# COURSE DATA

## DATA SUBJECT

**Code:** 34084
**Name:** Pharmaceutical Technology II
**Cycle:** Undergraduate Studies
**ECTS Credits:** 6
**Academic year:** 2025-26

## STUDY (S)

| Degree | Center | Acad. year | Period |
|---|---|---|---|
| 1201 - Degree in Pharmacy | Facultat de Farmàcia i Ciències de l'alimentació | 5 | First quarter |
| 1211 - Double Degree in Pharmacy and Human Nutrition and Dietetics | Facultat de Farmàcia i Ciències de l'alimentació | 5 | First quarter |

## SUBJECT-MATTER

| Degree | Subject-matter | Character |
|---|---|---|
| 1201 - Degree in Pharmacy | Pharmaceutical technology | COMPULSORY |
| 1211 - Double Degree in Pharmacy and Human Nutrition and Dietetics | Asignaturas obligatorias del PDG Farmacia-Nutrición Humana y Dietética | COMPULSORY |

## COORDINATION

CANO CEBRIAN MARIA JOSE

# SUMMARY

The student through this course will learn the theoretical background and acquire practical skills that will enable the design, development and control of dosage forms intended for administration other than the oral route.
This implies the theoretical and practical knowledge of the main operations involved in the manufacture of such forms, excipients to be used, controls to accomplish and procedures to ensure the quality of the dosages forms produced.
The study will cover both conventional and modified release dosage forms. It will also include the packaging material and its peculiarities.
All the above mentioned items will aim to promote the Sustainable Development Goals (SDG) of the UN 2030 agenda.

# PREVIOUS KNOWLEDGE

## RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

## OTHER REQUIREMENTS

Knowledge of Pharmaceutical Technology I, Biopharmaceutics and Pharmacokinetics and Physical-Chemistry is required.

# COMPETENCES / LEARNING OUTCOMES

## 1201 - Degree in Pharmacy

Act with autonomy in learning, making informed decisions in different contexts, issuing judgements based on experimentation and analysis, and transferring knowledge to new situations.

Apply such knowledge to the professional world, contributing to the development of human rights, democratic principles, principles of equality between women and men, solidarity, environmental protection and promotion of a culture of peace with a gender pe

Apply the knowledge acquired to solve physicochemical problems and elaborate and defend arguments.

Collaborate effectively in work teams, assuming responsibilities and leadership roles and contributing to collective improvement and development.

Contribute to the design, development and implementation of solutions that respond to social demands, taking into account the Sustainable Development Goals as a reference.

Demonstrate critical and self-critical thinking in the field of the degree programme, considering aspects such as professional ethics, moral values and the social implications of the different activities carried out.

Develop skills to update knowledge and undertake further studies, including pharmaceutical specialisation, scientific research, technological development and teaching.

Gather and transmit information in English at a level of proficiency equivalent to B1 of the Council of Europe.

Intervene in health promotion and disease prevention activities in the individual, family and community spheres, with a comprehensive and multiprofessional vision of the health-disease process.

Know and understand, within the field of the degree programme, gender inequalities in society; integrate different needs and preferences based on sex and gender into the design of solutions and problem solving.

Know how to communicate effectively, both orally and in writing, adapting to the characteristics of the situation and the audience.

Know how to identify the factors that influence the absorption and distribution of drugs depending on their route of administration.

Know how to interpret, evaluate and communicate relevant data in the different areas of pharmaceutical activity, using information and communication technologies.

Know the biopharmaceutical properties of active principles and excipients, as well as possible interactions between them.

Module: Pharmacy and Pharmaceutical Technology. Plan and adjust the dosage of medicines based on their pharmacokinetic parameters.

Module: Pharmacy and Pharmaceutical Technology. Understand the processes of release, absorption, distribution, metabolism and excretion of medicines, and factors conditioning absorption and disposition depending on their routes of administration.

