Course guide
250MEA010 - 250MEA010 - Urban Hydrology and Flood Risk

Last modified: 19/07/2024

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: BENIAMINO RUSSO

Others: ERNEST BLADÉ CASTELLET
FERRER BOIX, CARLES

TEACHING METHODOLOGY

The subject consists of 3.0 hours per week of classroom lessons in the classroom.

They are devoted to theoretical classes, 25.5 hours, in which the teacher exposes the concepts and basic materials of the subject, presents examples and carries out exercises.

9.0 hours are spent solving problems and practical excercises with a greater interaction with the students to consolidate the general and specific learning objectives.
The rest of the weekly hours is dedicated to laboratory practices and a field visit.

Support material is shared through the ATENEA virtual campus: contents, programming of assessment activities and directed learning and bibliography.

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

Plan and design advanced conventional and non-conventional solutions to face with environmental problems related to urban hydrology and flood risk management.

STUDY LOAD

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

Total learning time: 125.1 h

CONTENTS

Subject introduction

Description:
Introduction about the objectives, the contents and the context of the subject, explanation of the type of activities and evaluation criteria.

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

Flood risk management framework

Description:
Definitions of key concepts (flood hazard, exposure, vulnerability, flood risk), Legislative framework, Flood risk management framework (FRMF), classification of flood impacts.

Full-or-part-time: 9h
Theory classes: 3h
Self study : 6h

Fundamentals of Urban Hydrology

Description:
Introduction about urban hydrology and drainage systems, key concepts in the field of sewer systems, network classification, design criteria, IDF curves and project rainfalls, estimation of hydrological losses in urban areas, models of rainfall-runoff transformation in urban catchments.

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

Extension of Urban Hydrology

Description:
Hydrological and hydraulic modelling of urban drainage systems, surface drainage systems and design criteria, tangible and intangible flood damages, flood depth damage curves, expected annual damage, environmental impacts, grey and blue-green infrastructures.

Full-or-part-time: 9h 36m
Theory classes: 2h
Practical classes: 1h 36m
Self study : 6h

Sewers overflows and water quality in the receiving water bodies

Description:
Legal framework regarding water quality of the receiving water bodies, common pollutants in water quality, stormwater (SSO) and combined sewers overflows (CSO), first flush, retention tanks and other measures to reduce impacts produced by sewers overflows.

Full-or-part-time: 6h 30m
Theory classes: 0h 30m
Practical classes: 3h
Self study : 3h

Monitoring of sewers network and receiving water bodies

Description:
Description of the most common devices and sensors to measures hydrologic / hydraulic variables (rainfall, flow depth, flow velocity, discharge) and water quality parameters.

Full-or-part-time: 8h
Theory classes: 2h
Practical classes: 1h
Self study : 5h

Fluvial processes

Description:
Basic concepts of fluvial geomorphology and sediment transport. Flood propagation and flood defences.

Full-or-part-time: 20h
Theory classes: 5h
Practical classes: 0h 12m
Laboratory classes: 2h 48m
Self study : 12h

River restoration and floods

Description:
Basic concepts of fluvial restoration principles and sediment management, e.g. dyke and dam removal, gravel replenishment

Full-or-part-time: 15h
Theory classes: 5h
Laboratory classes: 4h
Self study : 6h

Theory of flood modelling

Description:
Reminder of 1D steady flow modelling, unsteady 1D and 2D modelling (equations and solvers).

Related activities:
Flood modelling practice

Full-or-part-time: 9h
Theory classes: 2h
Laboratory classes: 1h
Self study : 6h

Evaluation exam

Description:
Individual exam on the theoretical and practical modules of the subject syllabus.

Full-or-part-time: 6h
Practical classes: 2h
Self study : 4h

GRADING SYSTEM

The subject's mark is obtained from the continuous assessment grades (exam and course practice) and the one corresponding to the computer laboratory activity.

The continuous assessment consists of doing different activities, both individual and group, of acomplementary and formative nature, carried out during the course (inside and outside the classroom).

Final grade = 0.6 * Final exam + 0.05 Course practice grade + 0.35 Modelling practice

EXAMINATION RULES.

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

BIBLIOGRAPHY

Basic:
- Butler, D.; [i 3 més]. Urban drainage. 4th edition. Boca Raton: CRC Press, Taylor & Francis, 2018. ISBN 9781498750585.
- Gómez Valentín, M. Curso de hidrología urbana. Barcelona: Distribuidora Alfambra de Papelería, 2008. ISBN 9788461215140.
- Martín Vide, J.P. Ingeniería de ríos. 2a ed. Barcelona: Edicions UPC, 2006. ISBN 9788483019009.
- Gómez Valentín, M. Curso de análisis y rehabilitación de redes de alcantarillado mediante el código SWMM 5.0. Barcelona: Distribuidora Alfambra de Papelería, 2007. ISBN 9788461178179.
- Petts, G.E.; Amoros, C. Fluvial hydrosystems. London [etc.]: Chapman & Hall, 1996. ISBN 0412371006.

Complementary:
- Toro, E.F. Shock-capturing methods for free-surface shallow flows. Chichester [etc.]: John Wiley & Sons, 2001. ISBN 0471987662.
- Gómez Valentín, M. Curso de depósitos de retención de aguas pluviales. Barcelona: Mcharly, 2009. ISBN 9788461371013.

RESOURCES

Hyperlink:
- https://iberaula.es/vnews/21/2716/manual-v30. IBER manual