### 1.1.1 Retrofitting and Strengthening of Existing Structures

## GENERAL

| | | | |
|---|---|---|---|
| **SCHOOL** | Engineering | | |
| **ACADEMIC UNIT** | CIVIL ENGINEERING | | |
| **LEVEL OF STUDIES** | Undergraduate | | |
| **COURSE CODE** | ΔΟΜ031 | **SEMESTER** | 9th |
| **COURSE TITLE** | Retrofitting and Strengthening of Existing Structures | | |

| **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** |
|---|---|---|
| | 4 | 5 |
| | | |
| | | |
| *Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).* | | |

| | |
|---|---|
| **COURSE TYPE** *general background, special background, specialised general knowledge, skills development* | Specialization Course |
| **PREREQUISITE COURSES:** | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/course/view.php?id=440 |

## 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:

1. To recognize the forms of failure in existing constructions
2. To understand the concepts of intervention, repair, strengthening, valuation and vulnerability of structures
3. To be able to choose the appropriate intervention strategy (materials/techniques) for an existing structure
4. To assess the load-bearing capacity of reinforced concrete structural elements
5. To use the Regulation of Interventions (KAN.EPE.) for the assessment of an existing structure and the selection of an appropriate intervention

**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 information, with the use of the necessary technology* | *Project planning and management* |
| | *Respect for difference and multiculturalism* |

| | |
|---|---|
| *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 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

• Introduction to the concepts of assessment and vulnerability of structures
• Strategies and design for seismic retrofit of buildings
• Overview of regulatory provisions and guidelines relating to interventions and strengthening of structures. Introduction to KAN.EPE. and Eurocode 8-3
• Estimation of the load-bearing capacity of Reinforced Concrete structural elements
• Materials and techniques for repair/strengthening (RC jackets, FRP etc.)
• Introduction to inelastic methods of analysis of structures

## TEACHING and LEARNING METHODS - EVALUATION

| | |
|---|---|
| **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, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* | 1. Assignment of tasks aimed at exploring the understanding of the concepts taught (30%).<br>2. Final written exam (in Greek) at the end of the semester (70%).<br>3. Each student is given the opportunity to review their written exam and have their mistakes analyzed. |

| ***Activity*** | ***Semester workload*** |
|---|---|
| Lectures | 26 |
| Practice/exercises | 26 |
| Project(s) | 20 |
| Individual study | 58 |
| | |
| | |
| | |
| | |
| | |
| Course total (26 hours workload per ECTS credit) | ***130*** |

| | |
|---|---|
| *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.* | |

**ATTACHED BIBLIOGRAPHY**


Dritsos S., Repair and Strengthening of Reinforced Concrete Structures, 3rd ed., Patra, 2005 (in Greek)
Spyrakos K., Strengthening of Structures for Seismic Loads, TCG, 2004 (in Greek)
CEN, Eurocode 8: Design of structures for earthquake resistance Part 3: Assessment and retrofitting of buildings, 2005