

| Degree programme | Type | Course |
|------------------|------|--------|
| Biology          | OP   | 4      |

## Contact lecturer

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## Teaching staff

Llorenç Saez Goñalons

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## Group languages

You can consult this information at the [end](#) of the document.

## Prerequisites

To enrol in the course, students must have completed and passed the first-year Botany course. Moreover, students are expected to have an interest in biodiversity-related topics and a strong commitment to contribute to conservation.

## Objectives

The general objective of the course is to understand the immense social, environmental, cultural, and economic value of plants, algae, and fungi, while highlighting the wide range of applications that botany has at the societal level.

Through case studies, laboratory work, and field trips, the course will demonstrate how botanical knowledge is applied in global efforts to address major socio-ecological challenges facing humanity, such as the climate emergency, biodiversity loss, and food sovereignty.

The specific objectives of this course are:

1. To train students in methodologies used to apply botanical knowledge in practice, in order to address some of the social and ecological challenges facing humanity.
2. To provide a global overview of our current scientific knowledge on plants, algae, and fungi, and to review the different regulatory frameworks for their conservation and sustainable use.

3. To offer a scientific framework for the study and research of the main uses and applications of plants, algae, and fungi in fields such as health, agriculture, palynology, and the conservation and restoration of species and ecosystems.

## Learning outcomes

1. Be able to analyse and synthesise.
2. Develop a sensibility towards environmental issues.
3. 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.
4. 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.
5. 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.
6. Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
7. Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
8. Analyse a situation and identify its points for improvement.
9. Propose new methods or well-founded alternative solutions.
10. Critically analyse the principles, values and procedures that govern the exercise of the profession.
11. Propose viable projects and actions to boost social, economic and environmental benefits.
12. Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.
13. Identify and classify the plants.
14. Analyse and interpret the development, growth and biological cycles of plants.

## Contents

The course content is organised into five thematic blocks: one introductory cross-cutting block and four blocks focusing on different practical applications of botany.

### Block 1. Introduction to Applied Botany

Coordinator: Álvaro Fernández-Llamazares

This block provides an overview of applied botany and its different fields of application. It introduces a range of case studies illustrating how botanical knowledge has been mobilised to contribute to the conservation of plants, algae, and fungi while promoting their sustainable uses and applications. The block also reviews the current state of global knowledge on plants, algae, and fungi, including patterns in the discovery of new species, the major threats they face, and the methodological tools used to study them. Finally, students will be introduced to some of the main career opportunities in the field of applied botany.

Lectures: 2 hours

### Block 2. Ethnobotany

Coordinator: Álvaro Fernández-Llamazares

This block introduces the theoretical and methodological foundations of ethnobotany, the scientific discipline that studies the uses and properties of plants, algae, and fungi, as well as their social, cultural, and spiritual significance in societies around the world. Case studies on traditional knowledge of plants, algae, and fungi in

Catalonia will be presented, together with examples of the use of sacred plants in Indigenous societies. The concept of biocultural diversity will be introduced to illustrate how plants, algae, and fungi constitute an integral part of our cultural heritage. The block will also examine the concept of plant blindness, defined as the inability to perceive, appreciate, or interact with the plants that surround us and to recognise their fundamental contributions to human well-being. In addition, students will explore the origins of agriculture and the major centres of domestication and diversification of cultivated plants. Particular attention will be paid to the dynamic relationships between people and plants, not only from the perspective of knowledge systems but also through their identity-forming and psychological dimensions. Finally, several case studies on wild edible plants and the recovery of traditional crop varieties will be presented.

Lectures: 6 hours

Field trip: Visit to the Eixarcolant Collective (5 hours)

During this field trip, students will visit the Eixarcolant Collective, a non-profit organisation that promotes the recovery, and adaptation to contemporary contexts, of traditional uses of wild edible plant species and heritage crop varieties as a means of fostering a more sustainable, healthy, and equitable agri-food system. The visit will focus on wild edible plants, with particular emphasis on their culinary uses and preparation.

