

**COURSE DATA****Data Subject**

Code	34076
Name	Botany
Cycle	Grade
ECTS Credits	4.5
Academic year	2018 - 2019

Study (s)

Degree	Center	Acad. year	Period
1201 - Degree in Pharmacy	Faculty of Pharmacy and Food Sciences	1	Second term
1211 - D.D. in Pharmacy-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 - D.D. in Pharmacy-Human Nutrition and Dietetics	1 - Asignaturas obligatorias del PDG Farmacia-Nutrición Humana y Dietética	Obligatory

Coordination

Name	Department
STUBING MARTINEZ, GERARDO	32 - Botany

SUMMARY

Botany is to understand the patterns and mechanisms of origin and distribution of plant diversity, organization, complexity levels and types of reproduction, their lifestyles, their importance in the natural environment and its economic importance and pharmaceutical industries. Basics of Systematics, Evolution and Ecology of plants and major plant formations on Earth. Problems of human 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

OUTCOMES

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

The student after taking this course should be able to:

- Place the tree of life the diversity of photosynthetic organisms.
- Learn about the different levels of organization and complexity of the plant.
- Understand the importance of some of the pharmaceutical major groups of plants.
- Understanding and interpretation of scientific papers related to plants.
- Compression and basic use of scientific terminology related to the subject.



DESCRIPTION OF CONTENTS

1. Introduction

1. Plants, algae and fungi in relation to the kingdoms of organisms. The structural complexity of plants, algae and fungi. From unicellular to multicellular organization: Protophytes, Thallophytes, Bryophytes and Cormophytes (vascular plants).
2. Reproductive strategies. Vegetative, asexual and sexual reproduction. Life cycles. Syngamy (fecundation, fertilization) and meiosis. Alternating generations.
3. Plant, algae and fungi diversity in the Biosphere: Taxonomy and Systematics. Taxonomic units and Categories. Phylogeny and Molecular Systematics. Importance of plants to mankind. Pharmaceutical Botany. The interactions between plants and the environment. Botany in pharmaceutical insights.

2. Fungi

4. Fungi. Biology and general characteristics. Reproductive strategies. Diversity and systematics. Chytridiomycetes, Glomeromycetes, Zygomycetes, Ascomycetes, Basidiomycetes. Mutualistic Symbiosis between fungi and photosynthetic organisms: lichens and mycorrhizae. Pharmaceutical, ecological and nutritional importance.

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

5. Algae (I). Main groups of prokaryotic algae: Cyanophyta and prochlorophyta. The origin of plastids. Primary and secondary endosymbiosis.
6. Algae (II). Brown algae, red algae and green algae: General characteristics, organization, reproduction, ecology and systematics. Pharmaceutical and economic importance.
7. Bryophytes. General features. Cycle. Structure of the gametophyte and sporophyte. Groups: Antoceros, liverworts and mosses. Ecology. Pharmaceutical and economic importance.
8. Introduction to Vascular plants (Cormophytes). Ferns. General features. Life cycles: Heterospory and Isospory in Ferns. Diversity: Lycophyta and Monilophyta (Pteridophyta). Pharmaceutical and economic importance.

4. Seed plants I: 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, Conifers and Gnetales. economic, ecological and pharmaceutical importance.



5. II. Angiosperms

11. Angiosperms (Flowering plants). Magnoliophyta, General features, ultrastructural and chemical features. Angiosperm flowers (reproductive organs). Inflorescences. Fruits and seeds. Origin, phylogeny and evolutionary trends. Angiosperm systematics. Major clades: Magnolia, Monocotyledons (=Monocots) and Eudicotyledons (=Eudicots).
12. Basal groups of Angiosperms. Magnoliidae. 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. Biomes of the Earth. Zonal and non-zonal vegetation. Rainforests. Savannah. Deserts and sub deserts. Mediterranean. Laurel forests. Temperate deciduous forests. Steppes and meadows. Taiga. Artic tundra.

7. Practical lab training

1. Fundamentals concerning the identification of plants. Practical examples
2. Observation and identification of Cryptogams (I)
3. Observation and identification of Cryptogams (II)
4. Observation and identification of Gymnosperms and Flowering plants (I)
5. Observation and identification of Flowering plants (II)
6. Observation and identification of Flowering plants (III)

When possible, the students will attend to a field trip guided by the lecturer to an area of particular botanical and/or pharmaceutical interest, such as Sierra de Espadán or Sierra de Javalambre (providing that university insurance covers any possible damage to the students).

**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 by the Faculty of Pharmacy during the second quarter. The lectures will be devoted to introducing students to the contents of each issue 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, or may be left in reprography, so that students coming to class will have already been introduced to the field and will not have to take notes, or will only need some additional notes. The class aims to address and resolve doubts and personal matters that arise in learning the issues.

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 (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 short, specific questions and/or several test questions, both relatives to the contents taught during the course.

The Practice examination must be forwarded with the final exam and will consist of 1 or 2 questions about the practice. Also, a document representative of all the observations made during all the practices in the laboratory will be presented.

The contents of the topics in the seminars as well as the capacity to synthesize the subjects and the grade of comprehension, and the clarity on the oral communication will be evaluated.

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.

Any work, such as, herbarium, field trip reports, etc. voluntarily produced by the students will be considered and evaluated separately.

REFERENCES

Basic

- STRASBURGER, E. & al. (2007) Tratado de Botánica. 35ª Ed. Omega. Barcelona.
- IZCO, J. & al. (2004) Botánica. 2ª ed. McGraw-Hill. Madrid.
- SIMPSON, M.G. (2010) Plant Systematics, 2nd Edition. Elsevier/Academis Press.
- CAMPBELL, NEIL A.; REECE, J.E B.; URRY, L.A.; CAIN, M.L.; WASSERMAN, S.A.; MINORSKY, P.V.; JACKSON, R.B.(2008) Biology (8 ed.). San Francisco: Pearson - Benjamin Cummings.

Additional

- <http://www.eweb.unex.es/eweb/botanica/> [botánica]
- <http://www.unioviado.es/bos/Asignaturas/Botanica/1.htm> [ciclos biológicos]