

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

Code	43053
Name	Water quality and ecological status of inland aquatic ecosystems
Cycle	Master's degree
ECTS Credits	4.0
Academic year	2020 - 2021

Study (s)

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

Subject-matter

Degree	Subject-matter	Character
2139 - M.U. en Contaminación, Toxicología y Sanidad Ambient. 12-V.2	2 - Environmental pollution	Optional

Coordination

Name	Department
ANDREU SANCHEZ, OSCAR ENRIQUE	23 - Functional Biology and Physical Anthropology
ARMENGOL DIAZ, JAVIER	275 - Microbiology and Ecology
CAMACHO GONZALEZ, ANTONIO	275 - Microbiology and Ecology

SUMMARY

The subject "Water quality and ecological status of aquatic ecosystems" aims to provide students with theoretical and practical knowledge to enable them to assess problems regarding to water pollution or any other affecting aquatic ecosystems. It also provides knowledge and capacities for the assessment of ecological status of these ecosystems in the light of the Water Framework Directive (2000/60/EC) and, referring to the conservation of natural habitats, the habitats Directive (92/43 / EEC) as well as legislation and programs of measures associated with the implementation of both policies in Spain and the European Union.

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 are able to integrate knowledge and handle the complexity of formulating judgments based on information that, while being incomplete or limited, includes reflection on social and ethical responsibilities linked to the application of their knowledge and judgments.
- Students have the learning skills that will allow them to continue studying in a way that will be largely self-directed or autonomous.
- Students have the knowledge and understanding that provide a basis or an opportunity for originality in developing and/or applying ideas, often within a research context.
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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.
- Valorar integralmente del estado de salud del medio ambiente.
- Saber catalogar y evaluar recursos biológicos.
- Conocer la estructura y dinámica de las poblaciones.
- Evaluar el estado ecológico de los ecosistemas acuáticos epicontinentales.
- Interpretar el paisaje y restaurar hábitats.
- Planificar la explotación racional de los recursos naturales renovables terrestres y acuáticos.
- Evaluar la calidad de aguas.
- Comprender e interpretar los procesos de contaminación de las aguas y sus efectos.

LEARNING OUTCOMES

SKILLS TO ACQUIRE.

- To handle scientific terminology properly and become familiar with their sources.
To get an integrated view of the defense mechanisms of adaptation to the environment of animals.
Make sense of foreground, interrelate and apply.
- Ability to analyze data, choosing the right method, critical evaluation and interpretation of experimental results in various forms of expression (tables, graphs ...).
- Acquire synthesis capacity to collect, coherently and in an organized way, information or data of different origins.
- Meet the management of basic scientific instrumentation typical of Water Quality assessment



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 resistance to xenobiotics that will facilitate the work in ecology and water quality assessment in a society in continuous technological progress.

DESCRIPTION OF CONTENTS

1. THEORICAL LESSONS

- 1.- Introduction: The water: physical properties and water cycle. Hydrological regime of aquatic ecosystems. Aquifers.
- 2.- Water Framework Directive. Other European Directives that affect aquatic ecosystems.
- 3.- Water Planning. Impacts on quality and quantity of water and aquatic ecosystems.
- 4.- Pollution of aquatic systems: concepts. Bioaccumulation in food webs. Matrices: water, sediments and biota.
- 5.- Pollution processes and their effects on aquatic ecosystems. Eutrophication, acidification, heavy metals, faecal contamination, xenobiotics and complex organic compounds. Causes, effects, evaluation and solutions. Other types of pollutants, thermal pollution, radiation, etc.
- 6.- Evaluation of pollution. Physical-chemical indicators and methods of determination.
- 7.- Biological indicators and methods of determination
- 8.- Regulations on water quality and aquatic ecosystem health.
- 9 Monitoring. Control networks.
- 10.- Assessment of ecological status (DMA) and condition (DH)
- 11.- Measures mitigation of pollution of aquatic ecosystems. Restoration of a aquatic ecosystems
- 12.- Water quality and aquatic ecosystems in private companies and the water administration

**2. PRACTICAL SESSIONS**

1. Field trip for sampling biological and physical-chemical variables in locations with different pollution levels.
2. Laboratory Classes for the biological and physical-chemical analyses
3. Office work and sharing: Evaluation of water quality and ecological status.

