curricular books, if any) | Laboratory Manual of Practical Toxicology adopted by the department. |
| Main references (sources) | — |
| Recommended books and references (scientific journals, reports…) | — |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Pharmacoeconomics**

## 2. Course Code:

PCPC 56

## 3. Semester / Year:

Second Semester / Fifth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

30 theoretical hours (2 hours per week) / 2 units

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

Name: Assist. Lect. Ali Abdulwahid Mohammed Ali Al-Bayer
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Explain the relationship between pharmacoeconomics and clinical pharmacy and pharmacology.<br>2. Explain how to obtain the best medicine at the most appropriate price.<br>3. Describe the scientific methods for analysing the cost of medicines (CMA, CEA, CUA and CBA).<br>4. Enable students to conduct feasibility studies and make scientific decisions on purchasing medicines and medical supplies. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Thinking and discussion method; student–teacher dialogue.<br>2. Exploratory (inquiry-based) lectures using the whiteboard and projector.<br>3. Weekly reports and discussion of results. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge | Course overview; changes in health-care delivery | Whiteboard and projector | Daily quizzes and oral questions |
| 2 | 2 | Knowledge | Overview of pharmacoeconomics | Whiteboard and projector | Daily quizzes and oral questions |
| 3 | 2 | Knowledge | Cost determination; evaluation of outcomes and effectiveness | Whiteboard and projector | Daily quizzes and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 4 | 2 | Knowledge | Cost-minimization analysis (CMA) | Whiteboard and projector | Daily quizzes and oral questions |
| 5 | 2 | Knowledge | Cost-effectiveness analysis (CEA) | Whiteboard and projector | Daily quizzes and oral questions |
| 6 | 2 | Knowledge | Methods of data collection and analysis | Whiteboard and projector | Daily quizzes and oral questions |
| 7 | 2 | Knowledge | Incremental analysis; evaluation of outcomes | Whiteboard and projector | Daily quizzes and oral questions |
| 8 | 2 | Knowledge | Utility and quality of life | Whiteboard and projector | Daily quizzes and oral questions |
| 9 | 2 | Knowledge | Types of pharmacoeconomic analysis; cost–utility analysis (CUA) | Whiteboard and projector | Daily quizzes and oral questions |
| 10 | 2 | Knowledge | Evaluation of outcomes: net benefit and cost–benefit analysis (CBA) | Whiteboard and projector | Daily quizzes and oral questions |
| 11 | 2 | Knowledge | Comparison of CEA, CUA and CBA | Whiteboard and projector | Daily quizzes and oral questions |
| 12 | 2 | Knowledge | Methods of data collection and analysis: statistical and econometric modelling | Whiteboard and projector | Daily quizzes and oral questions |
| 13 | 2 | Knowledge | Pharmacoeconomic analyses | Whiteboard and projector | Daily quizzes and oral questions |
| 14 | 2 | Knowledge | How to conduct a feasibility study | Whiteboard and projector | Daily quizzes and oral questions |
| 15 | 2 | Knowledge | Decision making | Whiteboard and projector | Daily quizzes and oral questions |

## 11. Course Evaluation

Weekly reports, examinations and research. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Rascati, K. L. Essentials of Pharmacoeconomics, 3rd ed., 2021. |
| Main references (sources) | Rascati, K. L. Essentials of Pharmacoeconomics, 3rd ed., 2021. |
| Recommended books and references (scientific journals, reports…) | PharmacoEconomics (Springer journal). |
| Electronic References, Websites | https://link.springer.com/journal/40273; https://www.ispor.org/heor-resources |

# Course Description Form

## 1. Course Name:

**Applied Therapeutics II**

## 2. Course Code:

PCPC 57

## 3. Semester / Year:

Second Semester / Fifth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

32 theoretical hours (2 hours per week, as distributed in the weekly plan) / 2 units