Possess and understand knowledge in the different areas of study included in pharmacist training.

Propose creative and innovative solutions to complex situations or problems within the field of knowledge, to respond to diverse professional and social needs.

Transmit ideas, analyse problems and solve them with critical spirit, acquiring teamwork skills and assuming leadership when appropriate.

## DESCRIPTION OF CONTENTS

1. Semi-solid preparations: type of excipients, physical-chemical properties and stability controls and requirements. Formulation of emulsions and microemulsions. Preparation of patches. Industrial and pilot plant facilities. Selection of dosage forms.
2. Pharmaceutical forms intended application on the skin with purpose topical and systemic as a vehicle. Biofarmacèutiques considerations. Packaging material.

3. Key concepts on sterilization and sterile environment work
4. Lyophilization: rationale, development and control of key processes
5. General characteristics of parenteral preparations
6. Injection of small and large volume: technology requirements and biopharmaceutical constraints

7. Sprays and other preparations for inhalation: biopharmaceutical considerations. Devices. Preparation technology and excipients.
8. Nasal dosage forms and otologic application: biopharmaceutical considerations. Preparation technology and excipients.
9. Rectal dosage form: biopharmaceutical considerations. Preparation technology and excipients. Packaging material.
10. Dosage forms of vaginal administration, urethral and uterine biopharmaceutical considerations. Preparation technology and excipients.
11. Dosage forms for ophthalmic administration: general characteristics and suitability for therapeutic target.

## 1. Dosage forms to be administered on the skin

1. Semi-solid preparations: type of excipients, physical-chemical properties and stability controls and requirements. Formulation of emulsions and microemulsions. Preparation of patches. Industrial and pilot plant facilities. Selection of dosage forms.

## 2. Basic procedures and Parenteral dosage forms

3. Key concepts on sterilization and sterile environment work
4. Lyophilization: rationale, development and control of key processes

## 3. Dosage forms to be administered to the lung and mucosae

7. Sprays and other preparations for inhalation: biopharmaceutical considerations. Devices. Preparation technology and excipients.
8. Nasal dosage forms and otologic application: biopharmaceutical considerations. Preparation technology and excipients.

## 4. Controlled release strategies and targeting

12. The process of release from pharmaceutical forms. Mechanisms and control parameters. Biopharmaceutical considerations. Factors involved. Strategies to control release dosage forms designed to routes other than oral.

13. Targeting of drugs. Advantages and disadvantages. Biopharmaceutical considerations. Problems and solutions provided by the pharmaceutical technology. Packaging materials. Stability.

# WORKLOAD

### PRESENCIAL ACTIVITIES

| Activity | Hours |
|---|---|
| Tutorials | 3,00 |
| Theory | 32,00 |
| Seminar | 5,00 |
| Laboratory | 16,00 |
| Computer classroom practice | 4,00 |
| **Total hours** | **60,00** |

### NON PRESENCIAL ACTIVITIES

| Activity | Hours |
|---|---|
| Attendance at other activities | 0,00 |
| Individual or group project | 15,00 |
| Independent study and work | 65,00 |
| Preparation of lessons | 5,00 |
| Preparation for assessment activities | 5,00 |
| Resolution of case studies | 0,00 |
| **Total hours** | **90,00** |

## TEACHING METHODOLOGY

The most relevant concepts, and the physico-chemical and biopharmaceutical bases on the subjects treated will be taught by the teacher in the form of a master's lesson, in face-to-face classes. Face-to-face teaching can be reinforced through the proposal of activities by virtual classroom, videoconference, narrated powerpoint lectures and tutorial classes through videoconference.

In each thematic block, the methodology of problem solving will be used to promote the decision making about the appropriateness and peculiarities of different formulations. Finally, at the end of the study of each one of the blocs, several practical situations that will be presented, will be solved in the seminars by the students. The tutorials will be used to supervise and dynamize these works. Special emphasis will be placed on the use of ICTs. At the end of each theoretical block, a self-assessment will be carried out to promote continued study of the subject. The questions will be true/false, multiple choice and/or theoretical-practical problems or questions. Participation will be optional and will not be taken into account in the final evaluation.

