Course guide
250MEA013 - 250MEA013 - Water Resources and Comprehensive Management

Last modified: 26/06/2024

Unit in charge: Barcelona School of Civil Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering.

Degree: MASTER'S DEGREE IN ENVIRONMENTAL ENGINEERING (Syllabus 2024). (Optional subject).

Academic year: 2024 **ECTS Credits:** 5.0 **Languages:** Spanish

LECTURER

Coordinating lecturer: FRANCISCO JAVIER SANCHEZ VILA

Others:

TEACHING METHODOLOGY

The course consists of 3 hours per week of teaching in which the teacher presents the basic concepts and topics of the subject, shows examples and solves exercises.

Some classes will be dedicated to solve practical problems with greater interaction with the students. The objective of these practical exercises is to consolidate the general and specific learning objectives.

Support material is provided using the virtual campus ATENEA.

Although most of the sessions will be given in the language indicated, sessions supported by other occasional guest experts may be held in other languages.

LEARNING OBJECTIVES OF THE SUBJECT

.The goal on a global scale is to strengthen the security of water resources in a context of increasing demand, water scarcity, growing uncertainty, greater extremes and challenges of fragmentation. This is why a great knowledge of all the resources in terms of quantity, in the relationships between all of them and with the global cycle, and the analysis of their quality is needed. Investments in innovative technologies to improve productivity, conserve and protect resources, recycle rainwater and wastewater, and develop non-conventional water sources should be explored, as well as opportunities to improve water storage.
The correct management of resources has a component of institutional strengthening, generation and management of information and the development of infrastructures (natural and anthropic). Institutional tools such as legal and regulatory frameworks, water pricing and incentives are needed to better allocate, regulate and conserve water resources. Information systems are needed for resource tracking, decision making under uncertainty, system analysis and forecasting.

STUDY LOAD

Type	Hours	Percentage
Hours medium group	9,8	7.83
Hours large group	25,5	20.38
Self study	80,0	63.95
Hours small group	9,8	7.83

Total learning time: 125.1 h

CONTENTS

Water Resources

Description:
Water resources in the world. Global, regional and local scales. Surface conventional resources. Underground resources. Quantification of resources. Interrelationships between bodies of water. Climate change.

Specific objectives:

determination of the sources, extent, reliability and quality of water resources for their use and control

Full-or-part-time: 7h 11m
Theory classes: 2h
Practical classes: 1h
Self study : 4h 11m

unconventional resources

Description:
Water regeneration. Direct and indirect reuse. desalination Aquifer recharge. Induced recharge. Water culture Subsurface dams. Interactions between all methods. Integration with conventional resources. Effects of climate change.

Specific objectives:
Know the methods to increase water resources with non-conventional techniques: Regeneration of water. Direct and indirect reuse. desalination Aquifer recharge. Induced recharge. Water culture Subsurface dams and all interactions between water resources.

Full-or-part-time: 7h 11m
Theory classes: 2h
Practical classes: 1h
Self study : 4h 11m

Quality of resources, ecosystems, ecosystem services

Description:
Degradation of the natural quality of the resource, as well as its behavior within water systems under constant pressure. Preserving the quality of this resource is important for the supply of drinking water, the preservation of ecosystems, food production and the use of recreational waters. The ecological and social value of water will be described, emphasizing the relationship that exists between water and ecosystems, as well as the possible ecological and socioeconomic impacts derived from the exploitation of said resource.

Specific objectives:
Surface water quality. Groundwater quality. The quality linked to the interactions between bodies of water. The social and ecological value of water. Ecosystem services.

Related activities:
Degradation of the natural quality of the resource, as well as its behavior within water systems under constant pressure. Preserving the quality of this resource is important for the supply of drinking water, the preservation of ecosystems, food production and the use of recreational waters. The ecological and social value of water will be described, emphasizing the relationship that exists between water and ecosystems, as well as the possible ecological and socioeconomic impacts derived from the exploitation of said resource.

Full-or-part-time: 2h 24m
Theory classes: 1h
Self study : 1h 24m

World examples of (bad) water management

Description:
Unsuccesful management of resources in Europa. Examples.
Unsuccesful management of resources in Asia. Examples.
Unsuccesful management of resources in Africa. Examples.
Unsuccesful management of resources in America. Examples.

Specific objectives:
The resources in the world have been managed very inefficiently. There are many cases in the world and things can be learned from each of them.

Full-or-part-time: 4h 48m
Theory classes: 2h
Self study : 2h 48m

Water demand

Description:
The management of water resources is a task that is carried out by the Administration and by companies. One of the important aspects is the knowledge of technical tools to become familiar with the uniqueness of their management.

Specific objectives:
The management of water resources is a task that is carried out by the Administration and by companies. One of the important aspects is the knowledge of technical tools to become familiar with the uniqueness of their management.

Full-or-part-time: 2h
Theory classes: 1h
Self study : 1h

Evaluation

Full-or-part-time: 14h 23m
Laboratory classes: 6h
Self study : 8h 23m

GRADING SYSTEM

The final mark of the course is obtained as follows:

First exam (30%) + Second exam (40%) + Individual Coursework (30%).

The re-evaluation will be carried out according to the current regulation. Moreover, to be able to access to the re-evaluation it is necessary to submit the Coursework.

EXAMINATION RULES.

Failure to perform the continuous assessment activity in the scheduled period will result in a mark of zero in that activity.

BIBLIOGRAPHY

Basic:
- Crittenden, C.J.; Trussell, R.R.; Hand, D.W.; Howe, K.J.; Tchobanoglous, G. MWH's water treatment principles and design [on line]. 3rd ed. Hoboken, New Jersey: Wiley, 2012 [Consultation: 17/09/2024]. Available on: https://onlinelibrary.wiley.com/doi/book/10.1002/9781118131473. ISBN 9780470405390.
- Droste,R.; Gehr, R. Theory and practice of water and wastewater treatment [on line]. 2nd ed. Hoboken, NJ: John Wiley & Sons, 2019 [Consultation: 17/09/2024]. Available on: https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=5554617. ISBN 9781119312376.
- Société Degrémont. Manual técnico del agua. 4a ed. Degrémont, 1979. ISBN 8430016511.
- Hernández Muñoz, A. Abastecimiento y distribución de agua. 6a ed. rev. y ampl. Madrid: Garceta, 2015. ISBN 9788416228331.
- AWWA-ASCE. Water treatment plant design. 5th ed. New York: McGraw-Hill, 2012. ISBN 9780071745727.
- Crittenden, J.C. Water treatment principles and design [on line]. 3rd. Hoboken, New Jersey: Wiley, 2012 [Consultation: 17/09/2024]. Available on: https://onlinelibrary.wiley.com/doi/book/10.1002/9781118131473. ISBN 9780470405390.

Complementary:
- American Public Health Association, American Water Works Association, Water Environment Federation. Standard methods for the examination of water and wastewater. 23rd ed. Washington DC: American Public Health Association, 2017. ISBN 9780875532875.
- Agència Catalana de l'Aigua. Agència Catalana de l'Aigua [on line]. [Consultation: 17/09/2024]. Available on: http://aca.gencat.cat.