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

Name: Lect. Dr. Ali Hassan Zaki
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Identify common pathological conditions: their definition, causes, methods of diagnosis, treatment approaches and the drug groups used.<br>2. Enable graduates to identify the conditions documented in the patient's medical record.<br>3. Enable graduates to communicate with patients in general outpatient clinics and educate them about their medicines.<br>4. Enable graduates to compare treatment practices with evidence-based sources and identify inappropriate therapy. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Teaching and lecturing using the blackboard and display screen; PowerPoint presentations.<br>2. Discussion of medical conditions and hypothetical patient cases.<br>3. Student–teacher dialogue and exploratory thinking.<br>4. Seminars and homework. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge | Adrenal gland disorders | Blackboard and display screen | Daily exams and oral questions |
| 2 | 2 | Knowledge | Thyroid disorders | Blackboard and display screen | Daily exams and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 2 | Knowledge | Alzheimer's disease | Blackboard and display screen | Daily exams and oral questions |
| 4 | 2 | Knowledge | Anxiety disorders | Blackboard and display screen | Daily exams and oral questions |
| 5 | 2 | Knowledge | Depressive disorders | Blackboard and display screen | Daily exams and oral questions |
| 6 | 2 | Knowledge | Schizophrenia | Blackboard and display screen | Daily exams and oral questions |
| 7 | 2 | Knowledge | Sleep disorders | Blackboard and display screen | Daily exams and oral questions |
| 8 | 2 | Knowledge | Contraception | Blackboard and display screen | Daily exams and oral questions |
| 9 | 2 | Knowledge | Hormone replacement therapy (HRT) | Blackboard and display screen | Daily exams and oral questions |
| 10 | 2 | Knowledge | Menstruation-related disorders | Blackboard and display screen | Daily exams and oral questions |
| 11 | 2 | Knowledge | Cancer treatment and chemotherapy | Blackboard and display screen | Daily exams and oral questions |
| 12 | 2 | Knowledge | Leukaemias | Blackboard and display screen | Daily exams and oral questions |
| 13 | 2 | Knowledge | Lymphomas | Blackboard and display screen | Daily exams and oral questions |
| 14 | 2 | Knowledge | Breast cancer | Blackboard and display screen | Daily exams and oral questions |
| 15 | 2 | Knowledge | Prostate cancer | Blackboard and display screen | Daily exams and oral questions |
| 16 | 2 | Knowledge | Adverse effects of chemotherapy | Blackboard and display screen | Daily exams and oral questions |

## 11. Course Evaluation

Mid-semester and final exams; oral and written evaluation including hypothetical cases; research and reports. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

| | |
|---|---|
| | |
| **12. Learning and Teaching Resources** | |
| Required textbooks (curricular books, if any) | Schwinghammer, T. L., DiPiro, J. T., et al. Pharmacotherapy Handbook, 11th ed. |
| Main references (sources) | Chisholm-Burns, M. A., et al. Pharmacotherapy: Principles and Practice, 6th ed. |
| Recommended books and references (scientific journals, reports…) | Relevant clinical guidelines and pharmacotherapy journals. |
| Electronic References, Websites | Electronic websites and Internet resources. |

# Course Description Form

## 1. Course Name:

**Therapeutic Drug Monitoring (TDM)**

## 2. Course Code:

PCPC 58

## 3. Semester / Year:

Second Semester / Fifth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person attendance

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

30 theoretical hours (2 hours per week) / 3 units (2 theoretical + 2 practical hours per week)

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

Name: Lect. Dr. Ali Hassan Zaki
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Explain the principles, clinical importance and applications of therapeutic drug monitoring (TDM).<br>2. Describe the pharmacokinetic principles related to TDM: clearance, volume of distribution, half-life, loading and maintenance doses and dosing interval.<br>3. Explain therapeutic and toxic concentrations, peak and trough concentrations and appropriate sampling times.<br>4. Evaluate the effects of renal and hepatic impairment, special populations and drug interactions on drug concentrations and dosing.<br>5. Interpret TDM results and apply individualized dose adjustment for commonly monitored drugs. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Lectures and interactive presentations.<br>2. Case-based discussions, clinical examples and problem solving.<br>3. Group discussions and student presentations. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Theoretical knowledge | Introduction to therapeutic drug monitoring | Lecture and discussion | Daily exams, oral questions, discussion and homework |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 2 | Theoretical knowledge | Basic pharmacokinetic principles in TDM | Lecture and discussion | Daily exams, oral questions, discussion and homework |
| 3 | 2 | Theoretical knowledge | Therapeutic range, toxicity and the concentration–effect relationship | Lecture and discussion | Daily exams, oral questions, discussion and homework |
| 4 | 2 | Theoretical knowledge | Loading dose, maintenance dose and dosing interval | Lecture and discussion | Daily exams, oral questions, discussion and homework |
| 5 | 2 | Theoretical knowledge | Steady state, half-life, clearance and volume of distribution | Lecture and discussion | Daily exams, oral questions, discussion and homework |
| 6 | 2 | Theoretical knowledge | Drug sampling and interpretation of peak and trough concentrations | Lecture and discussion | Daily exams, oral questions, discussion and homework |
| 7 | 2 | Theoretical knowledge | TDM in renal disease and renal impairment | Lecture and discussion | Daily exams, oral questions, discussion and homework |
| 8 | 2 | Theoretical knowledge | TDM in hepatic disease and heart failure | Lecture and discussion | Daily exams, oral questions, discussion and homework |
| 9 | 2 | Theoretical knowledge | TDM in obesity, paediatrics and other special populations | Lecture and discussion | Daily exams, oral questions, discussion and homework |
| 10 | 2 | Theoretical knowledge | Drug interactions and their effects on TDM | Lecture and discussion | Daily exams, oral questions, discussion and homework |
| 11 | 2 | Theoretical knowledge | TDM of aminoglycosides I | Lecture and discussion | Daily exams, oral questions, discussion and homework |
| 12 | 2 | Theoretical knowledge | TDM of aminoglycosides II | Lecture and discussion | Daily exams, oral questions, discussion and homework |
| 13 | 2 | Theoretical knowledge | TDM of vancomycin I | Lecture and discussion | Daily exams, oral questions, discussion and homework |
| 14 | 2 | Theoretical knowledge | TDM of vancomycin II | Lecture and discussion | Daily exams, oral questions, discussion and homework |
| 15 | 2 | Theoretical knowledge | TDM of ciclosporin | Lecture and discussion | Daily exams, oral questions, discussion and homework |