WORKLOAD

ACTIVITY	Hours	% To be attended
Laboratory practices	25,00	100
Theory classes	15,00	100
Development of individual work	5,00	0
Study and independent work	15,00	0
Preparation of evaluation activities	10,00	0
Preparing lectures	10,00	0
TOTAL	80,00	

TEACHING METHODOLOGY

- Master class for acquiring the fundamental knowledge, including methodological aspects.
- Practice class on the evaluation of pollution effects.
- Students will work in groups (of 2 or 3 people) on specific subjects proposed by the lecturer, finally showing their results in an oral presentation to the rest of the class.
- A tutorship of 1.5 hours will be carry out in the class. On the other hand, other tutored sessions will be available by e-mail or using the “aula virtual” tool.
- All activities and master classes are reinforced with documentation and information exchanges between lecturers and students using the “aula virtual” tool of the Universitat de València webpage.

EVALUATION

Exámenes escritos sobre las clases teóricas y/o prácticas: basados en los resultados del aprendizaje y en los objetivos específicos de la asignatura, esta parte tiene un peso del 60% de la nota final. La nota mínima compensable con la parte de prácticas se fija en 4.0 sobre 10.

Elaboración de una memoria de prácticas que recoja el trabajo realizado durante las sesiones de campo y laboratorio incluyendo la discusión crítica de los resultados obtenidos durante las mismas. Esta parte tiene un peso del 40% de la nota final. Asistencia obligatoria al menos al 80% de las sesiones. La nota mínima compensable con la parte de teoría se fija en 4.0 sobre 10.



Recuperacion de la parte teórica: Sólo se realizará una recuperación (2ª convocatoria) de la parte teórica de la asignatura para aquellos alumnos suspendidos o no presentados en la primera convocatoria.

REFERENCES

Basic

- Andreu, E. & A. Camacho. 2002. Recomendaciones para la toma de muestras de agua, sedimentos y biota en humedales Ramsar. Dirección General de Conservación de la Naturaleza, Ministerio de Medio Ambiente. Madrid.
- APHA - AWWA WEF. 1992. Standard methods for the examination of water and wastewater. 18th edition. American Public Health Association. Washington D.C., 1100 pp.
- Appelo, C. A. J. & D. Postma. 1993. Geochemistry, groundwater and pollution. A. A. Balkema. Rotterdam, Brookfield. 536 pp.
- DOCE 1992. Directiva 92/43/CEE del Consejo, de 21 de mayo de 1992, relativa a la conservación de los hábitats naturales y de la fauna y flora silvestres. DOCE, nº L 206: 7-50, de 22 de julio de 1992. Bruselas. Texto consolidado, editado en 2004. Oficina de Publicaciones Oficiales de las Comunidades Europeas, Luxembourg.
- DOCE. 2000. Directiva 2000/60/CE del Parlamento Europeo y del Consejo, de 23 de octubre de 2000 por la que se establece un marco comunitario de actuación en el ámbito de la política de aguas. DOCE nº L 327: 1-73, de 22 de diciembre de 2000. Bruselas.
- DOCE. 2006. Directiva 2006/118/CE del Parlamento Europeo y del Consejo, de 12 de diciembre de 2006, relativa a la protección de las aguas subterráneas contra la contaminación y el deterioro. DOCE nº L 372: 19-31, de 27 de diciembre de 2006. Bruselas.
- Orozco, C.; A. Pérez, M. A. González, F. J. Rodríguez & J. M. Alfayate. 2003. Contaminación ambiental: una visión desde la química. Thomson Editores Paraninfo. Madrid.
- Orozco, C.; A. Pérez, M. A. González, F. J. Rodríguez & J. M. Alfayate. 2003. Problemas resueltos de contaminación ambiental: cuestiones y problemas resueltos. Thomson Editores Paraninfo. Madrid.

