

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

Code	43241
Name	Nematology
Cycle	Master's degree
ECTS Credits	3.0
Academic year	2021 - 2022

Study (s)

Degree	Center	Acad. year	Period
2148 - M.D. in Biodiversity: Conservation and Evolution	Faculty of Biological Sciences	1	Second term

Subject-matter

Degree	Subject-matter	Character
2148 - M.D. in Biodiversity: Conservation and Evolution	3 - Biodiversity and conservation of invertebrates	Optional

Coordination

Name	Department
NAVARRO GOMEZ, PILAR	355 - Zoology

SUMMARY

This subject deals with the study of soil nematodes, both in agricultural and natural systems, paying special attention to pathogenic species in the former and to the role of nematodes in soils and their possible use as bioindicators of soil quality in the latter.

Students are expected to acquire basic knowledge about Nematology and its current development, especially its applied aspects. They should also get to know the main trophic groups in which they are integrated and the techniques that allow their extraction, mounting and identification.

It is essential that they understand the interest of phytophagous species, that they learn to recognize them and assess the damage they can cause in relation to their population sizes, that they are aware of their economic importance in production systems and that they are able to carry out effective control of phytonematological problems.



They should also be able to use suitable nematodes as bio-controllers of entomological pests and some techniques for their detection, cultivation and application.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

N o n e .

OUTCOMES

2148 - M.D. in Biodiversity: Conservation and Evolution

- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- To acquire basic skills to develop laboratory work in biomedical research.
- Be able to make quick and effective decisions in professional or research practice.
- Be able to access the information required (databases, scientific articles, etc.) and to interpret and use it sensibly.
- Stimulate the capacity for critical reasoning and for argumentation based on rational criteria.
- Awaken interest in the social and economic application of science.
- Favour intellectual curiosity and encourage responsibility for one's own learning.
- Encourage ethical commitment and environmental awareness.

LEARNING OUTCOMES

To:

- Correctly handle scientific terminology and become familiar with the methodology used in Nematology and its sources of information.
- Acquire the essential basic knowledge about soil-associated nematodes.
- Identify and interpret structures and life cycles of these organisms.
- Learn extraction techniques of soil samples, as well as to perform preparations and/or staining of some structures or organisms.



- Identify specimens by means of simple keys and appropriate bibliography.
- Acquire synthesis skills to be able to gather, in an organized and coherent way, information or data from different sources, through the realization of proposed works tutored and evaluated.
- Obtain an integrated vision of nematodes in the edaphic environment. To understand the meaning of the acquired knowledge, to interrelate and apply it.
- Acquire basic knowledge about Nematology and its current development, especially its applied aspects.
- Acquire general information about the nature, activities and role of soil-dwelling nematodes and the techniques that allow their detection.
- Appreciate the interest of phytophagous species and their economic importance in production systems.
- Acquire the necessary knowledge for the control of phytonematological problems, for the use of nematodes as bio-controllers of entomological pests and as indicators of soil quality.

DESCRIPTION OF CONTENTS

1. Nematodes. General concepts.

Introduction. Objectives. History. Characteristics of edaphic nematodes.

2. Soil nematodes

Trophic groups. Direct and indirect effects. Quantification of the effect of nematodes in the soil. Community indices and their applications.

3. Methodology

Methods and techniques for sampling, extraction, mounting and identification of edaphic nematodes and phytoparasites.

4. Life cycles

Life cycles of soil-associated nematodes. Nematode cultures. Applications.

5. Phytoparasitic and entomopathogenic nematodes

Plant-parasitic nematodes. Economical importance and control. Entomopathogenic nematodes, applications.

**6. Nematodes and agriculture**

Agricultural practices and their effect on nematofauna. Relationship with agricultural production and soil quality.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	20,00	100
Laboratory practices	10,00	100
Development of individual work	5,00	0
Study and independent work	16,00	0
Preparation of practical classes and problem	6,00	0
Resolution of case studies	18,00	0
TOTAL	75,00	

TEACHING METHODOLOGY

This subject will be imparted in a maximum of five weeks. The first sessions will have a theoretical content, and then during the following sessions the effort will be dedicated to the more practical part. Both activities will overlap continuously, since each practical activity will also include theoretical questions.