## 11. Course Evaluation

Midterm and final examinations, class participation and discussion, homework and assignments, and student presentations. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Bauer, L. A. Applied Clinical Pharmacokinetics. McGraw-Hill, New York, 2014. |
| Main references (sources) | Beringer, P. Winter's Basic Clinical Pharmacokinetics, 7th ed., 2024. |
| Recommended books and references (scientific journals, reports…) | Relevant clinical pharmacokinetics journals and TDM guidelines. |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Therapeutic Drug Monitoring (TDM) (Practical)**

## 2. Course Code:

PCPC 58

## 3. Semester / Year:

Second Semester / Fifth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Daily in-person laboratory attendance

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

30 practical hours (2 hours per week) / 3 units (2 theoretical + 2 practical hours per week)

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

Name: Ali Hassan Zaki
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Perform and interpret therapeutic drug monitoring calculations.<br>2. Calculate individualized drug doses (loading and maintenance doses and dosing intervals) from patient characteristics.<br>3. Determine appropriate sampling times and interpret measured concentrations against therapeutic and toxic ranges.<br>4. Adjust drug doses according to measured concentrations and clinical condition. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Practical demonstrations.<br>2. Problem-solving and case-based calculations.<br>3. Practical worksheets and group discussions.<br>4. Student presentations and practical assignments. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Practical skills | Pharmacokinetic introduction | Practical calculations and group discussion | Daily exams, oral questions, discussion and homework |
| 2 | 2 | Practical skills | Basic pharmacokinetic calculations | Practical calculations and group discussion | Daily exams, oral questions, discussion and homework |
| 3 | 2 | Practical skills | Loading dose, maintenance dose and | Practical calculations | Daily exams, oral questions, |

| | | | | | |
|---|---|---|---|---|---|
| | | | dosing interval calculations | and group discussion | discussion and homework |
| 4 | 2 | Practical skills | TDM equations and pharmacokinetic calculations | Practical calculations and group discussion | Daily exams, oral questions, discussion and homework |
| 5 | 2 | Practical skills | Interpretation of drug concentrations and sampling time | Practical calculations and group discussion | Daily exams, oral questions, discussion and homework |
| 6 | 2 | Practical skills | TDM in renal disease and dialysis | Practical calculations and group discussion | Daily exams, oral questions, discussion and homework |
| 7 | 2 | Practical skills | TDM in hepatic disease and heart failure | Practical calculations and group discussion | Daily exams, oral questions, discussion and homework |
| 8 | 2 | Practical skills | TDM in obesity and drug interactions | Practical calculations and group discussion | Daily exams, oral questions, discussion and homework |
| 9 | 2 | Practical skills | TDM of aminoglycosides – part 1 | Practical calculations and group discussion | Daily exams, oral questions, discussion and homework |
| 10 | 2 | Practical skills | TDM of aminoglycosides – part 2: calculations | Practical calculations and group discussion | Daily exams, oral questions, discussion and homework |
| 11 | 2 | Practical skills | TDM of vancomycin – part 1 | Practical calculations and group discussion | Daily exams, oral questions, discussion and homework |
| 12 | 2 | Practical skills | TDM of vancomycin – part 2: calculations | Practical calculations and group discussion | Daily exams, oral questions, discussion and homework |
| 13 | 2 | Practical skills | TDM of cyclosporine: introduction | Practical calculations and group discussion | Daily exams, oral questions, discussion and homework |
| 14 | 2 | Practical skills | TDM of cyclosporine: calculations | Practical calculations and group discussion | Daily exams, oral questions, discussion and homework |
| 15 | 2 | Practical skills | Integrated TDM practical exercises and comprehensive review | Practical calculations and group discussion | Daily exams, oral questions, discussion and homework |