Additional

- Allan, J. D. & M. M. Castillo. 2007. Stream Ecology: Structure and Function of Running Waters. Springer
- Álvarez Cobelas, M.; J. Catalán & D. García de Jalón 2005. Impactos sobre los ecosistemas acuáticos continentales. En: Moreno, J. M. (coord.), Evaluación Preliminar de los Impactos en España por Efecto del Cambio Climático. Ministerio de Medio Ambiente, Gobierno de España, Madrid.
- BOE 2001. Real Decreto Legislativo 1/2001, de 20 de julio, por el que se aprueba el texto refundido de la Ley de Aguas. BOE nº 173: 26791- 26817, de 24 de julio de 2001. Madrid
- BOE 2007. Real Decreto 907/2007, de 6 de julio, por el que se aprueba el Reglamento de la Planificación Hidrológica. BOE nº 162: 29361-29398, de 7 de julio de 2007. Madrid.
- Confederación Hidrográfica del Ebro, 2005. Metodología para el establecimiento del estado ecológico según la Directiva Marco del Agua. Protocolos de muestreo y análisis para: Fitobentos, Fitoplancton, Ictiofauna, Invertebrados bentónicos, Macrófitos. Confederación Hidrográfica del Ebro (Ministerio de Medio Ambiente), Zaragoza.
- Costanza, R.; R. d'Arge, R. de Groot, S. Farber, M. Grasso, B. Hannon, K. Limburg, S. Naeem, R. V. O'Neill, J. Paruelo, R. G. Raskin, P. Sutton & M. van den Belt. 1997. The value of the world's ecosystem services and natural capital. Nature 387: 253-260.



- Confederación Hidrográfica del Ebro, 2005. Metodología para el establecimiento del estado ecológico según la Directiva Marco del Agua. Protocolos de muestreo y análisis para: Fitobentos, Fitoplancton, Ictiofauna, Inverteb
- Elosegi A. & S. Sabater, 2009. Conceptos y técnicas en ecología fluvial. Fundación BBVA, Madrid, 444 pp.
- Falkenmark, M. 2003. Water Management and Ecosystems: Living with Change. Global Water Partnership. Elanders, Sweden
- Jørgensen S.E. & G. Bendoricchio. 2003. Fundamentals of Ecological Modelling. Third edition. Elsevier. Amsterdam. 526 pp.
- Kalff, J. 2002. Limnology. Prentice Hall. 592 pp.
- Kumagai M. & W.F. Vincent 2003. Freshwater management. Global versus local perspectives. Springer. 233 pp.
- Likens, G. E. (ed.), 2009. Encyclopedia of Inland Waters. Elsevier, Oxford, UK, 6492 pp.
- Maitland P.S. & N.C. Morgan 1997. Conservation and management of freshwater habitats: lakes, rivers and wetlands. Chapman & Hall-Kluwer. New York.
- Mason, C. 2001. Biology of Freshwater Pollution. Prentice Hall
- Margalef, R. 1981. Limnología. Omega. Barcelona.
- Rosenberg D.M. & V.H. Resh 1993. Freshwater biomonitoring and benthic macroinvertebrates. Chapman & Hall, London.
- Wetzel R.G. & Likens G.E. 2000. Limnological analyses. Springer-Verlag, New York

ADDENDUM COVID-19

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

1. Contents

The contents of the laboratory sessions are maintained as initially collected in the Teaching Guide. Those concepts that can be acquired by audiovisual material to the detriment of one that, by their nature, can only be carried out mostly in person will be prioritized.

The contents to be developed in the field session are reduced to those that can be developed by audiovisual material, available on platforms of free access that will be facilitated by the teachers.

2. Workload and temporary planning of teaching

The face-to-face internship sessions scheduled in the subject are replaced by autonomous study work based on material (problems, audiovisual material, etc.) provided by the teachers.

The weight of the practice part (2.5 ECTS) within the subject is maintained.

Schedules are not maintained giving the student the freedom to perform the scheduled activities according to their own schedule.

The delivery of the practice memory can be done until June 30 through the specific task implemented in Virtual Classroom.



3. Teaching methodology

The teaching methodology adapts to the new situation of non-presence. To do this, the following adaptations will be implemented:

- 1.-Upload of materials to virtual classroom that complement those available for face-to-face practices
- 2.-Proposal of activities by virtual classroom
- 3.-Resolution of practical exercises to be solved by students based on real data provided by teachers
- 4.-Visualization of demo videos and free access tutorials provided by teachers and/or available on free access platforms
- 5.-Tutoring via e-mail or forum in AV to solve doubts

4. Evaluation

The face-to-face examination for the evaluation of the knowledge acquired in the face-to-face sessions of theory, originally posed as a written test and a test, is replaced by a single objective test in Virtual Classroom (test-type examination) to be performed in very limited time. The weight of this test will be worth 40% of the final grade.

The practices will be evaluated as set out in the original Guide, i.e. by a written report that collects the procedures, results obtained during the conduct of the internship sessions, as well as the interpretation of them. This part will have a weight of 60% of the final grade.

Both parties shall be compensable with each other provided that the note of each part is 4/10.