TEACHING GUIDE

PHARMACEUTICAL BOTANY

Academic year 2020-2021
Approved on july 09, 2020

MODULE	SUBJECT	COURSE	SEMESTER	CREDITS	TYPE
Biology	Botany	1º	2º	6	Basic

PROFESSOR	TUTORING CONTACT INFORMATION
- Joaquín Molero Mesa (A) jmolero@ugr.es - Reyes González-Tejero (B). mreyes@ugr.es - Juan Francisco Jiménez Martínez (C). jfjimenez@ugr.es - Guillermo Benítez Cruz. (D). gbcruz@ugr.es - Mª Noelia Jiménez Morales (E, F). mnoelia@ugr.es	Dpto. Botánica, planta -1 Facultad de Farmacia. Campus Universitario de Cartuja 18071 – Granada. Teléfono: 958 248 961, Fax: 958 243 912 Correo electrónico secretaria: cheloaj@ugr.es **TUTORING HOURS** Joaquin Molero: Monday, Tuesdays: 11,30-13,30h. Thursday 10,30- 12,30 Reyes González-Tejero: Monday, Tuesday: 11,30-13,30h. Thursday: 10,30-12,30 Juan Francisco Jiménez: Thursday 8:30-11:30h Guillermo Benítez: Monday 10:30-13:30. s Friday 9:30-12:30h M. Noelia Jiménez: Monday, Thursday 10,30-13,30

DEGREE IN WHICH THE SUBJECT IS TAUGHT	OTHER DEGREES IN WHICH THE SUBJECT IS TAUGHT
Pharmacy Degree	Medicine Degree

PREREQUISITES AND/OR RECOMENDATIONS (IF THEY APPLY)

BRIEF ACCOUNT OF THE SUBJECT PROGRAMME

- Plant Biology. Study of natural raw materials for medicinal use.
- Diversity and evolution of fungi, algae and plants. Botanical classification: characters, phylogeny, systematics, nomenclature.
- Origin, ecology, distribution and description of fungi, algae and plants of pharmaceutical interest.

GENERAL AND SPECIFIC COMPETENCIES

A. Generic Competencies

CG1. Identify, design, collect and analyze drugs and medicines as well as other products and raw materials health interest for human or veterinary use.
CG3. Learn to apply the scientific method and acquire skills in the use of legislation, sources of information, bibliography and protocol development
CG6. Promote rational use of medicines and health products, as well as acquiring basic knowledge in clinical management, health economics and efficient use of health resources.
CG15. Recognizing the limitations and the need to maintain and update professional skills, paying particular attention to self-learning of new knowledge based on scientific evidence available.

B. Specific competencies

CE.18 Developing skills related to the use of the beneficial effects of medicinal plants and understand the health risks associated with their misuse.
CE26. Knowing medicinal plants: botanical diversity, physiology, use and management.

OBJECTIVES (EXPRESSED IN TERMS OF EXPECTED RESULTS OF THE TEACHING PROGRAMME)

Learning outcomes

- Recognize the morphological characters of plants and fungi
- To demonstrate the basic degrees of differentiation of the various groups of fungi and plants and to have an overall idea of the botanical diversity and its phylogeny.
- To know and to characterize the plants and medicinal mushrooms: Biodiversity. Phylogeny. Taxonomy and nomenclature.
- To have skill in the manipulation of plant samples for analysis and observation, knowledge of basic botanical terminology, handling of identification keys and documentary sources.
- Perception of the medicinal, economic, environmental and cultural importance of algae, plants and fungi, their link with everyday life and its potential as a source of new products of pharmaceutical interest.

DETAILED SYLLABUS OF THE SUBJECT

THEORETICAL SYLLABUS

Unit 0/Introduction to the subject

GENERALITIES

Unit 1. Concept and object of study of botany. History of Botany and medicinal plants. Pharmaceutical Botany; Course Objectives. Plant concept. Systematics, taxonomy and nomenclature.

Unit 2. Structural and functional characteristics of plants. Morphological organization levels: protophytes, tallophytes and cormophytes. Reproduction in plants and their main types. The alternation of nuclear phases and generations. The life cycle.

