

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

<b>Code</b>	43057
<b>Name</b>	Endocrine disruption
<b>Cycle</b>	Master's degree
<b>ECTS Credits</b>	3.0
<b>Academic year</b>	2019 - 2020

**Study (s)**

<b>Degree</b>	<b>Center</b>	<b>Acad. year</b>	<b>Period</b>
2139 - M.U. en Contaminación, Toxicología y Sanidad Ambient. 12-V.2	Faculty of Biological Sciences	1	Second term

**Subject-matter**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
2139 - M.U. en Contaminación, Toxicología y Sanidad Ambient. 12-V.2	3 - Environmental toxicology	Optional

**Coordination**

<b>Name</b>	<b>Department</b>
GARCERA ZAMORANO, MARIA DOLORES	23 - Functional Biology and Physical Anthropology

**SUMMARY**

The subject "**Endocrine disruption**" is responsible for transmitting basic and applied knowledge on the endocrine regulation of animals, and how the presence in the environment of substances resulting from human activity (xenobiotics) can severely interfere with this regulation. The acquisition of this knowledge is accompanied by a set of competencies and skills that will lead to full professional training.

The study of this subject is essential to understand some phenomena of intoxication and impairment of fundamental physiological functions in animals, that may occur as a result of the presence of chemical agents in the environment capable of mimicking/antagonize the endocrine control functions thereof.

It is a subject with 3 ECTS, which is situated in the second semester of postgraduate studies. Efforts to acquire theoretical concepts represent 2.5 ECTS credits, while practical experience supposed 0.5 ECTS. It has an applied nature, aimed at evaluating specific situations that occur in the environment



## PREVIOUS KNOWLEDGE

### Relationship to other subjects of the same degree

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

### Other requirements

## OUTCOMES

### 2139 - M.U. en Contaminación, Toxicología y Sanidad Ambient. 12-V.2

- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.
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- Capacidad de análisis, síntesis y razonamiento crítico en la aplicación del método científico.
- Capacidad para el aprendizaje autónomo y organizado y para la adaptación a nuevas situaciones.
- Comprensión del mundo natural como producto de la evolución y de su vulnerabilidad frente a la influencia humana.
- Desarrollo de un compromiso ético y capacidad de participación en el debate social.
- Comprender los mecanismos de toxicidad de contaminantes.
- Realizar diagnóstico de problemas ambientales.
- Diseñar los indicadores específicos para un riesgo ambiental concreto.

## LEARNING OUTCOMES

### SKILLS TO ACQUIRE.

- To handle scientific terminology properly and become familiar with endocrine methodology and their sources.
- To get an integrated view of the functioning of animals. Make sense of foreground, interrelate and apply.



- To get ability to analyze data, choosing the right method, critical evaluation and interpretation of experimental results in various forms of expression (tables, graphs ...).
- To acquire synthesis capacity to collect, coherently and in an organized way, information or data of different origins.
- To meet the management of basic scientific instrumentation typical of Endocrinology.
- To acquire sufficient skill in handling experimental animals

## **SOCIAL SKILLS**

Develop capacity for critical thinking, fostering communication and discussion with a view to stimulating individual creative ability.

Ability to work in groups when dealing with problematic situations collectively.

Ability to build a comprehensive text written and organized.

Ability to speaking to a public audience, such as the class itself, by exposure or intervention in a debate on a topic or controversial issue.

Ability to interact with both the teacher and with peers.

Interest in social and economic application of science and in particular the Environmental Toxicology.

Interest in popular science and the impact of science on culture and consciousness of society.

Professional training. Acquisition of scientific and technical knowledge related to Endocrinology that will facilitate the work in Environmental Toxicology in a society in continuous technological progress.

## **DESCRIPTION OF CONTENTS**

### **1. THEORY**

UNIT 1.- INTRODUCTION TO THE SUBJECT. Definition of endocrine disruption.- Endocrinology. Concept. Importance.- History of Endocrinology.

UNIT 2.- INTRODUCTION TO THE ENDOCRINE SYSTEM. Cellular communication: regulatory molecules.- Hormones: general characteristics.- Hormonal interactions.- Endocrine glands. Types.

UNIT 3.- Hypothalamic-pituitary axis.- Hypothalamic-pituitary-thyroid axis.- Hypothalamic-pituitary-adrenal axis.-Hypothalamic-pituitary-gonadal axis.

UNIT 4.- SIGNAL TRANSDUCTION. General characteristics.- Concept and types of receptors.- Membrane receptors.- Intracellular receptors.

