Teaching Guide				
Identifying Data				2022/23
Subject (*)	Plant Systematics: Cryptogamia		Code	610G02024
Study programme	Grao en Bioloxía			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	1st four-month period	Second	Obligatory	6
Language	SpanishGalicianEnglish			
Teaching method	Face-to-face			
Prerequisites				
Department	Bioloxía			
Coordinador	Peña Freire, Viviana	E-mail	v.pena@udc.es	
Lecturers	Leira Campos, Antón Manoel Peña Freire, Viviana Pimentel Pereira, Manuel Piñeiro Portela, Rosalía	E-mail	m.leira@udc.es v.pena@udc.es m.pimentel@udc.es rosalia.pineiro@udc.es	
Web				
General description	Systematic Botany: Cryptogams. We will study fungi, algae, bryophytes and ferns in an evolutionary context, paying special attention to their phylogenetic positions. This course integrates information from previous courses (Biochemistry, Plant Physiology, Plant Anatomy and Histology, etc) and it will useful for students seeking to develop a career in research, teaching, environmental assessment, agriculture, ethnobotany, etc. Contents of this subject are reflected in the Sustainable Development Goals H2030, United Nations (Goal 14-Submarine life and Goal 15-Life in terrestrial ecosystems)			

Study programme competences / results	
Code	Study programme competences / results
A1	Recoñecer distintos niveis de organización nos sistemas vivos.
A2	Identificar organismos.
A4	Obter, manexar, conservar e observar especímenes.
A9	Identificar e utilizar bioindicadores.
A20	Muestrear, caracterizar e manexar poboacións e comunidades.
A22	Describir, analizar, avaliar e planificar o medio físico.
A27	Dirixir, redactar e executar proxectos en Bioloxía.
A32	Desenvolverse con seguridade no traballo de campo.
B1	Aprender a aprender.
B3	Aplicar un pensamento crítico, lóxico e creativo.
B4	Traballar de forma autónoma con iniciativa.
B6	Organizar e planificar o traballo.
B7	Comunicarse de maneira efectiva nunha contorna de traballo.
B8	Sintetizar a información.
B9	Formarse unha opinión propia.
B11	Debater en público.

Learning outcomes			
Learning outcomes	Study programme competences / results		
Acquire basic field- and laboratory work skills for the study of Cryptogams.	A4 A9	B1 B7 B8	

Development of Cryptogams observation, description and identification skills, as well as assessment of Cryptogam species integration and presence in the natural environment.	A2 A4 A20 A22 A27 A32	B1 B4 B6 B11	
Analyse Cryptogamic diversity: complexity, morphology, reproductive systems and adaptation to the environment.	A1 A2	B1 B3 B8 B9	
Understand the variation across the life cycles of the different groups of Cryptogams.	A1	B1 B3 B8 B9	
Encourage the student?s interest in Cryptogamic variation and biology as key elements for a thorough understanding of biodiversity.		B3 B4 B6 B7 B8 B9	
Understand the taxonomy of Crytogams as a reflection of evolutionary relationships among the different groups.	A1 A2	B1 B3 B8 B9	
Acquire skills for a correct and critical use of the bibliography.	A27	B6 B8 B9	

Contents	
Topic	**Sub-topic**
Lectures. Part I: Fungi. Systematics and Evolution	Lesson 1.- General features of fungi and fungi-like organisms. Fungal nutrition and life history. Ecological and economical importance. Origin and classification. Lesson 2.- General features of Acrasiomycota, Myxomycota and Plasmodiophoromycota. Reproduction and life history. Lesson 3.- General features of Oomycota. Reproduction and life history. Lesson 4.- Fungi sensu stricto. General features of Chytridiomycota, Zygomycota, Ascomycota and Basidiomycota. Reproduction and life history. Lesson 5.- Lichens, Fungi imperfectae (Deuteromycetes) and related groups. Ecological and economical importance. Summary and phylogeny of Fungi sensu lato.

