Universitat Autònoma de Barcelona

2022/2023

Botany

Code: 100801
ECTS Credits: 6

Degree	Type	Year	Semester
2500250 Biology	OB	1	2

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Teachers

Laia Guardia Valle

Prerequisites

No prerequisites are required.

The subject will be easier to follow with previous knowledge on evolution, reproductive biology, and morphological and functional diversity of plants and fungi. It will be also very useful to have a good base on geography on a global and Iberian scale and on geological periods.

Objectives and Contextualisation

Botany deals with the study of plant diversity in a broad sense and, with a synthetic focus, also addresses the diversity of fungi.

The student will be able to construct a phylogenetic scheme to address flora and fungal biodiversity. This work will be closely related to aspects of systematics and plant evolution, as well as to the study of techniques and knowledge that allow classification of living beings (morphology, anatomy, molecular markers, biogeographic aspects, etc.).

Also, emphasis will be given to the main biological (life cycles, reproduction, etc.), evolutionary (phylogenetic relationships, evolutionary trends, coevolution, etc.), ecological (limiting factors, habitats, adaptation, etc.) processes and human applications (industry, land management, etc.) of the main groups studied.

Botany will be complemented with the subject *Vegetation analysis and mapping*, and it is fundamental to attend optional subjects such as *Ecology, evolution and diversity of cryptogams*, *Biology and diversity of phanerogams* and *Applied botany*.

Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.

- Analyse and interpret the development, growth and biological cycles of living beings.
- Analyse and interpret the origin, evolution, diversity and behaviour of living beings.
- Be able to analyse and synthesise
- Describe and identify the levels of organisation of living beings.
- Develop a historical vision of biology.
- Develop a sensibility towards environmental issues.
- Identify and classify living organisms.
- Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
- Obtain, manage, conserve and observe specimens.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
- Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
- Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
- Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
- Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.
- Work in teams.

Learning Outcomes

1. Analyse a situation and identify its points for improvement.
2. Analyse and interpret the development, growth and biological cycles of plants.
3. Analyse and interpret the origin, evolution, diversity and behaviour of plants.
4. Be able to analyse and synthesise.
5. Critically analyse the principles, values and procedures that govern the exercise of the profession.
6. Describe and identify the levels of organisation of plants.
7. Develop a sensibility towards environmental issues.
8. Explain the principal historical landmarks in botanical knowledge.
9. Identify and classify the plants.
10. Obtain, manage, conserve and observe plant specimens.
11. Propose new methods or well-founded alternative solutions.
12. Propose viable projects and actions to boost social, economic and environmental benefits.
13. Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
14. Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
15. Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
16. Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
17. Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
18. Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.
19. Work in teams.

Content

- Macroevolution and phylogeny of plants and fungi

Fundamental concepts to understand the origin and evolution of the main groups (phylogenetic lines) of fungi and photoautotrophic organisms. Importance will be given to endosymbiosis processes that originated the main phylogenetic lines and plant diversity at basal levels of the tree of life.

The bases for the interpretation of classification systems and taxon delimitation will be given under a fundamentally evolutionary perspective, as well as the mechanisms of speciation and the macroevolutionary processes that have taken place.

- Characteristics, biodiversity and systematics of the main groups of plants and fungi

The student will see the biological characteristics (morphology, reproduction and ecology) and some examples of the main groups of: cyanobacteria, fungi, algae and especially land plants (bryophytes, pteridophytes, gymnosperms and angiosperms).

A criterion of phylogenetic organization will be followed according to the most recent, and also classic, classification proposals. Emphasis will be placed on shared derived characters (synapomorphies) and genealogical relationships.

- Functional characteristics

Following the phylogenetic framework, the different goals acquired throughout the evolutionary process by fungi and plant organisms will be highlighted, among others: origin of the chloroplast, origin of the embryo, acquisition of vascular tissue, origin and evolution of the seed and the pollen grain, and the evolution of the flower and the fruit.

Special mention will be made of coevolution and diversification processes. Other functional aspects will also be discussed, such as the importance of algae in marine and inland ecosystems, or the ecological role of fungi or fungal symbioses in terrestrial ecosystems.

Methodology

This subject presents a strong practical component closely related to theoretical contents. Therefore, students must be responsible for keeping up-to-date with the acquired knowledge both during theoretical sessions and in practices, including seminars.

- Directed activities

- Lectures or theory sessions:

The diversity, ecology and systematics of plants, fungi and other photoautotrophic groups will be presented. The phylogenetic groups will be organized according to an updated classification system. The teaching material corresponding to each theory topic will be available to students in Campus Virtual - Moodle.

- Seminars:

A part of the contents of this subject will be taught through two sessions of seminars. In them, a connection will be established between theory, practices and the herbarium work. Emphasis will be placed on developing skills for the identification of plants, the use of dichotomous identification keys, and the recognition of plants and their diagnostic characteristics. In addition, morphology and diversity of fruits will be treated in detail.

- Practices:

There will be two types of practical activities: laboratory and field practices.

- Laboratory practices:

They consist of six sessions of laboratory practices where the different groups of organisms treated in the theoretical classes will be presented. Students will have documentation, which include information on the observation methodologies of the plant material, the main structures to be identified, and a specific glossary. The students will have to fill in a specific report for each practical session. This material will be provided through *Campus Virtual-Moodle*.

- Field Practices:

They consist of three sessions that will be held in the field, in accessible places. There will be an introduction to floristic diversity and to the general aspects of the ecology of plant communities. Documents with information on the environmental and landscape characteristics of some visited itineraries will be provided through *Campus Virtual-Moodle*.

- Supervised activities

- Course work: Herbarium

Students must prepare and present an herbarium of a given number of wild plants. The herbarium will consist of plants collected by the students and pressed, labeled, and identified with the scientific name.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Field practices (3 field trips)	10	0.4	2, 3, 6, 9, 10, 17, 16, 15, 13, 14, 7, 4, 19
Laboratory practices (6 sessions)	12	0.48	2, 3, 6, 9, 10, 17, 16, 15, 13, 14, 7, 4, 19
Seminars (2 sessions)	4	0.16	2, 3, 9, 7, 4, 19
Theory classes (27 sessions)	27	1.08	18, 5, 2, 3, 1, 6, 8, 11, 12, 17, 16, 15, 13, 14, 7, 4
Type: Supervised			
Herbarium	50	2	2, 3, 6, 9, 10, 16, 7, 4, 19
Type: Autonomous			
Study	44	1.76	2, 3, 6, 8, 9, 10, 4

Assessment

The assessment consists of a theoretical part and a practical part. The student will need to get a minimum score of 5 in each of the two parts to pass the subject.

I. Theoretical part: 55%

First partial written exam: 27.5%

Second partial written exam: 27.5%

It is necessary to obtain a mark equal to or greater than 5 in each one of the partial exams to be assessed of the subject. Students who have not passed the partial theoretical exam(s) may submit to a recovery exam for the part corresponding to partial exam not passed. For the calculation of the mean of the theoretical part, the score obtained in the recovery exam will replace the original score of that partial exam.

II. Practical part: 45%

Practical exam: 25%

Herbarium work: 20%

The practical exam will consist of the identification of fungi and plant organisms of the groups studied in laboratory practices and field practices, and in the recognition and description of morphological structures and functional aspects.

Students must prepare the herbarium following the teacher's instructions throughout the course, and deliver it to the end of the course on the date indicated.

It is necessary to obtain a mark equal to or greater than 4 in the practical exam and in the herbarium to be evaluated of the subject. There is no possibility to recover any of these two tests.

Attendance to practices, both laboratory and field, is mandatory. The students will we graded as "Non-evaluable" when their absence exceeds 20% of the programmed sessions.

The student will be graded as "Non-evaluable" if the weighthing of all conducted evaluation activities is less than 67% of the final score.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Herbarium	20%	0	0	2, 3, 6, 9, 10, 16, 7, 4, 19
Practical exam	25%	1	0.04	2, 3, 6, 9, 10, 17, 16, 15, 13, 14, 7, 4
Theory partial exams (2)	55%	2	0.08	18, 5, 2, 3, 1, 6, 8, 11, 12, 17, 16, 15, 13, 14, 7, 4

Bibliography

Theory:

Bresinsky, A. *et al.* 2013. Strasburger's Plant Sciences (Including Prokaryotes and Fungi). Springer. Berlin.[Electronic resource available at UAB]

Evert, R. & Eichhorn, S. 2013. Raven Biology of plants. 8th ed. W.H. Freeman & Company. New York.