UNIT 5.- AGONIST AND ANTAGONIST ACTIONS. Ligand-receptor interaction: affinity, efficacy and



potency.- Hormonal interactions: synergism, permissiveness.- Pure and partial agonists.- Competitive and non-competitive antagonism.

UNIT 6.- ENDOCRINE DISRUPTION. General aspects of endocrine disruption.- Potential impact of endocrine disruptors.- Modes of action of endocrine disruptors.- Human and wildlife exposure to endocrine disruptors.- Criteria for evaluation of endocrine disruptors.- Future needs in this field .

UNIT 7.- PCB's as endocrine disruptors.

UNIT 8.- Polychlorinated dibenzo-p-dioxins.

UNIT 9.- DDT and its analogues as endocrine disruptors.

UNIT 10.- Heavy metals.

UNIT 11.- Endocrine disruption by alkylphenolic compounds.

UNIT 12. Phytochemical compounds with endocrine activity.

UNIT 13. Triazines.

## **2. LABORATORY**

Disruption of metamorphosis and reproduction in insects.

## **3. TUTORIALS**

The issues raised by students are solved regarding the topics explained during theoretical classes.

## **4. COMPLEMENTARY ACTIVITIES**

SEMINARS: Students will deepen a topic proposed by the teacher. The seminars will be presented by all students in the group, after which it will open a discussion moderated by the teacher.

CONFERENCES: Attendance at lectures given by members of the scientific community experts on the subject of the course.



## WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	21,00	100
Attendance at events and external activities	1,00	0
Development of group work	8,00	0
Study and independent work	14,00	0
Preparation of evaluation activities	20,00	0
Preparing lectures	10,00	0
Preparation of practical classes and problem	1,00	0
<b>TOTAL</b>	<b>75,00</b>	

## TEACHING METHODOLOGY

The course **is divided into**:

- Lectures with a total of 10 hours and to be taught sequentially throughout the course, so that they are integrated with the other proposed activities.
- Laboratory (MANDATORY ATTENDANCE). The total hours are spread over 3 sessions of 2 hours each. In each session, students complete the proposed activities after reading the instructions previously provided. You may not approve the practice if you have not attended all sessions.
- The collective Tutorials. There will be one tutorial throughout the course. It will be 1 hour long.
- Seminars (MANDATORY ATTENDANCE) will be prepared in groups of two/three students on the theme proposed by the teacher.
- Conferences: will be given by members of the scientific community experts in the subject.
- Tests, the knowledge acquired in the theoretical and practical classes will be checked out.

## EVALUATION

The following distribution of a maximum of 100 points is proposed:

- I. Assimilation of theoretical and practical concepts (up 40 points) by performing a final written exam.
- II. Evaluation of seminars (up 50 points). The quality of work will be assessed as well as its presentation and defense.
- III. Conferences. The drafting and adjustment of the summary to be provided by students (up 10 points) will be assessed.





## REFERENCES

### Basic

- Bentley, P.J. (1998) COMPARATIVE VERTEBRATE ENDOCRINOLOGY (3rd Ed.) Cambridge University Press.
- Bolander, Franklin F. (2004) MOLECULAR ENDOCRINOLOGY. Elsevier Academic Press. San Diego, London. 632 pp.
- Lodish, Harvey; Berk, Arnold; Matsudaira, Paul; Kaiser, Chris A.; Krieger, Monty; Scott, Matthew P.; Zipursky, S. Lawrence, and Darnell, James. (2004) MOLECULAR CELL BIOLOGY (5th Ed.) W. H. Freeman and Co. New York.
- Norris, David O. (2007) VERTEBRATE ENDOCRINOLOGY (4th Ed.) Elsevier Academic Press. San Diego, London. 550 pp.
- Norris, David O. and Carr, James A. (Eds) (2006) ENDOCRINE DISRUPTION: Biological bases for health effects in wildlife and humans. Oxford University Press. New York. 477pp.

### Additional

- Berkson, Lindsey (2000) HORMONE DECEPTION. McGraw Hill Books. New York.
- Hadley, Mac E. (2000) ENDOCRINOLOGY (5th Ed.) Prentice Hall. New Jersey, London.
- Highnam, K.C. y Hill, L. (1978). The Comparative Endocrinology of the Invertebrates. Edward Arnold.
- Krimsky, Sheldon (2000) HORMONAL CHAOS. The Johns Hopkins University Press. Baltimore and London.
- Schettler, Ted; Solomon, Gina; Valente, María, and Huddle, Annette. (1999) GENERATIONS AT RISK: Reproductive Health and the Environment. Massachusetts Institute of Technology Press.

## 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**