Seminar: Applied Ethnobotany and Crop Diversity (1 hour)

This seminar, delivered by Dr Laura Calvet-Mir (Institut Metròpoli), an environmental scientist and ethnobotanist, will present a range of case studies on the recovery of traditional crop varieties, including seed exchange networks, plant exchange fairs, and scientific assessments of the conservation status of local crop varieties cultivated in the kitchen gardens of the Catalan Pyrenees.

### Block 3. Habitat Assessment and Ecological Restoration

Coordinator: Ferran Pauné

This block introduces the fundamental concepts and methods used to assess environmental quality and ecosystem condition through the interpretation of flora and vegetation. Students will become familiar with concepts such as indicator species and plant community assemblages. Different techniques for sampling flora and vegetation will be presented, together with approaches for deriving ecological indicators from different sampling designs. Particular emphasis will be placed on the ecological processes underpinning these indicators, especially species interactions and disturbance dynamics. The block will conclude with case studies illustrating how vegetation-based assessments have contributed to understanding habitat change and informing conservation management, ecological restoration, wildfire prevention, and climate change mitigation.

Lectures: 6 hours

Field trip: Visit to the Congost River Valley (5 hours)

This field trip will provide students with an overview of practical projects and protocols for assessing natural environments using indicator plant species, as well as examples of ecological restoration initiatives. The visit will be led by Aprèn Serveis Ambientals, an environmental consultancy specialising in environmental assessment, management, and outreach. Students will explore the use of vegetation for environmental improvement and nature-based engineering (bioengineering) techniques. Several natural areas in the Congost River Valley (including El Figaró and La Garriga) will be visited, where the company has implemented ecological restoration projects over recent years.

Seminar: Marine Algae: Ecological Functions and Applications in Marine Ecosystems (2 hours)

This seminar, delivered by marine taxonomist and naturalist Xavier Salvador (Institute of Marine Sciences), will examine the ecological role of marine algae, including both phytoplankton and multicellular algae, as the primary producers of marine ecosystems. Topics will include their role as bioindicators, their contribution to

nutrient cycling and oxygen production, and their structural importance in coastal ecosystems. The seminar will also present several ecological restoration projects in marine environments, particularly those involving red and brown algae.

#### Block 4. Conservation of Plants, Algae, and Fungi

Coordinator: Llorenç Sáez

This block provides an overview of current conservation efforts aimed at reversing the global decline of plant, algal, and fungal diversity. Students will review the principal regulations governing the collection of plants, algae, and fungi and discuss ethical issues associated with harvesting protected endemic medicinal plants and the commercial collection of wild mushrooms. Finally, the block introduces the main legal frameworks for the protection of threatened plant species and reviews the criteria and mechanisms used to classify species according to their risk of extinction.

Lectures: 8 hours

Seminar: Plant Communities as a Tool for Assessing Habitat Conservation Status (2 hours)

In this seminar, botanist and river ecosystem management specialist Andreu Salvat (Aprèn Serveis Ambientals) will present a series of protocols and practical case studies drawn from his professional experience, illustrating how plant communities can be used as bioindicators to assess the conservation status of grasslands, river channels, riparian forests, and old-growth forests.

Field trip: Visit to the Botanical Garden and the Botanical Institute of Barcelona (5 hours)

Students will participate in a guided visit led by the technical and scientific staff of the Botanical Institute of Barcelona (IBB). The visit will include the Botanical Garden collections, the IBB Herbarium (the largest herbarium in Catalonia), the Salvador Cabinet (one of the few surviving Enlightenment-era natural history collections), and the Germplasm Bank (a genetic resource collection containing more than 3,000 accessions). Students will also learn about some of the research projects, scientific programmes, and botanical survey initiatives currently being conducted at Catalonia's leading botanical research institution.

Computer practical: Biodiversity Databases (3 hours)

This computer-based practical session introduces students to the main biodiversity databases available both in Catalonia and internationally, together with their application in estimating species extinction risk according to IUCN criteria using the RAMAS Red List software.