Thematic Unit: ALGAE

Unit 3. Algae. Generalities. Prokaryotic algae: *Cyanophyta* Division. Dinoflagellates (*Dinophyta* Division). General characteristics. Poisoning by toxic tides. Cultivation of microalgae and its importance. Pharmaceutical Interest

Unit 4. Ocrophyta Division. *Bacillariophyceae* (diatoms) and *Phaeophyceae* (brown algae) Famillies. Pharmaceutical Interest

Unit 5. Red algae (*Rhodophyta D*ivision) and green (*Chlorophyta* Division). General characteristics. Ecology and uses. Pharmaceutical Interest Thematic Unit: MOSSES AND FERNS

Unit 6. Mosses and liverworts (*Bryophyta* Division). General characteristics. Diversity. Applications. Ferns (*Pteridophyta* Division). General characteristics. Diversity. Pharmaceutical Interest

Thematic unit: SEED PLANTS

Block 1. Gymnosperms

Unit 7. Introduction to the study of seed plants (*Spermatophyta* Division). Gymnosperms. *Ginkgopsida* class. *Coniferopsida* class. *Taxaceae* and *Cupressaceae* families. Morphological and systematic study. Most important genera and species. Pharmaceutical Interest

Unit 8. *Gymnosperms*. *Coniferopsida* class. *Pinaceae* family. Morphological and systematic study. Most important genera and species. *Gnetopsida* class. *Ephedraceae* family. *Ephedra g*enus. Pharmaceutical Interest

Block 2. Primitive angiosperms and monocots

Unit 9. The Angiosperms *(Magnoliopsida* Class). Generalities. ANITA Group. O.*Nimpheales*. O. *Austrobaileyales* (*Illicium*). Magnolides Group. General characteristics Magnoliales Order. *Magnoliaceae, Annonaceae, Miristicaceae* Families. Laurales Order. *Lauraceae, Monimiaceae* families. O. *Piperales. Piperaceae*, *Aristolochiaceae* families. Pharmaceutical Interest

Unit 10. Monocots (Monocotyledons groups). General characteristics. O. *Dioscorales*, *Dioscoreaceae f*amily..O. *Liliales*, *Liliaceae*, *Colchicaceae* and *Smilacaceae* families. Pharmaceutical Interest

Unit 11. Monocotyledons. O. *Asparagales*. *Asparagaceae*, Amaryllidaceae, Xanthorrhoeaceae, *Iridaceae*, *Orchidaceae* Families. Pharmaceutical Interest

Unit 12. Monocotyledons. Comelinides clade. O. *Arecales*. *Arecaceae* family. O. *Poales*. *Bromeliaceae, Poaceae*

families*. O. Zingiberales. Zingiberaceae and Musaceae* families. Pharmaceutical Interest.

Block 3. Angiosperms dicotyledonous

Unit 13. Eudicotyledonous group: O. *Ranunculales. Menispermaceae*, *Ranunculaceae, Papaveraceae* families. Pharmaceutical Interest

Unit 14. Eudicotyledonous. Clade of rosids: O. Vitales. *Vitaceae* family. *Fabidae* (Eurosidas I): O. *Celastrales*.

***Celastraceae* family. O. *Malpighiales*. Families *Euphorbiaceae, Hypericaceae, Erythroxylaceae, Salicaceae*. Pharmaceutical Interest.**

Unit 15. Eudicotyledonous . Clade of rosids O. *Fabales*. Family *Fabaceae*. (*Leguminosae*) Importance of legumes in food and pharmacy. Pharmaceutical Interest

Unit 16. Eudicotyledonous . Clade of rosids : O. Rosales. Families *Rosaceae*, *Rhamnaceae*, *Moraceae*, *Cannabaceae*,

***Urticaceae*. O. *Cucurbitales. Cucurbitaceae*. Pharmaceutical Interest**

Unit 17. Eudicotyledonous. Clade of rosids O. *Fagales*. Families *Fagaceae*, *Betulaceae*, *Juglandaceae*. Malvidas

(Eurosidas II) O. *Myrtales. Lytrhaceae and Myrtaceae* families, Pharmaceutical Interest

Unit 18. Eudicotyledonous. Clade of rosids. O. Brassicales. Families *Brassicaceae* (*Cruciferae*) and *Caricaceae*. O. Malvales. *Malvaceae* and *Cistaceae*. O. Sapindales. *Rutaceae* and *Anacardiaceae* families. Pharmaceutical Interest

Unit 19. Eudicotyledonous, Early Asterids. O. *Caryophyllales.* Families *Caryophyllaceae, Amaranthaceae (*incl.

