



COURSE DATA

Data Subject

Code	34076
Name	Botany
Cycle	Grade
ECTS Credits	4.5
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
1201 - Degree in Pharmacy	Faculty of Pharmacy and Food Sciences	1	Second term
1211 - Double Degree in Pharmacy and Human Nutrition and Dietetics	Faculty of Pharmacy and Food Sciences	1	Second term

Subject-matter

Degree	Subject-matter	Character
1201 - Degree in Pharmacy	10 - Botany	Obligatory
1211 - Double Degree in Pharmacy and Human Nutrition and Dietetics	1 - Asignaturas obligatorias del PDG Farmacia-Nutrición Humana y Dietética	Obligatory

Coordination

Name	Department
GARRIDO BENAVENT, ISAAC	356 - Botany and Geology

SUMMARY

Botany deals with the patterns and mechanisms of the origin and distribution of plant diversity, including also algae, as well as fungi, their organisation, their levels of complexity and types of reproduction, their life forms, their importance in the natural environment and, finally, their **economic and pharmaceutical importance**. In this subject, students will learn basic notions of **systematics, evolution and ecology** of plants, algae and fungi, **tools for their identification** will be described, and mention will be made of the main plant formations on Earth. Emphasis will also be placed on the problem of anthropic pressure on plants and their conservation.



PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

1201 - Degree in Pharmacy

- To possess and to understand the knowledge in the different areas of study included in the formation of the pharmacist.
- To know how interpret, value and communicate relevant data in the different aspects of pharmaceutical activity, making use of information and communication technologies.
- Skill to communicate ideas, analyze problems and solve them with a critical mind, achieving team-working abilities and assuming leadership whenever required.
- Development of skills to update their knowledge and undertake further studies, including pharmaceutical specialization, scientific research and technological development, and teaching.
- Develop know-hows for their professional career.
- Understand and manage the basic scientific terminology related to the subject
- Knowledge of the morphology and systematics of plants, fungi and algae, especially those with interest in Pharmacy, including medicinal plants.
- Understanding and interpreting scientific works related to plants, fungi and algae.
- To carry out works of collection, preparation and conservation of plants, fungi and algae samples in order to study and identify these organisms by keys.
- To know how plants, fungi and algae can influence the development of the pharmaceutical profession.

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

After taking this course the student should be able to:

- Locate the diversity of photosynthetic organisms on the tree of life.
- Identify and describe the different levels of organisation and complexity of algae, fungi and plants.
- Explain the pharmaceutical importance of some of the most important groups of algae, fungi and plants.
- Interpret scientific papers related to algae, fungi and plants.
- Use basic scientific terminology related to the subject.



DESCRIPTION OF CONTENTS

1. Introduction

1. Plants, algae and fungi in the Tree of Life. The structural complexity of algae, fungi and plants. From unicellular to multicellular organization: protophytes, thallophytes, bryophytes and cormophytes (vascular plants).
2. Reproductive strategies. Vegetative, asexual and sexual reproduction. Life cycles. Syngamy (fertilization) and meiosis. Alternation of generations.
3. Plant, algal and fungal diversity in the biosphere: taxonomy and systematics. Taxonomic units and categories. Phylogeny and molecular systematics. Importance of plants to mankind and Pharmaceutical Botany.

2. Fungi

4. The fungi: biology and main traits. Reproductive strategies. Diversity and systematics: mucoromycetes (including the former zygomycetes), ascomycetes and basidiomycetes. Mutualistic symbioses between fungi and photosynthetic organisms: lichens and mycorrhizae. Pharmaceutical, ecological and nutritional importance.

3. Algae, Bryophytes, Ferns and Cormophytes (General)

5. Cyanobacteria. Main groups of prokaryotic algae: cyanophytes and prochlorophytes. The origin of plastids. Primary and secondary endosymbiosis.
6. Algae. Brown algae, red algae and green algae: main traits, vegetative organization, reproduction, ecology and systematics. Pharmaceutical and economic importance.
7. Bryophytes. Main traits. Cycle. Structure of the gametophytes and sporophytes. Main groups: hornworts, liverworts and mosses. Ecology. Pharmaceutical and economic importance.
8. Introduction to vascular plants (cormophytes): the Ferns. General features and life cycles. Diversity: Lycophytes and monilophytes (pteridophytes). Pharmaceutical and economic importance.