#### Block 5. Applications of Plants, Algae, and Fungi in Human Health and as Indicators of Climate Change

Coordinator: Jordina Belmonte

This block provides an introduction to the applications of plants, algae, and fungi in human health. Students will gain an overview of plant-derived bioactive compounds (including toxins, poisons, biocides, and psychoactive substances) and their pharmacological applications. The block will also introduce palynology, with particular emphasis on aerobiology and its contribution to the study of respiratory allergies and the phenology of wind-pollinated plants and fungi. Finally, students will explore the concept of urban greening and its importance for public health and the renaturalisation of increasingly urbanised municipalities.

Lectures: 6 hours

Laboratory practical: Visit to the UAB Palynological Analysis Laboratory (2 hours)

Students will visit the laboratory together with its technical staff, who will present the research carried out on pollen and spore analysis. The visit will include an introduction to the laboratory's main facilities, including the pollen reference collection (palynotheca), pollen, spore, and sporopollenin protein samplers used in

aerobiological monitoring, and the equipment employed to extract pollen and spores from materials such as honey (for quality control), terrestrial sediments, and archaeological deposits, which are used to reconstruct past climates, vegetation dynamics, and human-environment interactions.

## Learning activities and methodology

| Title                | Hours | ECTS | Learning outcomes                         |
|----------------------|-------|------|-------------------------------------------|
| Computer practical   | 3     | 0.12 | 1, 2, 4, 5, 7, 10, 11                     |
| Study                | 94    | 3.76 | 1, 2, 5, 14                               |
| Laboratory practical | 2     | 0.08 | 1, 2, 11, 13, 14                          |
| Lectures             | 28    | 1.12 | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14 |
| Field trips          | 15    | 0.6  | 1, 2, 8, 9, 10, 11, 13, 14                |
| Seminars             | 4     | 0.16 | 1, 2, 5, 7, 10, 12                        |

The teaching methodology of this course combines the following learning activities:

(1) Lectures, in which the main concepts and methods of applied botany are introduced. These sessions cover the fundamental topics addressed in each thematic block. Building on the conceptual framework developed during the lectures, students are expected to consolidate and expand their knowledge through independent study and the recommended bibliography. Lectures are 50 minutes long and are supported by audiovisual teaching materials prepared by the instructors, which will be made available to students as PDF files on the Virtual Campus.

(2) Seminars, in which specific case studies and methodological approaches related to each thematic block are examined in greater depth. Several seminars will be delivered by professionals from outside the UAB who apply botanical knowledge in different professional contexts, thereby providing students with complementary perspectives on the topics covered in the lectures.

(3) Field trips. Students will visit institutions and organisations representing different areas of professional practice in applied botany, including the Botanical Institute of Barcelona (IBB), the Barcelona Botanical Garden, and the environmental consultancy Aprèn Serveis Ambientals.

(4) Computer practical. Students will participate in a computer-based practical in which the main biodiversity databases will be introduced. They will then work through a practical case study to learn how to assess the extinction risk of a species using the IUCN Red List criteria.

(5) Laboratory practical. A laboratory session will be held at the UAB Palynological Analysis Laboratory, where students will be introduced to the main methodologies used in pollen analysis and their applications in fields such as allergology, climate change research, and palaeoecology.

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.

## Assessment

### Continuous assessment activities

| Title | Weight | Hours | ECTS | Learning outcomes |
|-------|--------|-------|------|-------------------|
|       |        |       |      |                   |

|                            |     |   |      |                                           |
|----------------------------|-----|---|------|-------------------------------------------|
| Exam of theory 1st partial | 40% | 2 | 0.08 | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14 |
| Exam of theory 2nd partial | 40% | 2 | 0.08 | 1, 2, 3, 4, 5, 6, 7, 10, 11, 12, 13, 14   |

The course will be assessed on the basis of the grades obtained in two cumulative midterm examinations (with the possibility of resits), as detailed below:

1) FIRST MIDTERM EXAMINATION. This examination assesses the corresponding theoretical content. Students must obtain a minimum mark of 5/10 to pass this component. It accounts for 50% of the final course grade.

2) SECOND MIDTERM EXAMINATION. This examination assesses both the theoretical content and the computer practical component. Students must obtain a minimum mark of 5/10 to pass this component. It accounts for 50% of the final course grade.