The time required to teach each of the topics is variable. The sessions required for each of them can be of 1, 2 or 3 hours.

The theoretical sessions will begin with the first session reserved for the presentation of the course and the explanation of the field techniques.

This will be followed by the sampling in the field, which will mark the beginning of the practical activities. During this session, appropriate samples will be extracted and analyzed during the following sessions, given that most of the methods used to obtain samples require some time of exposure to the extraction method.

During the course, students will work in continuous and intensive contact with the samples and will dedicate successive sessions to their study and preparation.

The preparation of a work on the nematofauna present in the samples taken by the students will also be required. The students will meet periodically with the teacher and will have to give him a script of the work in order to check their progress. The practical sessions will include questionnaires that the student will have to fill in and that will be handed in at the end of the course. The result of the evaluation of these questionnaires will be crucial to know the student's progress.



At the end of the course, each student must submit a report with a comprehensive assessment of the state of the soil studied, explaining the corrective measures that in his opinion are the most appropriate and reasoning extensively the justification for them.

EVALUATION

For the evaluation of learning, each student will make a report on the state of the soil analyzed, where it will be necessary to prove the knowledge acquired, both theoretical and practical. For the evaluation of the practical sessions, a continuous evaluation will also be carried out. The practical sessions will be linked to questionnaires that the student will have to answer and it will also be necessary the presentation of the materials and the notebook prepared in the classes from the samples that each one has processed. The different partial contributions of the grades will be the following:

- 1) Report50 %
- 2) Practical questions and participation20 %
- 3) Preparations and practical notebook30 %

REFERENCES

Basic

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- Gaugler, R. & H. K. Kaya (Eds.). 1990. Entomopathogenic Nematodes in Biological Control. CRC Press, Boca Raton.
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- Jairajpuril, M.S. & Ahmad, W., 1992. Dorylaimida - Freelifving, Predaceous and Plantparasitic. E.J. Brill, Leiden.
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Additional

- Abolafia, J. & Peña-Santiago, R. 2003. Nematodes of the order Rhabditida from Andalucía Oriental, Spain. The genus *Acrobeloides* (Cobb, 1924) Thorne, 1937 with description of *A. arenicola* sp. n. and a key to its species. *Journal of Nematode Morphology and Systematics*, 5 (2002): 107-130.
- Abolafia, J. & Peña-Santiago, R. 2006. Nematodes of the order Rhabditida from Andalucía Oriental, Spain. The family *Panagrolaimidae*, with a compendium of species of *Panagrolaimus* and a key to their identification. *Journal of Nematode Morphology and Systematics*, 8 (2005): 133-160.
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- Andrassy, I. 1984. Klasse Nematoda (Ordnungen Monhysterida, Desmoscolecida, Araeolaimida, Chromadorida, Rhabditida). Gustav Fischer Verlag, Stuttgart, Deutschland.
- Andrassy, I. 2001. A taxonomic review of the genera *Aporcelaimus* Thorne & Swanger, 1936 and *Metaporcelaimus* Lordello, 1965 (Nematoda, Aporcelaimidae). *Opuscula Zoologica Instituti Zoosystematici et Ecologici Universitatis Budapestinensis*, 33: 747.
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- Ruess, L., Michelsen, A., Jonasson, S. 1999. Simulated climate change in subarctic soils: responses in nematode species composition and dominance structure. *Nematology*, 1: 513-526.
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ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

English version is not available

Al tratarse de una asignatura fundamentalmente práctica, es difícil impartirla sin clases presenciales, no obstante se podrían sustituir algunas de éstas (por ejemplo las salidas al campo) por vídeos, y algunas clases de laboratorio se podrían dar por videoconferencia, proyectando las imágenes del microscopio en la pantalla del laboratorio y explicando cómo diferenciar los diferentes grupos de nematodos edáficos (bacteriófagos, fitoparásitos, fungívoros, depredadores,...).

Si los estudiantes no pudiesen hacer el trabajo de campo, a partir del cual elaboran los informes que se solicitan para su evaluación, estos informes serían sustituidos por estudios sobre los diferentes grupos tróficos de nematodos, en especial por los que mayor influencia tienen tanto en ecosistemas agrícolas, como jardines o incluso ecosistemas naturales.