## 11. Course Evaluation

Midterm and final exams, oral and written exams and laboratory reports. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

| 12. Learning and Teaching Resources | |
|---|---|
| Required textbooks (curricular books, if any) | Bauer L. A. Applied Clinical Pharmacokinetics. McGraw Hill, 2014. |
| Main references (sources) | Beringer P. Winter's Basic Clinical Pharmacokinetics, 7th ed., 2024. |
| Recommended books and references (scientific journals, reports…) | — |
| Electronic References, Websites | — |

# Course Description Form

## 1. Course Name:

**Hospital Training**

## 2. Course Code:

PCPC 59

## 3. Semester / Year:

Second Semester / Fifth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2025–2026

## 5. Available Attendance Forms:

Weekly attendance in hospital wards and training sessions

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

30 hours per semester (as distributed in the weekly plan) / 2 units (4 practical hours per week according to the study plan)

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

Name: Assist. Lect. Dr. Essa Hamad; Dr. Ahmed Komkom; Dr. Ali Hatem; Dr. Farah Ali Mahdi Aldabbagh
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Apply pharmacotherapeutic knowledge to real patients in the hospital setting across the main clinical specialties.<br>2. Develop skills in reviewing patient medical records and medication charts and identifying drug-related problems.<br>3. Train students to participate in ward rounds and communicate treatment recommendations to physicians, nurses and other members of the health-care team.<br>4. Develop skills in patient counselling, medication safety and the management of special populations (paediatric, obstetric and surgical patients). |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Hospital-based clinical training and ward rounds under supervision.<br>2. Case presentations and case-based discussion.<br>3. Short teaching sessions using the whiteboard and PowerPoint presentations.<br>4. Assignments and reports on patient cases. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge and clinical skills | Hypertension; nephrology; hypertension in pregnancy | Clinical training, case discussion and PowerPoint presentations | Group discussion, oral exams and assignments |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 2 | Knowledge and clinical skills | Introduction to cardiovascular disorders; neonatal sepsis and meningitis | Clinical training, case discussion and PowerPoint presentations | Group discussion, oral exams and assignments |
| 3 | 2 | Knowledge and clinical skills | Heart failure; endocrinology | Clinical training, case discussion and PowerPoint presentations | Group discussion, oral exams and assignments |
| 4 | 2 | Knowledge and clinical skills | Acute coronary syndrome; respiratory disorders | Clinical training, case discussion and PowerPoint presentations | Group discussion, oral exams and assignments |
| 5 | 2 | Knowledge and clinical skills | Atrial fibrillation; gastroenterology | Clinical training, case discussion and PowerPoint presentations | Group discussion, oral exams and assignments |
| 6 | 2 | Knowledge and clinical skills | Fluid, electrolyte and nutritional support | Clinical training, case discussion and PowerPoint presentations | Group discussion, oral exams and assignments |
| 7 | 2 | Knowledge and clinical skills | Deep-vein thrombosis and venous thromboembolism prophylaxis | Clinical training, case discussion and PowerPoint presentations | Group discussion, oral exams and assignments |
| 8 | 2 | Knowledge and clinical skills | Neurology; chronic stable angina | Clinical training, case discussion and PowerPoint presentations | Group discussion, oral exams and assignments |
| 9 | 2 | Knowledge and clinical skills | Stroke; surgical antibiotic prophylaxis | Clinical training, case discussion and PowerPoint presentations | Group discussion, oral exams and assignments |
| 10 | 2 | Knowledge and clinical skills | Rheumatic diseases of childhood | Clinical training, case discussion and PowerPoint presentations | Group discussion, oral exams and assignments |
| 11 | 2 | Knowledge and clinical skills | Endocrinology: diabetes mellitus and diabetes in pregnancy | Clinical training, case discussion and PowerPoint presentations | Group discussion, oral exams and assignments |
| 12 | 2 | Knowledge and clinical skills | Perioperative medication management | Clinical training, case discussion and PowerPoint presentations | Group discussion, oral exams and assignments |
| 13 | 2 | Knowledge and clinical skills | Neonatal hyperbilirubinaemia | Clinical training, case discussion and | Group discussion, oral |