3) RESIT EXAMINATION. Only students who need to retake one or both midterm examinations may sit this examination. The resit will follow the same format as the corresponding midterm examinations and each component will retain the same weighting (50% each). Students must obtain a minimum mark of 5/10 in each examination component to pass the course. No compensation between components will be applied.

#### Single Assessment

Students opting for the single assessment system will complete a single comprehensive examination covering all course content, including lectures, practical sessions, and seminars. The mark obtained in this comprehensive assessment will account for 100% of the final course grade. The examination will take place on the same date and at the same time as the second midterm examination. Students who do not pass the examination will be entitled to resit it on the date scheduled for the theoretical resit examination, as specified in the official examination calendar.

#### Use of Artificial Intelligence

In this course, the use of Artificial Intelligence (AI) technologies is permitted exclusively as a support tool for tasks such as literature and information searches, examination preparation, or translation. Students must clearly identify any parts of their work that have been generated or substantially assisted by AI, specify the tools used, and include a critical reflection on how these technologies influenced both the process and the final outcome of the activity. Failure to disclose the use of AI in assessed work will be considered a breach of academic integrity and may result in a partial or total loss of marks for the assessment, as well as more severe disciplinary measures in cases of serious misconduct.

#### Irregularities during the evaluation

Any irregularity committed during an assessment activity (academic misconduct, plagiarism, or improper use of AI, unless such use is expressly authorized in the course syllabus) that may lead to a significant alteration of the grade will result in that activity being graded as 0. If the course syllabus stipulates that obtaining a minimum mark in this assessment is an essential requirement to pass the course, or if multiple irregularities occur in the assessment activities of the same course, the final grade for the course will be 0. Furthermore, disciplinary proceedings may be initiated against any student who incurs any of these irregularities.

#### Bibliography

##### Block 1. Introduction to Applied Botany

Coyle, H.M. 2004. Forensic Botany: Principles and Applications to Criminal Casework. CRC Press.

Font Quer, P. 2014. Plantas medicinales. El Dioscórides renovado. Ediciones Península. Barcelona.

Levetin, E., McMahon, K. 1996. Plants and society. McGraw-Hill. Boston (Mass.).

Murphy, D.J. 2007. People, plants and genes: the story of crops and humanity. Oxford University Press.

Oxford.

Smartt, J., N. Simmonds. 1995. Evolution of crop plants. 2nd Edition. Longman. New York.

## Block 2. Ethnobotany

Anderson, E.N., et al. (eds.). 2011. Ethnobiology. Wiley-Blackwell. London.

Balick, M. J. 1996. Plants, people, and culture: the science of ethnobotany. Scientific American Library, New York.

Kimmerer, R. W. 2015. Braiding Sweetgrass. Milkweed Editions, Minneapolis, US. (traduït al català com a "Trenes d'herba dolça", publicat per Editorial Cossetània)

Lim, T. K. 2013. Edible Medicinal and Non-Medicinal Plants: Fruits (Vol. 1-6). Springer.

Martin, G.J. 2004. Ethnobotany: a methods manual. Earthscan, London [etc.].

Prance, G.T, et al. 1994. Ethnobotany and the search for new drugs. John Wiley & Sons (Ciba Foundation Symposium 185). Chichester.

Schultes, R.E.; Reis, S.V. (eds.). 2008. Ethnobotany: evolution of a discipline. Chapman and Hall, London.

Turner, N.J. (ed.) 2020. Plants, People and Places: The Roles of Ethnobotany and Ethnoecology in Indigenous Peoples' Land Rights in Canada and Beyond. McGill-Queen's University Press, Montreal, QC, Canada.

Wink, M., Van Wyk, B.-E. 2008. Mind-altering and poisonous plants of the world. Timber Press, Portland, London.

## Block 3. Habitat Assessment and Ecological Restoration

Chapin, F.S., P.A. Matson, P.M. Vitousek. 2011. Principles of Terrestrial Ecosystem Ecology. Springer.

Rüter, S., Matthies, S. A., Zoch, L. 2017. Applicability of Modified Whittaker plots for habitat assessment in urban forests: Examples from Hannover, Germany. *Urban Forestry & Urban Greening*, 21, 116-128.

Stohlgren, T.J., 2006. Measuring Plant Diversity: Lessons from the Field. University Press Oxford.

Sutherland, W.J. 2006. Ecological Census Techniques: A Handbook. Cambridge University Press, Cambridge.

## Block 4. Conservation of Plants, Algae, and Fungi

Blackmore, S., & Oldfield, S. (Eds.). (2017). Plant Conservation Science and Practice: The Role of Botanic Gardens. Cambridge: Cambridge University Press. ISBNs: 978-1107148147 (HB), 978-1316602461 (PB). DOI: 10.1017/9781316556726.

Guerrant Jr., E. O., Havens, K., Maunder, M. (eds.). 2004. Ex Situ Plant Conservation: Supporting Species Survival in the Wild. Island Press.

Medicinal Plant Specialist Group, IUCN, WWF Germany, and TRAFFIC. 2007. International Standard for Sustainable Wild Collection of Medicinal and Aromatic Plants (ISSC-MAP). Gland, Switzerland: IUCN.

Sáez, L., Aymerich, P., Blanqué, C. 2010. Llibre vermell de les plantes vasculars endèmiques i amenaçades de Catalunya. Zaragoza: Argania Editio. ISBN 978-84-934400-4-6

IUCN. 2012. Categorías y Criterios de la Lista Roja de la UICN: Versión 3.1. Segunda edición. Gland, Suiza y

Cambridge, Reino Unido: UICN. vi + 34pp. Originalmente publicado como IUCN Red List Categories and Criteria: Version 3.1. Second edition. (Gland, Switzerland and Cambridge, UK: IUCN, 2012).

## Block 5. Applications of Plants, Algae, and Fungi in Human Health and as Indicators of Climate Change

Alonso, J.R. 2020. Tratado de fitofármacos y nutracéuticos. 2a edición. Corpus. Rosario, Argentina. ISBN: 9789871860630

Erdtman, G. 1969. Handbook of palynology: morphology, taxonomy, ecology.

Font Quer, P. 2016. Plantas medicinales. El Dioscórides renovado. Ediciones Península. Barcelona.

Grant Smith, E. 2000. Sampling and identifying allergenic pollens and molds : an illustrated identification manual for air samplers. 3rd Edition. Blewstone Press.

Isard S.A., Gage, S.H. 2001. Flow of life in the atmosphere: an airscape approach to understanding invasive organisms. Michigan State University Press, East Lansing, Michigan, USA

Mandrioli, P., Comtois, P., Levizzan, V. 1998. Methods in aerobiology. Pitagora Editrice Bologna.

Martín, J., Julià, M.A., Riera, C. 2003. Diccionari de palinologia. UB, Barcelona.

Punt d'Informació Aerobiològica (PIA-UAB) <https://aerobiologia.cat>

Sáenz de Rivas, C. 1978. Polen y esporas. H. Blume. Madrid, España.

Sofiev, M., Bergmann, K-C. Eds. 2013. Allergenic Pollen. A Review of the Production, Release, Distribution and Health Impacts. Springer. DOI: [10.1007/978-94-007-4881-1](https://doi.org/10.1007/978-94-007-4881-1). ISBN: 978-94-007-4880-4

## Software

RAMAS Red List Professional, <https://www.ramas.com/red-list-pro>

## Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this [link](#). To access the information, you will need to enter the course CODE

| Type of teaching                   | Group | Language        | Semester       | Shift         |
|------------------------------------|-------|-----------------|----------------|---------------|
| (TE) Theory                        | 14    | Catalan/Spanish | first semester | morning-mixed |
| (PLAB) Practical laboratories      | 141   | Catalan/Spanish | first semester | afternoon     |
| (SEM) Seminars                     | 141   | Catalan         | first semester | morning-mixed |
| (PCAM) Field practices             | 141   | Catalan         | first semester | morning-mixed |
| (VEXT) Visites externes a entitats | 141   | Catalan         | first semester | morning-mixed |