Asignatura: Aquatic Bioindicators
Código: 32766
Centro: Facultad de Ciencias
Titulación: Master of Inland Water Quality Assessment
Nivel: Master
Tipo: obligatoria- Mandatory
Nº de créditos: 4 ECTS

ASIGNATURA / COURSE TITLE

BIOINDICADORES ACUÁTICOS/ AQUATIC BIOINDICATORS

1.1. Código / Course Number

32766

1.2. Materia / Content area

This course is mandatory and is not included in any higher rank area within the master

1.3. Tipo / Course type

Compulsory - Mandatory

1.4. Nivel / Course level

Master (second cycle)

1.5. Curso / Year

1st

1.6. Semestre / Semester

1st (Fall semester)

1.7. Número de créditos / Credit allotment

4 ECTS

1.8. Requisitos previos / Prerequisites

A Bachelor degree with a major in Biology, Environmental sciences or Environmental Engineering. Students should be familiar with Biological concepts, description and physiology, and of course with the notions acquired in Aquatic ecology.

1.9. Requisitos mínimos de asistencia a las sesiones presenciales / **Minimum attendance requirement**

Attendance is mandatory, at a minimum of 80 % of in-class sessions is mandatory
Attendance to seminars and discussions, chats, etc. is mandatory

1.10. Datos del equipo docente / **Faculty data**

Docente(s) / Lecturer(s): Elvira Perona
Departamento de Biología / Department of Biology
Facultad de Ciencias/ Faculty Sciences
Despacho B-002- Módulo Edificio de Biología / Office – Module B-002, Biology Building
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Página web/Website:http://www.uam.es/elvira.perona
Horario de atención al alumnado/Office hours: Monday to Friday from 15-17 hours (preferably contact with the teacher previously)

1.11. Objetivos del curso / **Course objectives**

They would have skills identifying bioindicators, taxonomy, biology, ecology, physiology and use of bioindicators in aquatic inland waters.

The students should know all groups or organisms used as bioindicators.
Students should know the different methods and protocols used for major bioindicators types (for legislation, ecosystem management, environment stress assessment etc)

1.12. Contenidos del programa / **Course contents**

Module 1: BIOINDICATORS AS BIOINDICATION STRATEGIES:

1. Bioindication elements and Strategies: What is a bioindicator? Principles of bioindication. Bioindicators as tools to evaluate aquatic ecosystem integrity.

2. Bioindicators and environmental stress. Uses and kinds of bioindicators. Advantage/Disadvantage of bioindicators in comparison with other methods.

3. Environmental parameters or environmental state assessed by the use of bioindicators

4. Types of bioindicators: biomarker, biosensor, ecological indicator. Differences of bioindication / biomonitor

Module 2. USE OF BIOINDICATOR FOR ASSESSMENT WATER QUALITY

5. Choosing and using bioindicators under different situations and bioindication strategies.

6. Predictive systems to detect toxic effects in water systems. Design and application of Bioassays, Biotest and Mesocosm

7. Aquatic bioindicators: biology, ecology, physiology, relevance and their use as a tool for bioindication in inland waters ecosystems (stream, river, lake, dam, estuary, wetland, marsh)

7. Approaches, biological assessment systems and methods: Design and application of biological indexes and statistical procedures

8. Comparative and intercalibration procedures with bioindicators

9 Biotechnology in aquatic bioindicators: new tools for biomonitors, bioreports, etc.

1.13. Referencias de consulta / **Course bibliography**

Jamil, K. 2001- Bioindicators and biomarkers of environmental pollution and risk assessment. Science Publishers, Inc. USA 204 pp.

John D.M., Whitton B.A. & A.J.Brook (Eds) 2002. The freshwater algal flora of the British Isles. An identification Guide to Freshwater and terrestrial Algae. Camdbridge University Press. London.

Hellawell J.M. Biological indicators of freshwater pollution and environmental management. En: Pollution monitoring series. Elsevier Science Pub. 1989. Norwich. Inglaterra

Lovett Doust J., M. Schmidt y L. Lovett Doust. Biological assessment of aquatic pollution: a review, with emphasis on plants as biomonitors. Biological Reviews 1994 (69): 147-186.

McKenzie D.H., D.E. Hyatt y V.J. McDonald. Ecological Indicators. Vol.1 & 2. Chapman and Hall. 1995. Cornwall. I

Markert B.A,. Breure A.M and Zechmeister H.G.(EDS), 2003, Bioindicators & biomonitors Elsevier

2. Métodos docentes / Teaching methodology

1. *Lectures* 2. *Seminars and practical exercises, oral presentation*
3. *Papers prepared individually or in groups*:
4. *Online teaching*
5. *Office hours, including online*
6. *Written exam*

(all task are mandatory at 80 %).

The calendar of every task will be notified in different moments and all the lectures will be presented to the student during September, October and the first week on November. *(see final calendar for the master courses)

3. Tiempo de trabajo del estudiante / Student workload

AMOUNT OF STUDENT WORK MEASURED IN HOURS

Task	Time (h)
lecture attendance (presential)	25
seminar (preparation and discussion) (partially presential)	20
Reading papers and exercises	15
Work group	10
study and exam (partially presential)	30
Total amount	100

4. Métodos de evaluación y porcentaje en la calificación final / **Evaluation procedures and weight of components in the final grade**

Final score will be calculated assuming the credit load of each module and students assignments
Exam about concepts: 50 %
Seminar : 20 %
Exercises and other activities: 30 %

Every part (EXAM/SEMINAR/OTHER ACTIVITIES) should be passed independently for the final score in Aquatic bioindicators.

Any student that participated less than 10% of evaluable activities will be qualified as "unevaluated".

In the case that the student does not obtain the minimum requirements for passing the course (see evaluation section) will have another opportunity "convocatoria extraordinaria" at the end of the academic year (June-July).

5. Cronograma* / **Course calendar**

Week	Contents	Contact hours	Independent study time
1	Themes 1-2	4	5
1-2	Themes 3-4-5 Theory & Exercises	6	10
2	Themes 6 Theory & Exercises	6	10
3	Themes 6 Theory & Exercises	6	10
3-4	Themes 7-8 Theory & Exercises	6	10
5-6	Theme 9 Theory & Exercises	4	10
6	Exam	4	25
6	Seminar	4	10

Presential lectures will be taught during 6 weeks (September and October), Seminar and Exam will take place on January

*(see final calendar for the master courses)