The laboratory practices will consist of 16 hours in which will be studied and elaborated forms and pharmaceutical operations, as well as the handling of the legal documentation in compounding. The teaching methodology will be the problem solving. To be able to participate in the practices a previous minimum knowledge will be required, which will be available to students through the virtual classroom. The control of this knowledge will be done through an online test, which can be repeated until the necessary knowledge is obtained. The teaching methodology that will be used in carrying out the laboratory practices will be project-based learning. In this way, it is intended to work on the development of student autonomy, research and innovation. In addition, the management of waste laboratory products will be carried out. Through these practices, the SDGs 8.3, 9.5, 12.4 and 12.5 mentioned above can be worked on.

The computer lab will focus on mathematical aspects related to different contents of the course.

## EVALUATION

The use of the different activities will be evaluated by written tests. 80 % of the final mark will correspond to the evaluation of theoretical knowledge and seminars and the complementary documentation imparted through the TICs. This 80 % may be obtained through a single assessment in the exam.

The remaining 20% will correspond to the grade obtained in the practice block. The grade for the laboratory practices will be calculated through a practical exam that will be taken at the end of the group of practices together with the delivery of a project, and will constitute 18% of the final grade. The evaluation of hands-on computer practices will be carried out by submitting a task, and will constitute 2% of the final grade for the subject.

. Appart from the subject contents, considerations such as the ability to work in teams, progress in the use of language characteristic of matter and critical spirit, among others will be taken into account.

It is an essential requirement to be able to approve the subject in the first call, to have participated in at least 80% of the programmed activities. To pass the subject, each part must be passed separately.

The copying or plagiarism of any task that is part of the evaluation will mean the impossibility of passing the subject, subjecting the student to the appropriate disciplinary procedures. Keep in mind that, in accordance with article 13. d) of the University Student Statute (RD 1791/2010, of December 30), it is the duty of a student to refrain from the use or cooperation in fraudulent procedures in the evaluation tests , in the work carried out or in official documents of the university.

According to the Pharmacy CAT guidelines (14 May 2012), those students who do not present themselves to the theory test at the first call, but have participated and have a note in any of the teaching activities carried out (seminars, tutorials) will be qualified as non-presented, but if they still do not take part in the theory test, the final mark that will appear in the second call will take into account the grades obtained in the different activities and, consequently, may appear as a fail.

## REFERENCES


- Martínez-Pacheco R. Tratado de Tecnología Farmacéutica, Vol, III: Formas Farmacéuticas. Ed Síntesis (2017).
- Vila Jato, J.L. Tecnología Farmacéutica. Vol I y II: aspectos fundamentales de los sistemas farmacéuticos y operaciones básicas. Ed. Síntesis, 1997.
- Lachman L, Lieberman H. Kanig J. The Theory and Practice of Industrial Pharmacy. Ed. Lea and Febiger. Filadelfia.
- M.J. Rathbone, J. Hadgraft, M. S. Roberts and M. E. Lane Eds. Modified-Release Drug Delivery Technology. Vol 1 and 2 Drugs and the pharmaceutical sciences. Vol 183 and 184. Informa Healthcare, 2008
- Fielder Encyclopedia of Excipients for Pharamceuticals, Cosmetics and Related Areas, 6th Edition, vol 1 y 2 Editio Cantor Verlag, 2007
- Sarfaraz K. Niazi, Ed Handbook of Pharmaceutical Manufacturing Formulations. Vol 6. Sterile Products Vol 4. Semisolid Products CRC Press, 2004
- Aulton's Pharmaceutics: The Design and Manufacture of Medicines, 6º Ed. Ed Elservier, (2021).