In addition to the general offer of courses taught in English, some Centers also offer for incoming students English Friendly Courses (EFC): subjects taught in Spanish, in which the syllabus summary, lecturer tutoring, examinations and/or papers are available in English.

<table>
<thead>
<tr>
<th>FACULTY OF PHARMACY (125)</th>
<th>SEMESTER</th>
<th>CREDITS</th>
<th>SCHEDULE¹</th>
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<tr>
<td>25259 Física</td>
<td>Sep. 2020- Jan. 2021</td>
<td>6</td>
<td>M</td>
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<tr>
<td>25282 Dermofarmacía</td>
<td>Sep. 2020- Jan. 2021</td>
<td>6</td>
<td>M</td>
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<tr>
<td>25192 Epidemiología Nutricional</td>
<td>Sep. 2020- Jan. 2021</td>
<td>6</td>
<td>M</td>
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<tr>
<td>25264 Biología Molecular</td>
<td>Sep. 2020- Jan. 2021</td>
<td>6</td>
<td>M</td>
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<tr>
<td>25249 Diagnóstico y Restauración Vegetal</td>
<td>Jan. 2021- May 2021</td>
<td>6</td>
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<tr>
<td>25108 Física</td>
<td>Jan. 2021- May 2021</td>
<td>6</td>
<td>A</td>
</tr>
<tr>
<td>25272 Farmacia Galénica</td>
<td>Jan. 2021- May 2021</td>
<td>9</td>
<td>M</td>
</tr>
</tbody>
</table>

¹ SCHEDULE: Morning (M)/ Afternoon (A): begins at 13.30.
By clicking the subject’s name, its Syllabus will appear.
Description and contextualization of the course

Physics is one of the basic courses of the first year of the Degree in Pharmacy. Here some basic physical concepts are developed, which will be later applied in other courses of the degree, such as Instrumental Techniques.

Competences/ Learning outcomes of the course

1.- To accurately use the International System of Units and Magnitudes.
2.- To apply computational and data processing techniques to Physics-related data and information.
3.- To apply Physics-related criteria to the design of experiments.
4.- To understand the nature and effects of the different types of radiation used in medical diagnosis and therapies.
5.- To be able to interpret the symbols and parameters of the radioactive nuclei, along with understanding their physical behavior and their use in radio-pharmacy.

Common competences

To develop communication and information transmission capabilities, both oral and written.

To encourage team-work abilities.

Syllabus

Unit 1.- Observables, magnitudes, units. Dimensional equations. Scale relations. Treatment and representation of experimental data.

Unit 2.- Ideal fluid mechanics.

Unit 3.- Oscillations. Resonance phenomenon. Relation to microscopic systems.


Unit 5.- Electromagnetic waves: electromagnetic spectrum. Properties of each type of radiation, and their interaction with physical matter.

Computer practice sessions

1. Introduction to spreadsheets: relative and absolute variables, cell filling with various types of contents, functions, formats, data tables, and graphical representation.


Laboratory practice sessions


Methodology

- Lectures: classes in which the teacher will explain the contents of the course. Low/medium difficulty problems may be proposed and solved during the class, in order to help settle the newly learned concepts. Student participation is encouraged.

- Class practices: the teacher and/or designated students will solve medium/high difficulty problems from a list assigned at the start of each unit.

- Computer/laboratory practices: the students will perform experiments and computer calculations on matters closely related to the contents of the course. Student attendance is mandatory.

Evaluation systems

- Continuous assessment
- Final assessment

Weights of the exams/tests:

- Test(s) on the course contents (%): 80
- Practices (%): 20

Regular examination session (January)

Students will be able to choose between “continuous assessment” and “final assessment” modalities:

Continuous assessment

The exams and their weights break down as follows:

- One midterm exams: 20% of the grade.
- Final exam: 80% of the grade (20% for the practices exam, 60% for the course contents exam).
Final assessment

A single final examination will be taken at the end of the term, weighting 100% of the grade (20% for the practices exam, 80% for the course contents exam).

Extraordinary examination session (June)

The June examination will be graded following the final assessment modality, therefore a single final examination will be taken, weighting 100% of the grade (20% for the practices exam, 80% for the course contents exam).