4. Seed plants I: the gymnosperms

9. Seed plants (spermatophytes). General features. Life cycles. Seeds: origin and evolution. Groups of seed plants.
10. Gymnosperms. Reproductive traits. Diversity and phylogeny. Cycadophytes, ginkgophytes, cupressophytes, pinophytes and gnetophytes. Economic and pharmaceutical importance.



5. Seed plants II: the angiosperms

11. Angiosperms (flowering plants). Magnoliophyta, main features, ultrastructural and chemical features. Angiosperm flowers (reproductive organs). Inflorescences. Fruits and seeds. Origin, phylogeny and evolutionary trends.

12. Basal groups of Angiosperms. Magnolids. General features. Most representative families. Environmental and pharmaceutical importance.

13. Monocots. Morphological features. Most representative families. Environmental, alimentary and pharmaceutical importance.

14. The basal Dicots. General features. Most representative families. Environmental and pharmaceutical importance.

15. Eudicots (I): Rosidae. General features. Most representative families. Economic, pharmaceutical, environmental and alimentary importance.

16. Eudicots (II). Asteridae. General features. Most representative families. Ecological, pharmaceutical, economic and nutritional importance.

6. Biogeography

17. Plant biogeography. Earth biomes. Zonal and non-zonal vegetation. Rainforests. Savannah. Deserts and sub deserts. The Mediterranean. Laurel forests. Temperate deciduous forests. Steppes and meadows. Taiga. Arctic tundra.

7. Practical lab training

1. Observation and recognition of vegetative and reproductive structures of fungi and lichens.

2. Observation and recognition of vegetative and reproductive structures of algae.

3. Bryophytes and vascular plants (case of angiosperms). Recognition of the parts of a vascular plant and introduction to classification with a dichotomous key.

4. Observation and identification of flowering plants (I).

5. Observation and identification of flowering plants (II).

6. Visit to the Botanical Garden. Observation of liverworts, pteridophytes, gymnosperms and angiosperms.



WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	28,00	100
Laboratory practices	12,00	100
Seminars	2,00	100
Tutorials	2,00	100
Development of group work	20,00	0
Development of individual work	30,00	0
Preparing lectures	17,50	0
TOTAL	111,50	

TEACHING METHODOLOGY

1. THEORETICAL LECTURES: An average of two hours per week over 15 weeks will be given in the Faculty of Pharmacy during the second quarter. The lectures will be devoted to introducing students to the contents of each topic in the most graphic and entertaining way possible with the support of media if deemed appropriate. The scheme for the contents of each issue may be placed in the Virtual Classroom.

2. PRACTICAL LECTURES: Consist of the examination and identification of the most important features of plants, algae and fungi with the help of adequate material. Several selected families representative of the Mediterranean flora will be presented when available (depending on the climatology).

3. SEMINARS: Attendance is mandatory. We will propose the establishment of small working groups. The lecturer will present several topics to the students. Each topic will be randomly assigned to every group (1-2-3 members). Seminars can be defended via poster or through a brief oral exposition (8-10 minutes). The student who will defend the topic of the seminar will be selected by draw.

4. TUTORIALS: Attendance is mandatory. Problems posed previously by the lecturer in class will be solved, as well as any question related to the content of each lecture. The lecturer will evaluate the learning process globally.

Likewise, tutorials will provide guidance on the working methods for problems resolution. The lecturer shall provide specific exercises according to the students' needs. The construction of a glossary will make the understanding of botanical terminology easier and help to settle the botanical acquired knowledge.

EVALUATION

The evaluation of the two parts of the subject, Practice and Theory, will be held at the end of the academic year by examining in THEORY the content delivered over the same, with one or more questions of variable extension and/or several test questions, both relatives to the contents taught during the course.

The examination of the practical module will consist of a few questions related to the practices and the



material that was shown in the lab. Previous documentation about the content of each practice will be supplied, so students have to study the content before going to the laboratory for observations and sample analysis improving its performance. Likewise, at the end of each practice, the teacher responsible for the group may ask the student to submit a brief report on the practice carried out. At the end, a global report might also be asked to be evaluated in order to obtain the corresponding final grade together with the grade obtained in the practice exam.

The final grade will be the sum of grades:

Theory: 70% of the final (up to 7 points).

Practical training: 20% of the final (up to 2 points).