Izco, J. *et al.* 2004. Botánica. McGraw-Hill-Interamericana. Madrid.

Lee, R. E. 2008. Phycology. 4th ed. Cambridge University Press. Cambridge. UK.

Llimona, X. *et al.* 1985. Història Natural dels Països Catalans, vol. 4: Plantes inferiors. Enciclopèdia Catalana. Barcelona.

Masalles, R. M. *et al.* 1988. Història Natural dels Països Catalans, vol. 6: Plantes superiors. Enciclopèdia Catalana. Barcelona.

Mauseth, J. D. 2017. Botany. An Introduction to Plant Biology. 6th ed. Multimedia enhanced edition. Jones & Bartlett Learning. Burlington.

Nabors, M. W. 2006. Introducción a la Botánica. Pearson Addison Wesley Educación. Madrid. [Electronic resource available at UAB]

Practices:

Aguilella, A. & Puche, F. 2004. Diccionari de Botànica. Universitat de València. València.

Bolòs, O. de & Vigo, J. 1984-2001. Vols. I-IV. Flora dels Països Catalans. Barcino. Barcelona.

Bolòs, O. *et al.* 2005. Flora Manual dels Països Catalans. 3a edició revisada i ampliada. Pòrtic. Barcelona.

Bonnier G. & De Layens, G. 1990. Claves para la determinación de plantas vasculares. Omega. Barcelona.

Cambra, J. *et al.* 1989. Guia de les algues i els líquens dels Països Catalans. Pòrtic. Barcelona.

Castroviejo, S. *et al.* (eds.). 1986-present. Flora iberica. Plantas vasculares de la Península Ibéricae Islas Baleares. CSIC. Madrid. http://www.floraiberica.es

Font Quer, P. 2009. Diccionario de Botánica. 4a ed. Península. Barcelona.

Font Quer, P. 2015. Iniciació a la Botànica, 3a ed. revisada i actualitzada per Vallès, J. i Vigo, J. Edicions de la Universitat de Barcelona. Barcelona.

Gerhardt, E. *et al*. 2000. Hongos de España y de Europa. Omega. Barcelona.

Llistosella, J. & Sánchez-Cuixart, A. 2004. L'herbari. Arbres, arbusts i lianes. Edicions de la Universitat de Barcelona. Barcelona.

Llistosella, J. & Sánchez-Cuixart, A. 2008. L'herbari: Mates, herbes i falgueres. Edicions de la Universitat de Barcelona. Barcelona.

Llistosella, J. & Sánchez-Cuixart, A. 2015. Guia il·lustrada per a conèixer els arbres. Edicions de la Universitat de Barcelona. Barcelona.

Llistosella, J. & Sánchez-Cuixart, A. 2020. Guia il·lustrada per a conèixer els arbusts i les lianes. Edicions de la Universitat de Barcelona. Barcelona.

Llistosella, J. & Bernal, M. 2022. Manual pràctic de botànica. Morfologia de les plantes vasculars. Edicions de la Universitat de Barcelona. Barcelona.

López González, G. 2001. Los árboles y arbustos de la Península Ibérica e Islas Baleares. Tomos I y II. Ed. Mundi-Prensa. [Electronic resource available at UAB]

Recasens, J. 2000. Botànica agrícola. Plantes útils i males herbes. Universitat de Lleida. [Electronic resource available at UAB]

Wirth, V. *et al*. 2004. Guía de campo de líquenes, musgos y hepáticas. Omega. Barcelona.

Web sites:

Flora catalana.net. La flora del nostre entorn: http://www.floracatalana.net/

Herbari virtual del Mediterrani occidental: http://herbarivirtual.uib.es/cat-med/index.html

Tree of Life web project: http://tolweb.org/tree/

Software

There is no specific software in this course.