Bibliography

Basic readings

Further readings
Serway RA, Jewett JW. Physics for Scientists and Engineers. 10th ed. Cole Publishing; 2013

Websites
The Applet Collection. Available at http://lectureonline.cl.msu.edu/~mmp/applist/applets.htm
Interactive simulations. Available at https://phet.colorado.edu/en/simulations/category/physics
What is a Wave? Available at http://www.acs.psu.edu/drussell/Demos/waves-intro/waves-intro.html
Nuclear Data Center at KAERI. Available at http://atom.kaeri.re.kr/
Física con ordenador. Available at http://www.sc.ehu.es/sbweb/fisica/
DERMOPHARMACY

DESCRIPTION
Skin pharmacy is a branch of Pharmacy that studies, manufactures and dispenses non-pathology-related cosmetic products. A ‘cosmetic product’ is any substance or preparation designed for contact with the superficial parts of the human body (skin, hair and capillary system, nails, lips and external genital organs) or with teeth and buccal mucosa with the aim of cleaning or perfuming them, modifying their appearance and correcting body odours, and protecting or keeping them in good condition.

SKILLS
- Know, formulate and prepare products used for the hygiene, protection and beautification of people’s skin and appendages.
- Identify states of healthy skin and the alterations/pathologies that require dermo-pharmaceutical treatment.
- Identify and select the most suitable excipients for creating different types of cosmetic formulations.
- Collect and analyse information in the field of dermo-pharmaceutics to develop and formulate a line of specific products for a particular kind of skin.

THEORETICAL PROGRAMME
GENERAL CONCEPTS

STRUCTURE AND PHYSIOLOGY OF THE SKIN: DERMO-PHARMACEUTICAL IMPLICATIONS.
- Histology and physiology of the skin and appendages. Basic aspects and cosmetic implications.

DERMO-PHARMACEUTICAL PREPARATIONS FOR FACIAL APPLICATION

DERMO-PHARMACEUTICAL PREPARATIONS FOR SOLAR PROTECTION


DERMO-PHARMACEUTICAL PREPARATIONS FOR BODY APPLICATION


DERMO-PHARMACEUTICAL PREPARATIONS FOR HAIR


- Other hair care products. Hair conditioners. Hair preparations for combing and hair care. Hair colouring/dyeing.

- Hair cosmetics. Hair disorders.

- Anti-dandruff and anti-sebaceous preparations.

DERMO-PHARMACEUTICAL PREPARATIONS FOR ORAL HYGIENE


CONTROLS ON COSMETICS

- Control of cosmetic products.

WRITTEN WORK IN GROUPS

Students will make an analysis of the type of skin presented to formulate the most suitable product. They will write a report containing 5 specific formulations for the type of skin.

PRACTICAL PROGRAMME

Preparation of different formulations

- Exfoliating gel

- Fluid or body lotion for dry skin

- Shampoo with panthenol and silk proteins

- Moisturising-nourishing cream
- After-shave cream-gel
- Serum with alpha hydroxy acids
- Facial tonic
- Aqueous dermal paste with physical filters
- Anti-acne, anti-sebaceous and keratolytic mask
- Lip salve
- Oil-free hand cream

**EVALUATION**

Theoretical-practical written examination:

- Objective test (multiple-choice, short comprehension questions on theory, solving practical cases)
  - A mark of 50% must be achieved in the exam to pass the subject

Written work:

- Presentation of the final report

Practical work:

- Practical work: pass/not pass. If not passed, a laboratory exam should be taken.
- Practical work reports
DESCRIPTION AND CONTEXT OF THE SUBJECT

This subject provides an updated vision of the methodological basis of epidemiology, highlighting the special features inherent to nutritional epidemiology. This subject also inter-relates and completes knowledge that a Graduate in Nutrition and Diet acquires during the course, offering an overall vision of research in nutritional epidemiology in human beings and provides the scientific level required to work as a professional in the field of Nutrition in decision-making and therapeutic practical work.

COMPETENCES / LEARNING OUTCOMES OF THE SUBJECT

COMPETENCES

1. Participate in the analysis, planning, intervention and evaluation of epidemiological studies and intervention programmes in diet and nutrition in different areas (M05CM02).

2. Design and make nutritional evaluations to identify the population's needs in terms of diet and nutrition, and identify key factors in nutritional health (M05CM03).

3. Design, intervene in and carry out diet-nutrition educational programmes, and training in diet and nutrition (M05CM04).

LEARNING OUTCOMES

1. Apply the epidemiological method to study the effect of diet on human health.

2. Learn about the main types of epidemiological studies used to respond to a research question.

3. Calculate the main epidemiological measures in different types of epidemiological studies.

4. Analyse statistically the data from nutritional epidemiological studies.

5. Evaluate the validity of the nutritional epidemiology studies.

5. Make bibliography searches in biomedical databases.

7. Critically evaluate scientific articles in the field of nutritional epidemiology.

8. Formulate an evidence-based nutritional recommendation.
9. Select methods to measure diet and the intake of the most suitable nutrients in different types of epidemiological studies.

10. Carry out teamwork in a collaborative and cooperative manner.

Themes

Introduction to Nutritional Epidemiology.

Types of study design in Nutritional Epidemiology.

Frequency measures / association and effect measures.

Causality

Validity in nutritional studies. Bias and confusion

Diet evaluation in Nutritional studies

METHODOLOGY

1. In theory classes (lectures) the concepts of the subject will be taught, with student participation in occasional debates.

2. In the practical work sessions, individual and collective exercises will be done. Problem-solving in class will be done in a participative way. Problems and exercises will be provided to be worked on individually or in groups, to go into greater detail in the theoretical knowledge of the subject and relate Public Health to other similar areas.

3. In the practical work with computers the students will make bibliography searches using biomedical search engines, and they will carry out epidemiological exercises to learn how to calculate the main measures of frequency and effect applied to different epidemiological studies. At the end, each group will present the main methodological aspects of the study they have worked on to their fellow students. In this way, the formulation of questions and open discussion will be encouraged so that students can acquire skills related to oral communication, the ability to summarise and work in a team.

ASSESSMENT

Assessment will be in the combined modality, as follows:

- Information search, exercises, participation, attitude and attendance: 20%
- Computer practices: 15%
- Team work: 15%

- Theory-practice exam 50%

Final grade: (Theory-practice exam x 0.50) + (Group work x 0.15) + Computer practices (x 0.15) + (Information search, exercises, participation, attitude and attendance x 0.20).

Clarifications:

- If the student does not present him/herself at the exam he/she will be considered to have withdrawn from the call and will appear as “Not presented”.

- Minimum mark to pass the subject: 5 points

- Minimum mark to pass the theory-practical exam: 5 points.
### COURSE GUIDE 2020/21

<table>
<thead>
<tr>
<th>Faculty</th>
<th>125 - Faculty of Pharmacy</th>
<th>Cycle</th>
<th>Not Applicable</th>
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<tr>
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<td>GFARMA10 - Bachelor’s Degree in Pharmacy</td>
<td>Year</td>
<td>Second year</td>
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### COURSE

| 25264 - Molecular Biology | Credits, ECTS: 6 |

### COURSE DESCRIPTION

Molecular Biology deals with the composition, structure and function of biopolymers, focusing on genetic material. It is arguably one of the fastest developing fields among life sciences and it yields more and more biomedical applications for diagnosis, prognosis, gene therapy, drug production, vaccines, etc. Pharmacy professionals play an important role designing and manufacturing new drugs that result from knowing the molecular details of different health conditions. In addition, pharmacists must know the biochemical and molecular biology bases for the drugs that they provide to patients.

In this class, we deepen the knowledge acquired in the first year Biochemistry class. First, we will consider the structure of genetic material, its organization and metabolism, including transfer of genetic information and protein synthesis as well as its regulation in prokaryotic as well as eukaryotic cells. The second part will deal with DNA repair mechanisms and health issues related with it, paying special attention to human health conditions resulting from genetic modifications. We will also see molecular analysis techniques suitable for the diagnosis of such conditions. The third part will cover recombinant DNA technology for gene therapy and other applications.

This content will be completed with a lab section that will help students become familiar with molecular biology techniques and the scientific method as well as to improve their problem solving skills.

### COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

**COMPETENCIES**

1. Knowing the composition, structure, and metabolism of the macromolecules involved in storage, transmission, and expression of genetic information.
2. Knowing the changes genetic material undergoes in a living organism, and their correlation with genetic diversity; identifying those changes through DNA analysis (PCR and RFLP), and interpreting DNA-based diagnoses.
3. Knowing the basics of molecular biotechnology needed for genetic engineering: gene therapy requirements, and production of health-related recombinant proteins.
4. Extracting, amplifying, and analyzing nucleic acids for disease prevention, treatment and/or diagnosis.

**CROSS-COMPETENCY**

5. Correct use of the scientific terminology to communicate with patients, collaborators, and the public at large.

### DESCRIPTION

Molecular Biology studies the molecular bases of biological processes. This introductory course covers the following processes: transmission of genetic information, gene expression and regulation, genetic variability, and biotechnological applications (diagnosis, gene therapy, and recombinant drug and vaccine production).

### COURSE OBJECTIVE

To provide pharmacy students with basic knowledge to understand advanced pharmaceutical technology based on molecular biotechnology.

### COURSE CONTENTS, THEORETICAL & APPLIED

**I.- TRANSMISSION AND EXPRESSION OF GENETIC INFORMATION**

1. Introduction. Identification of genetic material. Genome characteristics. DNA molecules in eukaryotic genomes.
4. DNA Replication. DNA polymerases. General characteristics of replication.
5. RNA Structure and Metabolism. RNA molecules. RNA Transcription. Stages and enzymology of RNA transcription. RNA processing.

**II.- GENETIC VARIABILITY, ANALYTICAL TECHNOLOGIES, AND APPLICATIONS FOR DIAGNOSIS.**


III.- TRANSFECTION, MOLECULAR BIOTECHNOLOGY AND APPLICATIONS IN PHARMACY
14.- Gene transfer to animal cells. Transgenic animals. Expression of recombinant proteins of interest in Pharmacy. Protein engineering.

TEACHING METHODS

LEARNING ACTIVITIES

Lectures

Active learning: students answer questions and solve exercises and problems on their own time.

Laboratory class: experiments to be carried out in the lab.
- DNA extraction and purification. Purity determination. DNA quantification. Hyperchromic effect to characterize DNA.
- PCR of the STR region of human DNA. Electrophoretic separation and staining of amplified fragments on agarose gels. Lab report.

Computer class: exercises and questions in the computer lab.
- Virtual lab (cibertorio) to analyze and diagnose the beta-S globin polymorphism by RFLP. Sequence analysis in databases, selection of an appropriate restriction enzyme, diagnosis of drepanocytosis by RFLP. Questionnaire.
- Image processing using IMAGEJ software. Processing of electrophoresis images; obtaining other authors' images in databases and processing them.

Personal (at-home) study
- reading recommended material for lectures
- reading and understanding lab protocols
- answering questions and solving exercises, animations, etc.

TYPES OF TEACHING

<table>
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<tr>
<th>Types of teaching</th>
<th>M</th>
<th>S</th>
<th>GA</th>
<th>GL</th>
<th>GO</th>
<th>GCL</th>
<th>TA</th>
<th>TI</th>
<th>GCA</th>
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<td>Hours of face-to-face teaching</td>
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<td>Hours of student work outside the classroom</td>
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<td>12</td>
<td>10,5</td>
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Legend:
- M: Lecture-based
- S: Seminar
- GA: Applied classroom-based groups
- GL: Applied laboratory-based groups
- GO: Applied computer-based groups
- GCL: Applied clinical-based groups
- TA: Workshop
- TI: Industrial workshop
- GCA: Applied fieldwork

Evaluation methods

- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark

- Exercises, cases or problem sets 15%
- Individual assignments 15%
- Teamwork assignments (problem solving, Project design) 10%
- Galdera laburrez eta test erako galdez euskatutako proba 60%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

The final grade will result from the final test related to the lectures (60%) and from the labs (including a lab test) and exercises presented to the students (40%).
In order to pass the class, a minimum grade is required in the tests. In the lab test, this minimum grade is 5. In the theory test, 60% of the questions in the multiple choice test and 50% in the written test need to be correct. In addition, students who did not attend labs the previous year must attend them during the current academic year.

Students who want to obtain their full grade from the final test must request it within the first 9 weeks after the beginning of the class. If students who are graded according to the continuous assessment want to opt out of the final test, they must request it at the latest a month before the test date.

### EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

### MANDATORY MATERIALS

- Computer with internet connection (in the computer labs on Campus)
- Textbook: Campus library
- Lab coat
- Lab notebook and graph paper

### BIBLIOGRAPHY

#### Basic bibliography

BIBLIOGRAPHY (from the Course Description in Euskara or Spanish).

#### Detailed bibliography


#### Journals

- Molecular Biology Reports. Springer. Alemania.

#### Web sites of interest

from the Course Description in Euskara or Spanish.

### OBSERVATIONS
COURSE GUIDE 2020/21

Faculty 125 - Faculty of Pharmacy
Degree GCAMBI10 - Bachelor’s Degree in Environmental Sciences
Cycle Not Applicable
Year Third year

COURSE
25249 - Plant Diagnostics and Restoration
Credits, ECTS: 6

COURSE DESCRIPTION
The course is designed as an optional matter targeted to those students interested in developing a professional profile oriented towards research and management of plant biodiversity. It develops and expands the concepts given by Plant Biology and Ecology, under a more applied perspective.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT
It is intended to gain solid skills on the techniques of monitoring and evaluation of environmental stress, together with their methodological and conceptual bases. In its more applied side, the course introduces some bioengineering techniques such as phytoremediation and plant ecological restoration.

COURSE CONTENTS, THEORETICAL & APPLIED
Theoretical lessons

Practical lessons
7. Techniques to model and measure environmental stress in plants. Examples of metabolite analysis (ascorbate), physiological processes (chlorophyll fluorescence) and cellular integrity. Study of stress sensitive and tolerant ecotypes.
9. Critical analysis of a restoration or phytoremediation project similar to those studied in the course (phytoremediation, restoration, species recovery).

TEACHING METHODS
The teaching methodology consists of lectures in which the main topics of the subject will be reviewed together with exercises or theoretical assumptions that will be solved during the course. The laboratory practices are planned with the aim of familiarizing students with some of the most common techniques in the diagnosis of plant stress, as well as the effects of the main stress factors. The field practices complement the experience acquired with the laboratory practices, extending this to the realization of practical assumptions in real cases of environmental restoration. Classroom practices will be dedicated to solving problems and assumptions, conducting lectures by professionals (about three per year), presenting projects and seminars by groups of students. Throughout the course, questionnaires will be proposed to assess the progress of students providing a marginal score in the final grade. Attendance at tutorials at the fixed schedule is recommended and encouraged.
### Evaluation tools and percentages of final mark

**Evaluation methods**

- End-of-course evaluation

**Evaluation tools and percentages of final mark**

- Written test, open questions  40%
- Multiple choice test  20%
- Individual assignments  10%
- Teamwork assignments (problem solving, Project design)  30%

### ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

The evaluation of the subject will be through a mixed system. The qualification of the subject will be composed of several criteria and will be proportional to the number of credits of each type of teaching. Specifically, the lectures (60% of the total credits) will be evaluated through a theoretical exam (A) and continuous assessment/evaluation (B). The practice (laboratory and field work and the seminars (remaining 40%) will be evaluated by a exam(C) and by the qualifications of seminars and practice questionnaires and reports (D). The final mark is calculated as follows: final mark = $0.5A + 0.1B + 0.1C + 0.3D$

There is the possibility that students renounce the mixed evaluation system choosing for the final evaluation, regardless of whether or not they have participated in the aforementioned mixed evaluation. To do this, the voluntary waiver/ resignation letter of the mixed evaluation must be submitted in writing within a period of 9 weeks from the beginning of the semester. In the final evaluation the acquisition of the competences of the subject will be evaluated through a theoretical exam (oral and written) and a practical (laboratory) exam. In any case, the evaluation and resignation criteria will always be adjusted to what is contemplated in the Regulations relating the Evaluation of the Students of the Undergraduate Degrees (BOPV no50, March 13, 2017).

Students, both under the continuous or final evaluation, will receive the mark of "not presented" in case of not presenting to the final exam.

This method of evaluation could change following the recommendations of the health authorities. These modifications will be announced in due time, using the required tools and strategies to warrantee the right of students to be evaluated with equity and justice.

### EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

There will be an extraordinary call consisting on a single exam that will certify the achievement of the required level of theoretical and practical knowledge and acquisition of competencies.

This method of evaluation could change following the recommendations of the health authorities. These modifications will be announced in due time, using the required tools and strategies to warrantee the right of students to be evaluated with equity and justice.

### MANDATORY MATERIALS

- Lab coat
- Field boots/SHOES

### BIBLIOGRAPHY

**Basic bibliography**


**Detailed bibliography**

Aula Abierta

Journals
Ecosistemas.

Web sites of interest
www.plantstress.com, general plant stress physiology
www.plantphysiol.org, American Society of Plant Physiology
www.aeet.org, Spanish Society of Terrestrial Ecology
www.ser.org, International Society of Ecological Restoration
PHYSICS – 25108

Description and contextualization of the course

Physics is one of the basic courses of the first year of the Degree in Environmental Sciences and the Degree in Food Science and Technology.

This course offers an overall view of Physics, aimed towards basic concepts such as magnitudes and units, laws of motion, work and energy, and gravitational and electric forces.

Competences/ Learning outcomes of the course

1.- To accurately use the International System of Units and Magnitudes.
2.- To apply computational and data processing techniques to Physics-related data and information.
3.- To correctly recognize and interpret the natural forces involved in a physical phenomenon.
4.- To apply Physics-related criteria to the design of experiments.
5.- To acquire basic knowledge regarding the concept of field, mainly electric and magnetic fields, as well as forces an electrostatic potential.

Common competences

To develop communication and information transmission capabilities, both oral and written.

To encourage team-work abilities.

Syllabus

Unit 1.- Observables, magnitudes, units. Significant figures.

Unit 2.- Laws of motion. Inertia, equilibrium, acceleration. Motion in a straight line, circular and parabolic. Inertial and non inertial frames of reference. Relative motion. Energy and work. Conservative and non conservative forces.


Methodology
- Lectures: classes in which the teacher will explain the contents of the course. Low/medium difficulty problems may be proposed and solved during the class, in order to help settle the newly learned concepts. Student participation is encouraged.

- Class practices: the teacher and/or designated students will solve medium/high difficulty problems from a list assigned at the start of each unit.

- Computer/laboratory practices: the students will perform experiments and computer calculations on matters closely related to the contents of the course. Student attendance is mandatory.

Evaluation systems
  • Continuous assessment
  • Final assessment
  • Weights of the exams/tests:
    • Test(s) on the course contents (%): 80
    • Practices (%): 20

Regular examination session (May)
Students will be able to choose between “continuous assessment” and “final assessment” modalities:

Continuous assessment
The exams and their weights break down as follows:
- Two midterm exams: 20% of the grade, 10% each.
- Final exam: 80% of the grade (20% for the practices exam, 60% for the course contents exam).

Final assessment
A single final examination will be taken at the end of the term, weighting 100% of the grade (20% for the practices exam, 80% for the course contents exam).

Extraordinary examination session (July)
The July examination will be graded following the final assessment modality, therefore a single final examination will be taken, weighting 100% of the grade (20% for the practices exam, 80% for the course contents exam).
Bibliography

Basic readings

Further readings

Websites
http://www.sc.ehu.es/sbweb/fisica/
http://lectureonline.cl.msu.edu/~mmp/applist/applets.htm
http://phet.colorado.edu/index.php
http://www.phy.ntnu.edu.tw/ntnujava/index.php
GALENIC PHARMACY

- **SUBJECT:** Galenic Pharmacy
- **DEPARTMENT:** Pharmacy and Food Sciences
- **ACADEMIC YEAR:** 3
- **FOUR-MONTH PERIOD:** 2
- **TYPE:** Compulsory
- **ECTS CREDITS:** 9

Galenic Pharmacy is a subject in which the basic principles of the design of drug delivery systems are studied. These principles are based on the physico-chemical properties of the active ingredients, the characteristics of the dosage forms, and the physio-pathological conditions of the patients. Therefore, concepts that the students have previously taken in other subjects of the degree (such as Physico-chemistry, Human Anatomy or Human Physiology) are handled. These subjects are scheduled in the 1st or 2nd academic year.

This subject is closely related to the subjects Biopharmacy and Pharmacokinetics, Pharmaceutical Technology I, and Pharmaceutical Technology II, scheduled in the 4th academic year. It is convenient that the students take the subject Galenic Pharmacy before taking the mentioned subjects.

**GALENIC PHARMACY**

**SPECIFIC SKILLS**

1. Evaluate the influence of anatomic and physiological aspects of the site of administration on the disposition of drugs.
2. Identify and assess the properties of the drugs that condition their disposition in the organism from the dosage forms.
3. Analyse and evaluate the biopharmaceutical behaviour of drug products that condition the design of the dosage forms.
4. Select the most suitable route of administration based on the characteristics of the patient, the drug, and the desired therapeutic effect.
5. Determine the bioavailability, evaluate the bioequivalence, and know the factors that condition them.
TRANSVERSAL SKILLS

1. Develop communication and information skills, both oral and written, to deal with patients and users of the work center where the professional activity is performed. Promote working and collaborative capacities in multidisciplinary teams and those capacities related to other healthcare professionals.

2. Recognize the own limitations and the need to maintain and update professional skills, paying special attention to the self-learning of new knowledge based on the available scientific evidence.