Lectures. Part II: Algae. Systematics and Evolution	Lesson 6.- General features of algae. Algal biology, reproduction and life history. Ecological and economical importance. Origin and classification. Lesson 7.- Procariotic algae. Cyanophyta: characters, habitat and classification. Lesson 8.- Eucariotic algae. Rhodophyta: characters, reproduction, life history, habitat and classification. Lesson 9.- Eucariotic algae. Ochrophyta: characters, reproduction, life history, habitat and classification (Chrysophyceae, Xanthophyceae, Bacillariophyceae and Phaeophyceae). Lesson 10.- Eucariotic algae. Haptophyta, Cryptophyta, Dinophyta and Euglenophyta: characters, reproduction, life history, habitat and classification. Lesson 11.- Eucariotic algae. Chlorophyta and Streptophyta: characters, reproduction, life history, habitat, classification and examples of Prasinophyceae, Chlorophyceae and Ulvophyceae (Chlorophyta) and Charophyceae, Zygnematophyceae and Coleochaetophyceae (Streptophyta). The origin of embryophytes.
Lectures. Part III: The colonization of drylands. Systematics and Evolution of embryophytes	Lesson 12.- Introduction to embryophytes. The origin of land plants. Adaptation to drylands. Lesson 13. Non vascular embryophytes; bryophytes s. lat.: characters, reproduction, life history, habitat and classification. Differential features of Anthocerophyta, Marchantiophyta and Bryophyta). Lesson 14.- Introduction to vascular plants. Telomatic theory. Lesson 15.- Euphyllophytina p.p. (Monilophytes, former Pteridophyta) and Lycophytina: features, reproduction, life history, habitat and examples of Lycopsida, Psilophytopsida, Psilotopsida, Equisetopsida, Marattiopsida and Polypodiopsida. Phylogeny of ferns sensu lato.
THEORETICAL TEACHING (SEMINARS)	Seminar 1.- Fungi sensu lato: questions about reproduction, life history, definitions, etc. (2 hours). Seminar 2.- Algae: questions about reproduction, life history, definitions, etc. (2 hours). Seminar 3.- Embriophytic plants: questions about reproduction, life history, definitions, etc. (2 hours). Seminar 4.- General summary of the course and open questions for the students. (2 hours).
PRACTICAL TEACHING (FIELD TRIP)	One field trip in which two localities will be visited to observe cryptogams in marine and terrestrial habitats.
PRACTICAL TEACHING (LAB SESSIONS)	Lab session 1.- Observation, description, identification and preservation of Fungi sensu lato. Lab session 2.- Observation, description, identification and preservation of Lichens. Lab session 3.- Observation, description, identification and preservation of Red Algae. Lab session 4.- Observation, description, identification and preservation of Diatoms and Dinoflagellates Lab session 5.- Observation, description, identification and preservation of Brown Algae. Lab session 6.- Observation, description, identification and preservation of Green algae and Bryophytes s. l. Lab session 7.- Observation, description, identification and preservation of Ferns.

PRACTICAL TEACHING (PRACTICAL CASES)	Practical case 1.- Write a descriptive report of a natural environment of the seashore (mainly seaweeds and lichens), as well as a representative herbarium of the plants collected in the area. Practical case 2.- Write a descriptive report of a natural environment of a forest (mainly lichens, fungi, bryophytes s. lat. and ferns), as well as a representative herbarium of the plants collected in the area.

