Course guides

250476 - AVAREDRSIS - Seismic Risk Assessment and Reduction

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

Degree: MASTER'S DEGREE IN GEOTECHNICAL AND EARTHQUAKE ENGINEERING (Syllabus 2009). (Optional subject).
MASTER'S DEGREE IN CIVIL ENGINEERING (PROFESSIONAL TRACK) (Syllabus 2012). (Optional subject).
MASTER'S DEGREE IN GEOTECHNICAL ENGINEERING (Syllabus 2015). (Optional subject).

Academic year: 2020 ECTS Credits: 5.0 Languages: Spanish

LECTURER

Coordinating lecturer: MARTHA LILIANA CARREÑO TIBADUIZA
Others: MARTHA LILIANA CARREÑO TIBADUIZA

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
8162. Knowledge of all kinds of structures and materials and the ability to design, execute and maintain structures and buildings for civil works.
8228. Knowledge of and competence in the application of advanced structural design and calculations for structural analysis, based on knowledge and understanding of forces and their application to civil engineering structures. The ability to assess structural integrity.

Transversal:
8559. ENTREPRENEURSHIP AND INNOVATION: Being aware of and understanding the mechanisms on which scientific research is based, as well as the mechanisms and instruments for transferring results among socio-economic agents involved in research, development and innovation processes.
8560. SUSTAINABILITY AND SOCIAL COMMITMENT: Being aware of and understanding the complexity of the economic and social phenomena typical of a welfare society, and being able to relate social welfare to globalisation and sustainability and to use technique, technology, economics and sustainability in a balanced and compatible manner.
8561. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

TEACHING METHODOLOGY

The course consists of 3 hours per week of classroom activity.

The 3 hours are devoted to theoretical lectures, in which the teacher presents the basic concepts and topics of the subject, shows examples and solves exercises.

Support material in the form of a detailed teaching plan is provided using the virtual campus ATENEA: content, program of learning and assessment activities conducted and literature.
LEARNING OBJECTIVES OF THE SUBJECT

Specialization subject in which knowledge on specific competences is intensified.

Knowledge and skills at specialization level that permit the development and application of techniques and methodologies at advanced level.

Contents of specialization at master level related to research or innovation in the field of engineering.


STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours small group</td>
<td>9,8</td>
<td>7.83</td>
</tr>
<tr>
<td>Guided activities</td>
<td>6,0</td>
<td>4.80</td>
</tr>
<tr>
<td>Self study</td>
<td>80,0</td>
<td>63.95</td>
</tr>
<tr>
<td>Hours large group</td>
<td>19,5</td>
<td>15.59</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>9,8</td>
<td>7.83</td>
</tr>
</tbody>
</table>

Total learning time: 125.1 h

CONTENTS

Introduction. ¿What is disaster risk? ¿Why should we know it?

Description:
Introduction to the course. Introduction to seismic risk, earthquake damage

Full-or-part-time: 7h 11m
Theory classes: 3h
Self study: 4h 11m

Risk Assessment Theory (Part 1)

Description:
Engineering models. Loss occurrence processes. Components of a model (threat, exposure and vulnerability)

Full-or-part-time: 7h 11m
Theory classes: 3h
Self study: 4h 11m

Risk Assessment Theory (Part 2)

Description:

Full-or-part-time: 7h 11m
Theory classes: 3h
Self study: 4h 11m
### Modeling of exposed elements

**Description:**
Dimensions of vulnerability. Direct, indirect losses, injuries, deaths, business interruption, etc. Methodologies for the development of exposure databases. What is the exhibition and what are you interested in capturing?

**Full-or-part-time:** 7h 11m  
Theory classes: 3h  
Self study : 4h 11m

### Seismic hazard assessment

**Description:**
Session 5

**Full-or-part-time:** 7h 11m  
Theory classes: 3h  
Self study : 4h 11m

### Probabilistic assessment of seismic risk.

**Description:**
Session 6

**Full-or-part-time:** 7h 11m  
Theory classes: 3h  
Self study : 4h 11m

### Practical session: Probabilistic evaluation of the seismic hazard and risk

**Description:**
Session 7

**Full-or-part-time:** 7h 11m  
Practical classes: 3h  
Self study : 4h 11m

### Hurricane Risk Modeling

**Description:**
Session 8

**Full-or-part-time:** 7h 11m  
Theory classes: 3h  
Self study : 4h 11m
**Practical session: Multi-hazard risk assessment**

**Description:**
Multi-threat risk assessment

**Full-or-part-time:** 7h 11m  
Practical classes: 3h  
Self study : 4h 11m

---

**Applications of risk assessment in insurance and reinsurance**

**Description:**
Session 10

**Full-or-part-time:** 7h 11m  
Theory classes: 3h  
Self study : 4h 11m

---

**Ex-post evaluation of damage in buildings**

**Description:**
Assessment of habitability and damage in buildings affected by an earthquake.

**Full-or-part-time:** 7h 11m  
Theory classes: 3h  
Self study : 4h 11m

---

**Disaster risk management**

**Description:**
Ex-post evaluation. Indicators of disaster risk management.

**Full-or-part-time:** 7h 11m  
Theory classes: 3h  
Self study : 4h 11m

---

**Evaluation**

**Full-or-part-time:** 7h 11m  
Laboratory classes: 3h  
Self study : 4h 11m

---

**GRADING SYSTEM**

Presentación oral: Cada alumno hará una presentación oral en la que trate un tema relacionado con la temática de la asignatura. (30%)

Trabajo final: Consiste en realizar el análisis sísmico de una estructura a elegir por el estudiante aplicando una norma de diseño de su elección. (40%)

Evaluaciones: Los alumnos realizarán en clase ejercicios prácticos puntuables sobre los temas explicados. (30%)
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: