Teaching guide

IDENTIFICATION DETAILS

Degree:	Pharmacy
Scope	Pharmacy
Faculty/School:	Experimental Sciences
Course:	EXPERIMENTAL TECHNIQUES
Type:	Compulsory
ECTS credits:	6
Year:	2
Code:	2524
Teaching period:	Fourth semester
Subject:	Analytical Techniques
Module:	Chemistry
Teaching type:	Classroom-based
Language:	Spanish
Total number of student study hours:	150

SUBJECT DESCRIPTION

The subject of Instrumental Techniques studies the techniques most used in the pharmaceutical laboratory for the identification, structural elucidation, isolation and purification of compounds, as well as other techniques used both in the research and development of new drugs and in the quality assurance of drugs and other compounds of pharmacological interest already marketed. Both theoretical and practical aspects are addressed, often based on the guidelines of pharmacopoeias and drug agencies, and will be applied to the resolution and interpretation of problems in the pharmaceutical field'.

This course is taught in the second semester of the Degree in Pharmacy and is part of the Chemistry Module with an estimated 150 hours of student dedication. The motivation of this subject, together with the rest of the disciplines that make up this degree, is to provide students with knowledge and skills that enable them to be a

good pharmacy professional in any of the fields related to research and development, formulation, manufacturing, distribution and dispensing of medicines, information and health promotion. The involvement of these professionals in the search for the common good and the development of society with respect for life and the environment in which it develops is highlighted. Likewise, and as reflected in the ideology proposed by the university, students are encouraged to be able to integrate anthropological, ethical and philosophical aspects that do not limit the explanation of reality to a single source of knowledge.

GOAL

Introduce students to the basic principles and the most important applications of the instrumental techniques used in the analysis and characterization of compounds of interest in Pharmacy, encouraging their critical spirit and scientific rigor.

The specific aims of the subject are:

Identify, design, obtain, analyze, control and produce drugs and drugs, as well as other products and raw materials of health interest for human or veterinary use.

Design, apply and evaluate clinical analytical reagents, methods and techniques, knowing the basic fundamentals of clinical analysis and the characteristics and contents of laboratory diagnostic opinions.

Recognize one's own limitations and the need to maintain and update professional competence, giving special importance to self-learning new knowledge based on available scientific evidence.

PRIOR KNOWLEDGE

Adequate knowledge of the subjects of Statistics, Physics, General Chemistry and Organic Chemistry is recommended.

COURSE SYLLABUS

Topic 1. Introduction to spectroscopy.
Theme 2. Atomic optical spectroscopy.
Theme 3. UV-visible molecular absorption spectroscopy.
Topic 4. Fluorescence and phosphorescence spectroscopy.
Topic 5. Infrared absorption spectroscopy.
Theme 6. Nuclear magnetic resonance spectroscopy.
Topic 7. Mass spectrometry.

LABORATORY PRACTICES Four internship sessions and a seminar will be held in small groups of students. In them, the theoretical contents of the subject will be applied in a practical way.

EDUCATION ACTIVITIES

ACTIVITIES RELATED TO FACE-TO-FACE WORK
- AFP1, AFP3. Face-to-face sessions: The syllabus will be worked on by combining expository sessions by the teacher with the resolution of practical exercises, problems or questions, for which active learning methodologies will be used, such as cooperative learning or problem-based learning.
- AFP4. Carrying out individual or group work: The teacher will propose a series of current topics related to the contents of the subject. Students will gather information on these topics and prepare a written document and/or an oral presentation.
- AFP2. Practical classes: Laboratory practices and seminars in small groups that allow the student to directly contact the methodology of several simple instrumental techniques, reinforcing the theoretical contents of the subject and acquiring manual skills in the laboratory. A problem-based learning methodology will be used.
- AFP5. Tutoring: In person or via email, they allow us to resolve any doubts that may have arisen during other teaching activities and to advise students on the strategies to follow to overcome difficulties that may arise in acquiring knowledge and competencies. The tutoring schedule can be consulted in the degree coordinator and will be informed by the teacher at the beginning of the course.
INDEPENDENT WORK ACTIVITIES (NOT IN PERSON)
- AFNP1. Study of theory, exercises and problems related to the subject.
- AFNP3. Preparation of individual or group work: Collection of information on the topic to be presented and preparation of the oral presentation.
- AFNP2. Preparation and study of practical classes: Prior knowledge of the theoretical contents to be applied in practice and/or seminars and preparation of pre-lab activities.
- AFNP4. Preparation of tutoring by the student to make the most of this activity.

DISTRIBUTION OF WORK TIME

TEACHER-LED TRAINING ACTIVITIES	INDIVIDUAL WORK
60 Horas	90 Horas

Cross Skills

To nurture an attitude of intellectual curiosity and a quest for truth in all areas of life.

To be able to approach a subject by means of rigorous, profound and comprehensive thought.

To be able to assess knowledge acquired.

To be able to apply the theoretical knowledge learnt in the of solving problems and practical cases linked to the various subjects.

LEARNING RESULTS

Identify, design, obtain, analyze and produce active ingredients, drugs and other products and materials of health interest.

Know the principles and procedures for the analytical determination of compounds: analytical techniques applied

to the analysis of water, food and the environment.

Know and apply the main techniques of structural research, including spectroscopy

Know the origin, nature, design, procurement, analysis and control of drugs and medical devices.

Select appropriate techniques and procedures in the design, application and evaluation of reagents, methods and analytical techniques.

Carry out standard laboratory processes including the use of scientific synthesis and analysis equipment, including appropriate instrumentation.

SPECIFIC LEARNING RESULTS

- Distinguish the different instrumental techniques used in the pharmaceutical field.

- Identify the physicochemical principles of the different instrumental techniques.

- Describe the basic components of the instruments studied as well as their functions.

- Explain the techniques most used in the identification and quantification of pharmaceutical products.

- Select the most appropriate technique for the analysis and control of drugs, medical devices, analysis of water, food and the environment.

- Solve numerical problems related to the instrumental techniques studied.

- Interpret simple structural elucidation.

- Apply simple instrumental techniques in laboratory work

LEARNING APPRAISAL SYSTEM

REGULAR EVALUATION SYSTEM
Priority system, based on continuous evaluation.
- 55%: WRITTEN OR ORAL, DEVELOPMENTAL, SHORT ANSWER OR TEST TYPE TESTS (SE1): The degree of comprehension, assimilation and relationship capacity of the contents presented in the theoretical classes will be evaluated. This exam will consist of exercises and case studies, and may also include development questions, short questions, multiple choice, true/false or matchmaking questions. It will be essential to obtain a minimum grade of 5.0 to pass the subject and to average with the rest of the sections. At the discretion of the subject teacher, an exam may be taken in the middle of the semester with the possibility of freeing up material for the final exam if the grade set by the teacher is passed.
- 10%: DAILY ACTIVITIES AND EXERCISES, ATTENDANCE AND PARTICIPATION IN FACE-TO-FACE ACTIVITIES IN THE CLASSROOM (SE2, SE4): The teacher will publish in the virtual classroom or deliver

exercises and problems to be solved by the student and delivered to the teacher within the deadline established by the teacher. This section includes the evaluation of attendance and participation in face-to-face activities in the classroom (2%). The grade obtained is kept until the extraordinary call.
- 15%: INDIVIDUAL AND GROUP WORK (SE3): Their completion and preparation in class or in tutoring (5%) will be evaluated as well as the quality of the work delivered in writing and/or its oral defense (10%). The grade obtained is kept until the extraordinary call.
- 20%: ATTENDANCE AND PARTICIPATION IN FACE-TO-FACE ACTIVITIES IN THE LABORATORY (SE8): The practice evaluation system includes the following aspects:
 - Prior preparation for the practice by the student. By means of prelab tests.
 - Participation in face-to-face activities in the laboratory. A rubric evaluates skill, work pace, quality of data collection, and so on.
 - Quality of the results obtained and their interpretation, the organization of the information obtained, the obtaining of conclusions and the degree of consolidation of the concepts and techniques learned. Through a laboratory report, practice exam and/or postlab test.
To pass the course, it is essential to obtain a minimum grade of 5.0 in this section. To average, a minimum score of 4 is required for face-to-face activities in the laboratory and 5 for internship reports and/or practice exams.
Attendance at all practical sessions and seminars is mandatory. The unjustified absence of any of these sessions leads to the loss of the right to an internship evaluation in the ordinary call and a suspension of the course. In the same way, arriving late or leaving the practice session early leads to the loss of the right to continuous evaluation. Students in this situation should immediately contact the teacher.
Attendance at in-person activities is mandatory. It is necessary to attend at least 80% of all classes. Absences of assistance due to illness must be justified by a medical certificate. Any other lack of assistance must be duly justified. Absences of attendance due to the preparation or study of exams in other subjects are not justified and therefore such classes will not be recovered.
ALTERNATIVE EVALUATION SYSTEM
Intended for students who enroll for the second or more times in the subject and who cannot take advantage of the ordinary system because they cannot attend classes regularly. Students in this situation should contact the teacher in the first few days of class to request to take advantage of this system.
- 55%: WRITTEN OR ORAL, DEVELOPMENTAL, SHORT ANSWER OR TEST-TYPE TESTS (SE1)
- 10%: DAILY ACTIVITIES AND EXERCISES (SE2)
- 20%: ATTENDANCE AND PARTICIPATION IN FACE-TO-FACE ACTIVITIES IN THE LABORATORY (SE8)
- 15%: INDIVIDUAL AND GROUP WORK (SE3) Plagiarism, the use of illegitimate means in evaluation tests, and inappropriate behavior within the laboratory will be sanctioned in accordance with the provisions of the Evaluation Regulations and the University's Coexistence Regulations

ETHICAL AND RESPONSIBLE USE OF ARTIFICIAL INTELLIGENCE

1.- The use of any Artificial Intelligence (AI) system or service shall be determined by the lecturer, and may only be used in the manner and under the conditions indicated by them. In all cases, its use must comply with the following principles:
a) The use of AI systems or services must be accompanied by critical reflection on the part of the student regarding their impact and/or limitations in the development of the assigned task or project.
b) The selection of AI systems or services must be justified, explaining their advantages over other tools or methods of obtaining information. The chosen model and the version of AI used must be described in as much detail as possible.
c) The student must appropriately cite the use of AI systems or services, specifying the parts of the work where they were used and describing the creative process followed. The use of citation formats and usage examples may be consulted on the Library website(https://www.ufv.es/gestion-de-la-informacion_biblioteca/).
d) The results obtained through AI systems or services must always be verified. As the author, the student is responsible for their work and for the legitimacy of the sources used.
2.- In all cases, the use of AI systems or services must always respect the principles of responsible and ethical use upheld by the university, as outlined in the Guide for the Responsible Use of Artificial Intelligence in Studies at UFV.

Additionally, the lecturer may request other types of individual commitments from the student when deemed necessary.
3.- Without prejudice to the above, in cases of doubt regarding the ethical and responsible use of any AI system or service, the lecturer may require an oral presentation of any assignment or partial submission. This oral evaluation shall take precedence over any other form of assessment outlined in the Teaching Guide. In this oral defense, the student must demonstrate knowledge of the subject, justify their decisions, and explain the development of their work.

BIBLIOGRAPHY AND OTHER RESOURCES

Basic

Skoog, Douglas A. Principles of Instrumental Analysis/7th ed. Mexico:Cengage Learning, 2018.
(Skoog, Douglas A. Principles of Instrumental Analysis/7th ed. Mexico:Cengage Learning, 2018. , ||Douglas A. Skoog... [et al.]. Analytical chemistry/7th ed. Madrid: McGraw-Hill, 2005.)

Additional

Juan Manuel Garcia-Segura... [et al.]. Instrumental analysis techniques in biochemistry/Madrid: Synthesis, 2008.

Levine, Ira N. (1937-) Physicochemistry/5th ed. Madrid: Mc-Graw Hill, 2012.