## 1.1.1 Earthquake Engineering

### GENERAL

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| **SCHOOL** | Engineering | | |
| **ACADEMIC UNIT** | CIVIL ENGINEERING | | |
| **LEVEL OF STUDIES** | Undergraduate | | |
| **COURSE CODE** | ΔΟΜ023 | **SEMESTER** | 8th |
| **COURSE TITLE** | Earthquake Engineering | | |

| **INDEPENDENT TEACHING ACTIVITIES** *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits* | **WEEKLY TEACHING HOURS** | **CREDITS** |
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| | 4 | 5 |
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| *Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).* | | |

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| **COURSE TYPE** *general background, special background, specialised general knowledge, skills development* | Scientific Field |
| **PREREQUISITE COURSES:** | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/enrol/index.php?id=1035 |

### LEARNING OUTCOMES

**Learning outcomes**

*The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.*

*Consult Appendix A*

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

Upon successful completion of the course, students will be able to:
become familiar with the background of seismic design for structures
delve into the determination of seismic actions through design response spectra
understand the concept and estimate the ductility of structures
become familiar with the philosophy of performance-based seismic design
know how to apply non-linear analysis methods for the design and assessment of structures against seismic actions
get acquainted with new technologies in seismic design, such as seismic isolation.
recognize seismic damage and propose methods for their restoration, as they will learn the appropriateintervention technologies

**General Competences**

*Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?*

*Search for, analysis and synthesis of data and* *Project planning and management*

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| *information, with the use of the necessary technology*<br>*Adapting to new situations*<br>*Decision-making*<br>*Working independently*<br>*Team work*<br>*Working in an international environment*<br>*Working in an interdisciplinary environment*<br>*Production of new research ideas* | *Respect for difference and multiculturalism*<br>*Respect for the natural environment*<br>*Showing social, professional and ethical responsibility and sensitivity to gender issues*<br>*Criticism and self-criticism*<br>*Production of free, creative and inductive thinking*<br>*……*<br>*Others…*<br>*…….* |

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Adapting to new situations
- Decision-making
- Working independently
- Team work
- Working in an interdisciplinary environment
- Project planning and management
- Criticism and self-criticism
- Production of free, creative and inductive thinking

**SYLLABUS**

• Elements of Technical Seismology. Earthquake genesis – distribution. Strong ground motion – recordings. Magnitude and intensity.
• Seismic hazard – risk. Elements of Seismic Mechanics.
• Elastic response spectra. Inelastic response – hysteretic damping – ductility. Design spectra.
• Building analysis for seismic actions. Plasticity of structural elements and carriers.
• Background of seismic design regulatory provisions.
• Structural elements under seismic load. Beam-column nodes under seismic load.
• Seismic pathology. Technology of repair and strengthening of buildings.

**TEACHING and LEARNING METHODS - EVALUATION**

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| **DELIVERY**<br>*Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY**<br>*Use of ICT in teaching, laboratory education, communication with students* | |
| **TEACHING METHODS**<br>*The manner and methods of teaching are described in detail.*<br>*Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.*<br><br>*The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS* | |
| **STUDENT PERFORMANCE EVALUATION**<br>*Description of the evaluation procedure*<br><br>*Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work,* | 1. Assignment of tasks aimed at exploring the understanding of the concepts taught.<br>2. Final written exam at the end of the semester (in Greek).<br>3. Each student is given the opportunity to review their written exam and have their mistakes analyzed. |

| ***Activity*** | ***Semester workload*** |
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| Lectures | 52 |
| Individual study | 78 |
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| Course total (26 hours workload per ECTS credit) | ***130*** |

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| *essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other*<br><br>*Specifically-defined evaluation criteria are given, and if and where they are accessible to students.* | |

## ATTACHED BIBLIOGRAPHY


Psycharis I., Earthquake Engineering Notes Vol. 1, NTUA publ., 2016 (in Greek)

Chopra, A.K. (1995) Dynamics of Structures: Theory and Applications to Earthquake Engineering. Prentice-Hall, New Jersey

Fardis, Michael, et al. Designers' Guide to EN 1998-1 and 1998-5. Eurocode 8: Design Provisions for Earthquake Resistant Structures. Thomas Telford Publishing, 2005.

Anastasiadis K., Earthquake Resistant Structures vol. I, Ziti, 1989 (in Greek)