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A1 A2 B1 B3 B8 B9	23	46	69
Seminar	A1 B1 B3 B7 B8 B9 B11	8	10	18
Laboratory practice	A9 B1 B7 B8	14	7	21
Case study	A2 A4 A20 A22 A27 A32 B1 B4 B6	0	31	31
Field trip	A2 A20 A22 A27 A32	6	3	9
Personalized attention		2	0	2
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	Description
Guest lecture / keynote speech	The lecturer will introduce all the basic concepts and ideas to the students using presentations and documents that will be available to them beforehand.
Seminar	During the seminars, the student will autonomously analyse some of the contents of the course, using what they learnt during the lectures, as well as using the bibliography suggested by the lecturer. The work of the different students will be assessed and discussed by the group.
Laboratory practice	The student will conduct macro- and microscopic descriptions of the Cryprogams available to him in the lab. They will have to complete a questionnaire that will be assessed by the lecturer. The students will also improve their identifications skills through the use of taxonomic keys, guides and floras.
Case study	The student will write a report (in pdf) on the Cryptogam flora growing in two areas of their interest, one in or near the sea-shore (focused in marine algae) and another in a forest (focused in mosses, fungi and ferns). The student will have to collect specimens belonging to the different groups studied in the course, and they will have to prepare a Herbarium that will be assessed (together with the report) by the lecturer.
Field trip	One compulsory field trip guided by the lecturers will take place at the beginning of the term. Areas of interest for Cryptogamic flora will be visisted. During the field trips the lecturers will teach and discuss with the students the cryptogams found. The students will write a report (pdf) about the activities conducted in the field trip that will be assessed by the lecturers.

Personalized attention	
Methodologies	Description
Seminar Laboratory practice Case study Field trip	Guidance will be available to the students in order to solve possible doubts or problems that might arise during the course. Ideally, the student should make appointments with the lecturers by e-mail. In case of students with academic exemption, different mechanisms of personalised attention -face-to-face or no face-to-face- will be applied to attend personally any doubts or questions that may arise

Assessment			
Methodologies	Competencies / Results	Description	Qualification

Seminar	A1 B1 B3 B7 B8 B9 B11	Qualifications will be based on the work conducted by the student as well as on his/her participation in class. Attendance to the seminars is compulsary. Competencies: A1, B1, B3, B7, B8, B9, B11	10
Guest lecture / keynote speech	A1 A2 B1 B3 B8 B9	Assessment will be conducted through a written exam that willl include essay questions, short-answer questions and a multiple choice questionnaire. A1, A2, B1, B3, B8 and B9	40
Laboratory practice	A9 B1 B7 B8	Qualifications will be based on a questionnaire that the student will have to complete during each lab session. Participation will also be considered. Competencies: A9, B1, B7, B8	20
Case study	A2 A4 A20 A22 A27 A32 B1 B4 B6	Qualifications will be based on the content and quality of the report written by the student. An oral exam will also be conducted in order to assess the quality of the herbarium that must be presented together with the report. Competencies: A2, A4, A20, A22, A27, A32, B1, B4, B6	20
Field trip	A2 A20 A22 A27 A32	Qualifications will be based on the report written by the student. Attendance and participation will also be considered. Competencies: A2, A20, A22, A27, A32.	10

Assessment comments

STUDENTS MUST PAY SPECIAL ATTENTION TO THE PLANNING SECTION OF
THIS TEACHING GUIDE.
It is essential that students understand that to be succesful in
the course they should work around 150 hours, from which 51 hours are onsite,
either face to face or telematic. Non presential activities include (but are
not limited to) preparation of case studies and reports, preparation of
seminars and studying for the final exam.
All students that participate in at least 30% of the activities
of the course will obtain a qualification. To pass the course in the first
opportunity, students must participate at least in 70% of the activities of the
course. All students must obtain at least 4,5 points out of 10 in the written
exam (and at least 4 in the different parts of the written text) and 4 out of
10 points in the rest of the activities. The final (overall) grade of the
course must be above 5 points (out of 10).
The fraudulent performance of the assessment tests or activities, once verified, will directly imply a failing grade of "0" in the subject in the corresponding opportunity, thus invalidating any grade obtained in all the assessment activities with a view to the extraordinary opportunity.
To pass the course in the second opportunity (July) all students
(depending on the grades obtained in the first opportunity) must take a written
exam and/or a lab test. The obtained qualifications will be kept only during
the academic term (first and second opportunities). On a case by case basis, those students that,
for justified reasons, are not able to participate in all the programmed
activities will be given alternative options to pass the course.
Students with officially recognised academic exemption or who
participate in equality and diversity support programs are welcome to
participate in this subject. The teachers will adapt the different compulsory
activities in order to enable these students to fulfill the aims of the course.