Seminars: 10% of the final (up to 1 point).

To get a minimum pass in Botany (5 points) it is necessary to achieve at least 3,5 points in Theory, 1 point in Practice and 0,5 points in Seminars.

In the second examination round, the marks of those grades passed in the first round will be maintained.

In any case grades will not be saved for future academic years.

The activities of **practices** and **seminars**, are of MANDATORY ATTENDANCE and, therefore, NOT RECOVERABLE, in accordance with the provisions of article 6.5 of the Regulation of Evaluation and Qualification of the UV for Bachelor and Master degrees. If, for justified reasons, you are unable to attend any of these activities, you must inform the corresponding lecturer sufficiently in advance. In this way, the person in charge of the subject may assign the student a session in another group.

Evidence of copying or plagiarism in any of the assessable tasks will result in failure to pass the subject and in appropriate disciplinary action being taken. Please note that, in accordance with article 13. d) of the Statute of the University Student (RD 1791/2010, of 30 December), it is the duty of students to refrain from using or participating in dishonest means in assessment tests, assignments or university official documents.

In the event of fraudulent practices, the “**Action Protocol for fraudulent practices at the University of Valencia**” will be applied (ACGUV 123/2020):

<https://www.uv.es/sgeneral/Protocols/C83sp.pdf>



REFERENCES

Basic

- AGUILELLA, A. & F. PUCHE. (2004). Diccionari de Botànica. Col·lecció Educació. Material. Universitat de València. 500 pp.
- CHARCO, J., MATEO, G. & SERRA, L. (2014) Árboles y arbustos autóctonos de la Comunidad Valenciana. Centro de investigaciones Ambientales del Mediterráneo. 442pp.
- DÍAZ GONZÁLEZ, E. et al. (2004). Curso de Botánica. Ediciones Trea. Gijón. 574 p.
- IZCO, J. et al., (2004). Botánica. McGraw-Hill Interamericana (2ª edición). Madrid. 906 pp.
- MOORE, R., CLARK, D. & VODOPICH, D. (1998). Botany. 2nd ed. WCB/ McGraw-hill.
- NABORS, M. W. (2007). Introducción a la Botánica. Pearson Educación. Madrid. 744 p.
- EVERT, R.F. & S. E. EICHHORN (2013). 8ª ed. Raven Biology of Plants. W.H. Freeman and Company. New York, 727 pp.
- SIMPSON, M. G. (2006). Plant Systematics. Elsevier Academic Press, 590 pp.
- BOLÒS, O. DE & J. VIGO (1984-2001) Flora dels Països Catalans. [vol. 1: Introducció. Licopodiàcies - Capparàcies; vol. 2: Crucíferes - Amarantàcies; vol. 3: Pirolàcies - Compostes; vol. 4: Monocotiledònies]. Pòrtic S.A., Barcelona.
- MATEO, G. & CRESPO, B. 2014. Claves ilustradas para la flora valenciana 1ª Ed. Jolube consultor botánico y editor, www.jolube.es, 501pp.
- VARGAS, P & ZARDOYA, R. (eds.) (2012) El Árbol de la Vida: sistemática y evolución de los seres vivos. Madrid 597 pp.

Additional

- <https://bos.uniovi.es/docencia/documentacion> [ciclos biológicos]
- <http://www.botanica.unne.edu.ar/index.html> [botánica morfológica (UNNE)]
- http://webs.uvigo.es/mmegias/1-vegetal/guiada_v_inicio.php [visita guiada por los tejidos de las plantas]
- <http://tolweb.org/tree/> [árbol de la vida]
- <http://www.ucmp.berkeley.edu/fungi/fungisy.html> [hongos]
- <https://britishlichensociety.org.uk/learning/about-lichens> [líquenes]
- <https://naturalhistory.si.edu/research/botany/research/algae> [algas]
- <https://stri.si.edu/story/bryophytes> [musgos, hepáticas y antocerotas]
- https://blogs.ubc.ca/biology321/?page_id=3602 [musgos, hepáticas y antocerotas]
- <http://www.ucmp.berkeley.edu/seedplants/seedplantssy.html> [plantas con semillas]
- <https://ebps.org.uk/ferns/> [Helechos]
- <http://herbarivirtual.uib.es/>
- <http://www.arbolesibericos.es>
- <http://www.anthos.es>