Chenopodiceae), Cactaceae and Polygonaceae.

Unit 20. Eudicotyledonous Sympetalous or Asterids Clade. O. *Ericales*. Families *Sapotaceae*, *Ebenaceae, Theaceae, Ericaceae.* Lamides (Euasterids I). O. *Gentianales.* Families *Gentianaceae*, *Rubiaceae, Apocynaceae, Loganiaceae*. Pharmaceutical Interest

Unit 21. Eudicotyledonous Sympetalous or Asterids Clade. O. Solanales. Families *Solanaceae, Convolvulaceae, Boraginaceae*. Pharmaceutical Interest

Unit 22. Eudicotyledonous Sympetalous or Asterids Clade O. *Lamiales*. *Oleaceae* families, *Plantaginaceae* (incl. Genus *Digitalis*), *Scrophulariaceae. Pharmaceutical Interest*

Unit 23 Eudicotyledonous. Sympetalous or Asterids Clade. O. *Lamiales*. Family *Lamiaceae* (*Labiatae*. Ecologic, industrial, economic and pharmaceutical importance.

Unit 24. Eudicotyledonous Sympetalous or Asterids Clade. Campanulides (Euasteridas II). O. *Aquifoliales. Aquifoliaceae* family. O. *Apiales*. Family *Apiaceae* (*Umbelliferae*), *Araliaceae*. O. *Dipsacales. Caprifoliaceae* and *Valerianaceae* families. O. *Asterales*. Family *Asteraceae* (Compositae) subfamilies *Lactucoideae* and *Asteroidea*e. Pharmaceutical Interest

Thematic Unit: MUSHROOMS

Unit 25. General characteristics of fungi: Biology, structure, reproduction. The large groups: Zygomycetes, Ascomycetes and Basidiomycetes. Fungi Kingdom, *Zygomycota* Division. O. Mucorales. Pharmaceutical Interest

Unit 26. The *Ascomycota* Division. O. Sacharomycetales, Eurotiales, Pezizales. Pharmaceutical Interest

Unit 27. The *Basidiomycota* Division; Geastrales, Aphyllophorales and Agaricales fungi. Nutritional, pharmaceutical and toxicological concern.

SEMINARS
Botanical methodology, introduction to the subject.
Introduction to the types of plant chemicals. Introduction to Research
The plants used in traditional medicine
Lichens
Allergies caused by pollen
The plant life

PRACTICAL SYLLABUS (imparted by students in 5 sessions) Laboratory practices
Laboratory practices with special emphasis on morphology and botany organography
Recognition flowering plants using artificial keys
Field practice
Practice 1. Fieldwork practice (excursion) to observe, understand and characterize the botanical diversity.

WORKS AND SEMINARS TO BE DEVELOPED BY STUDENTS
-Works / Monographic seminars to be developed on the following topics • Making herbarium with a minimum of 25 plants
This herbarium may be exposed in seminary.
• Group work to develop certain themes of the theoretical program.
• Exhibition of scientific articles.

BIBLIOGRAPHY

FUNDAMENTAL

ARTECHE, A., B. VANACLOCHA, J. I. GÜENECHEA, R. MARTÍNEZ, C. ARCINIEGA, COLEGIO OFICIAL DE FARMACÉUTICOS DE BIZKAIA & ASOCIACIÓN ESPAÑOLA DE MÉDICOS NATURISTAS. (1998). Vademecum de Prescripción. Plantas Medicinales. Fitoterapia 3ª Edición. Masson, S.A. 1148 pp.
DÍAZ GONZÁLEZ, T.; FERNÁNDEZ-CARVAJAL ÁLVAREZ, C. & FERNÁNDEZ PRIETO, J. A. (2004). Curso de Botánica. Ed.Trea 574 pp.
IZCO, J., E. BARRENO, M. BRUGUÉS, M. COSTA, J. DEVESA, F. FERNÁNDEZ, T. GALLARDO, X. LLIMONA, E. SALVO, S. TALAVERA & B. VALDÉS (2ª edic. 2004).Botánica. McGraw-Hill Interamericana. 906 pp.
FONT-QUER, P. (1975). Diccionario de Botánica. Labor, S. A. 1243 pp.
FONT-QUER, P. (1979). Plantas medicinales. El Dioscórides renovado. Labor, S. A. 1033 p.
PIQUERAS, J. (1996).- Intoxicaciones por plantas y hongos. Masson, S. A. 153 pp.
SCAGEL, R. E., BANDONI, R.J., ROUSE, G. E., SCHOFIELD, W.B., STEN, J. R. & T. M. C. TAYLOR (1987).
El Reino Vegetal.
Omega 778 pp.
STRASBURGER, E. (auct. plur.)(2004). Tratado de Botánica 35ª Edición. Marin. 1098 pp.