| | | | | | |
|---|---|---|---|---|---|
| | | | | PowerPoint presentations | exams and assignments |
| 14 | 2 | Knowledge and clinical skills | Obstetrics and abortion | Clinical training, case discussion and PowerPoint presentations | Group discussion, oral exams and assignments |
| 15 | 2 | Knowledge and clinical skills | Post-operative pain and nausea management | Clinical training, case discussion and PowerPoint presentations | Group discussion, oral exams and assignments |

## 11. Course Evaluation

Assessment of clinical performance during training, case presentations, oral exams, reports and assignments. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | University of Baghdad – Hospital Training Guide. |
| Main references (sources) | Al-Nahrain University – Practical Hospital Training Guide. |
| Recommended books and references (scientific journals, reports…) | Current clinical practice guidelines and hospital formularies. |
| Electronic References, Websites | https://share.google/GQo3keFwExQO2uSMW |

# Course Description Form

## 1. Course Name:

**Pharmaceutical Biotechnology**

## 2. Course Code:

PCLS 512

## 3. Semester / Year:

Second Semester / Fifth Stage – Academic Year 2025–2026

## 4. Description Preparation Date:

2024–2025

## 5. Available Attendance Forms:

Daily in-person attendance

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

20 theoretical hours (2 hours per week, as distributed in the weekly plan) / 1 unit according to the study plan

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

Name: Dr. Azher Abdulmutaleb Ibrahim
Email:

## 8. Course Objectives

| | |
|---|---|
| **Course Objectives** | 1. Understand the basics of biotechnology and the properties of high-molecular-weight, protein-based drugs (hormones, antibiotics, vaccines and others).<br>2. Study the properties of drugs produced by recombinant DNA technology.<br>3. Understand the formulation, storage, routes of administration and absorption of biopharmaceuticals.<br>4. Understand the pharmacokinetics, excretion and degradation of protein and peptide drugs. |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | 1. Discussion and dialogue method.<br>2. Problem-solving (troubleshooting) approach.<br>3. Seminars.<br>4. Blackboard and screen presentations. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | Knowledge | Introduction to biotechnology | Blackboard and screen presentations | Daily exams and oral questions |
| 2 | 2 | Knowledge | Production of biopharmaceuticals and bacterial contamination | Blackboard and screen presentations | Daily exams and oral questions |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 2 | Knowledge | Sterilization and disinfection | Blackboard and screen presentations | Daily exams and oral questions |
| 4 | 2 | Knowledge | Additives and excipients | Blackboard and screen presentations | Daily exams and oral questions |
| 5 | 2 | Knowledge | Solubility enhancers | Blackboard and screen presentations | Daily exams and oral questions |
| 6 | 2 | Knowledge | Oral biopharmaceutical products | Blackboard and screen presentations | Daily exams and oral questions |
| 7 | 2 | Knowledge | Other routes of administration: nasal, pulmonary, rectal and buccal | Blackboard and screen presentations | Daily exams and oral questions |
| 8 | 2 | Knowledge | Pharmacokinetics of biopharmaceuticals | Blackboard and screen presentations | Daily exams and oral questions |
| 9 | 2 | Knowledge | Excretion of biopharmaceuticals | Blackboard and screen presentations | Daily exams and oral questions |
| 10 | 2 | Knowledge | Protein degradation; examples of peptides as drugs | Blackboard and screen presentations | Daily exams and oral questions |

## 11. Course Evaluation

Oral classroom discussion, written exams, midterm and end-of-semester exams, and daily assignment reports. The final grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral and written quizzes, monthly (mid-semester) exams, reports and the final examination.

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Crommelin, D. J. A., Sindelar, R. D., & Meibohm, B. (Eds.). Pharmaceutical Biotechnology: Fundamentals and Applications, 4th ed., 2013. |
| Main references (sources) | Crommelin, D. J. A., Sindelar, R. D., & Meibohm, B. (Eds.). Pharmaceutical Biotechnology: Fundamentals and Applications, 4th ed., 2013. |
| Recommended books and references (scientific journals, reports…) | Relevant pharmaceutical biotechnology journals. |
| Electronic References, Websites | — |