THEORETICAL PROGRAMME

MODULE I: RELEASE AND ABSORPTION OF DRUGS
1. Introduction to Galenic Pharmacy.
2. Transit of drugs in the organism: concept of LADME.
3. Drug release.
4. Drug absorption.

MODULE II: ENTERAL ROUTES OF ADMINISTRATION OF DRUGS
5. Drug administration routes.
6. Oral administration.
7. Buccal administration
8. Rectal administration.

MODULE III: PARENTERAL ROUTES OF ADMINISTRATION OF DRUGS
10. Intravenous and intra-arterial drug administration.
11. Intramuscular administration.
12. Subcutaneous administration.
13. Other routes of parenteral administration.

MODULE IV: ADMINISTRATION OF DRUGS THROUGH MUCOUS
14. Nasal administration
15. Pulmonary administration.
16. Administration of drugs in the skin.
17. Ophthalmic administration.
18. Administration in the ear.
19. Vaginal administration.

MODULE V: ADMINISTRATION OF DRUGS IN THE CENTRAL NERVOUS SYSTEM
20. Administration of drugs in the central nervous system.
MODULE VI: BIOAVAILABILITY AND BIOEQUIVALENCE
22. Bioequivalence.

MODULE VII: ADMINISTRATION OF BIOLOGICAL DRUGS
23. Administration and delivery of therapeutic peptides and proteins.

PRACTICAL PROGRAMME
Practice 1. Determination of the partition coefficient of salicylic acid.
Practice 2. Influence of the excipient in the release of active ingredients based on an iodine ointment: release test.
Practice 3. Release study of pantoprazole from gastro-resistant tablets using a continuous flow dissolving equipment.
Practice 4. Determination of the solubility of drugs.
Practice 5. Dissolution kinetics of furantoin from tablets.
Practice 6. Evaluation in of the permeation capacity of various semi-solid formulations by using Franz cell chambers.

COMPUTER PRACTICES:
1. “Biopharmaceutics” program.
2. In vitro equivalence study of citalopram formulations.

CLASSROOM PRACTICES
1. Dissolution kinetics: a practical case
2. Calculation of the permeability constant of a drug: a practical case
3. Preparation of the group work
4. Bioequivalence study: a practical case
5. Self-evaluation tests

METHODOLOGY
1. Lectures. (5.5 ECTS)
2. Classroom practices: solving practical cases. (0.5 ECTS)
3. Practical laboratory classes. (2.6 ECTS)
4. Practical computer class. (0.4 ECTS)
5. Self-evaluation tests through the e-Gela platform.

COMBINED EVALUATION SYSTEM
Compulsory written test.
Requirements:
Absence of conceptual errors
Obtain a score higher than 0 in at least 70% of the questions
Obtain a minimum of 5 points
Spelling and syntax errors will be penalised depending on their number (-0.1 points for each one, up to a maximum of -0.5 points).

**Practical classes.**
Attendance at and benefit from practical classes. Scores from 0 to 5.
Punctuality
Good housekeeping
Attitude

Results and preparation of the practice book
To pass the practical part of the subject, the sum of the scores in sections A and B must be 7 points as a minimum.
Laboratory examination. Students who have not attended all the practical classes. The following will be considered: good housekeeping, laboratory skills and the results and preparation of the final report.

**Oral presentation and debate on the group work.** 10-15-minute oral presentation of a scientific publication related to the subject, using an audiovisual followed by a 10-minute debate. The professors will decide which part of the work will be presented by each student. An evaluation matrix will be used to evaluate each student. It will be handed over together with the work. The final mark for the work (7%) will be the same for the members of the group (i.e. average for the group). The percentage of this test in the final mark is 15% (7% work and 8% oral presentation).

**Withdrawal:** The student must submit her/his exam withdrawal request. The deadline will be the day before the official call.

EXTRAORDINARY CALL
The positive results of the activities of continuous evaluation (laboratory practices and group work) will be maintained in the extraordinary call.

**BIBLIOGRAPHY**


ELECTRONIC DOCUMENTS

3. www.wits.ac.za/pharmacy/biopharmacy.htm
4. A First Course in Pharmacokinetics and Biopharmaceutics. David Bourne, Ph.D. www.boomer.org/c/p1/
5. www.farm.kuleuven.ac.be/pharbio/aplink.htm
7. WILEY. http://www3.interscience.wiley.com
8. ELSEVIER http://www. Sciencedirect.com