COMPLEMENTARY BIBLIOGRAPHY

BLANCA, G. (2006-2007, coord.). Proyecto Andalucía Naturaleza. Botánica, 5 vols.Publicaciones Comunitarias-Grupo Hércules, Sevilla.
BLANCA, G., B. CABEZUDO, M. CUETO, C. FERNÁNDEZ LÓPEZ & C. MORALES TORRES (2009, eds.). Flora Vascular de Andalucía Oriental, 4 vols. Consejería de Medio Ambiente, Junta de Andalucía, Sevilla.
JUDD, W. S. & col. (2002). Plant Systematics: A Phylogenetic Approach. Sinauer Associates, Massachusetts, U. S. A.
CASTROVIEJO, S. & col. (1987-). Flora Iberica. CSIC, Real Jardín Botánico, Madrid.
LOPEZ GONZÁLEZ, G. (2004). Guía de los árboles y arbustos de la Península Ibérica y Baleares, 2ª edición. Ed. Mundi Prensa, Madrid.

INTERNET RECOMENDED LINKS

ENLACES RECOMENDADOS

http://www.ugr.es/local/botanica (página web del Departamento)
http://www.unex.es/botanica , http://www.ugr.es/local/mcasares
http://www.uniovi.es/bos/Asignaturas/Botanica/1.htm
http://www.programanthos.org
http://herbarivirtual.uib.es
http://www.floraiberica.es/index.php
http://botanica.ugr.es/pages/publicaciones/libros/cdflorandor1
http://www.mobot.org/MOBOT/research/APweb/

EVALUATION (EVALUATION INSTRUMENTS, EVALUATION CRITERIA AND PERCENTAGE ON THE FINAL QUALIFICATION

The evaluation will be carried out based on the theory and practice exams and the works and presentations carried out, in which the students will have to demonstrate the acquired skills. A balanced knowledge of the whole subject is required to pass any of the test. Based on the UGR Student Evaluation and Qualification Regulations, article 6.2, approved by the Governing Council at its extraordinary session on May 20, 2013, the student will be offered the possibility choosing at the beginning of the academic year between the continuous evaluation system, with tests or knowledge controls throughout the course, or the traditional evaluation system, with the completion of a final knowledge evaluation test. To pass the process of continuous evaluation, it is necessary for the student to obtain an average of 5 or higher grade in the partial exams that will be taken throughout the course. The final evaluation exam will consist of a written test in which the theoretical knowledge acquired will be reviewed through tests, concepts and / or development questions. The subject will be passed as long as the grade is a 5 or higher grade. The decision on the chosen evaluation system must be communicated within a period not exceeding 14 days, after the start of the course

Subject evaluation:

Theory (70%): theoretical knowledge acquired through Continuous Evaluation (6 tests / theoretical controls)

Laboratory practices (10%)

Field work, seminars and other activities (20%)

DESCRIPTION OF THE TESTS THAT WILL BE PART OF THE UNIQUE FINAL EVALUATION ESTABLISHED IN THE "RULES OF EVALUATION AND QUALIFICATION OF STUDENTS OF THE UNIVERSITY OF GRANADA"

In accordance with the Evaluation Regulations in force at the UGR, students who for work reasons, health status, disability or any other duly justified cause prevent them from following the evaluation regime, can opt for the traditional evaluation system with the completion of a Final test of knowledge assessment. In these cases, the student, in the first two weeks of teaching the subject, will request it from the Director of the Department, who will transfer to the corresponding teaching staff, alleging and accrediting the reasons that assist him in not being able to follow the evaluation system keep going.

The final evaluation will consist of a theoretical and a practical exam, which will compute 70% and 30% of the final grade.