This course has the following key dates:
Lab course: between September and October, 2022 (specific dates are still pending to be confirmed, they will be communicated in advance)
Field trip: September 30, 2022
Open Lab sessions: between October and November, 2022 (specific dates are still pending to be confirmed, they will be communicated in advance)
Field trip (pdf) report submission (deadline): October 14, 2022

Case study (pdf) report submission and herbarium
exam: December 14, 2022

Sources of information

Basic	A more complete list of references will be available to students at the beginning of the courseBasic bibliography for lectures:ABBAYES, H. des, M. CHADEFAUD, J. FELDMANN, Y. de FERRÉ, H. GAUSSEN, P.-P. GRASSÉ & A.R. PRÉVOT (1989) Botánica, vegetales inferiores. Reverté, Barcelona. BOLD, H.C., C. J. ALEXOPOULOS & T. DELEVORYAS (1989) Morfología de plantas y hongos. Omega, Barcelona. CARRIÓN, J.S. (2003) Evolución vegetal Editorial: DIEGO MARIN, ed. 497 Págs. DÍAZ GONZÁLEZ, T.E. Mª C. FERNÁNDEZ-CARVAJAL ÁLVAREZ & J.A: FERNÁNDEZ PRIETO (2004) Curso de Botánica. Trea Ciencias. FONT-QUER, P. (1993) Diccionario de Botánica. Labor, Barcelona. GORENFLOT, R. (1975) Précis de botanique, 1 Protocaryotes et Thallophytes eucaryotes.Doin, Paris. GORENFLOT, R. & M. GUERN (1989) Organisation et biologie des thallophytes. Doin, 235 p IZCO, J., E. BARRENO, M. BRUGUÉS, M. COSTA, J. DEVESA, F. FERNÁNDEZ, T. GALLARDO, X. LLIMONA, E. SALVO, S. TALAVERA & B. VALDÉS (1997) Botánica. McGraw-Hill, Madrid. PEARSON, L.C. (1995) The diversity and evolucion of plants. C.R.C. Press, New York. RAVEN et al. (1991) Biología de las plantas. RODRÍGUEZ IGLESIAS, F. (Ed.) Galicia Naturaleza. Botánica I. Hércules de Ediciones, S.A., A Coruña. SCAGEL, R.F., R.J. BANDONI, G.E. ROUSE, W.B. SCHOFIELD., J.R. STEIN & T.M.C. TAYLOR (1987) El Reino Vegetal. Omega, Barcelona. SCAGEL, R.F., R.J. BANDONI, J.R. MAZE, G.E. ROUSE, W.B. SCHOFIELD & J.R. STEIN (1991) Plantas no vasculares. Omega, Barcelona. STRASBURGER, E., F. NOLL, H. SCHENCK & A.F.W. SCHIMPER. (2004) Tratado de Botánica (actualizado por P. SITTE et al.) Omega, Barcelona. Basic bibliography for the lab course: EGEA FERNANDEZ, J.Mª & P. TORRENTE PAÑOS (1997) Manual de Teoría y Prácticas de Botánica. DM Librero Editor. GUERRA MONTES, J., J.S. CARRIÓN, M. ABOAL, J.M. EGEA & R.M. ROS (1988) Guiones de clases prácticas de Botánica. Promociones y publicaciones Universitarias, Barcelona. MANOBENS, R. Mª (1988) Botánica, instruccions per als recol-lectors de plantes: l'herbari. Preparació i documentació. Generalitat de Catalunya.
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Introduction to Botany: General Botany/610G02023
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Plant Systematics: Phanerogamia/610G02025
Other comments

Although it is not indispensable, is very important that the student had passed the subject ?Introduction to Botany? (1st course of the degree) and to keep in mind the acquired knowledge in order to be applied in the present subject.

Green
Campus Program of the Faculty of Sciences

To help to achieve a sustainable environment and fulfil with the point 6 of the "Environmental Statement of the Faculty of Sciences (2020)", the documentary works conducted in this subject:

a) will be asked mostly in virtual format and computer support.

b) if paper is employed:

- do not use plastics.

- choose duplex/two-sided printing.

- use recycled paper.

- avoid the use of drafts