Seismic design principles - BMEEOHSDT86

I. Subject Specification

1. Basic Data

1.1 Title

Seismic design principles

1.2 Code

BMEEOHSDT86

1.3 Type

Module with associated contact hours

1.4 Contact hours

Type	Hours/week / (days)
Lecture	2

1.5 Evaluation

Exam

1.6 Credits

3

1.7 Coordinator

name	Kollár László
academic rank	Professor
email	kollar.laszlo@emk.bme.hu

1.8 Department

Department of Structural Engineering

1.9 Website

https://epito.bme.hu/BMEEOHSDT86
https://fiek2.mywire.org/course/view.php?id=2546

1.10 Language of instruction

hungarian and english

1.11 Curriculum requirements

Ph.D.

1.12 Prerequisites

1.13 Effective date

2 February 2022

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2. Objectives and learning outcomes

2.1 Objectives

Understanding the behavior of structures subjected to earthquakes. Importance of ductility. Modelling of steel structures. Design methods and their interpretation in the EC. Design principles.
See detailed topics.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. will learn the methods of earthquake resistant design
2. will learn the behavior of structures subjected to earthquake
3. will learn the typical seismic analyses
4. will learn the to design for ductility
5. will learn basic seismic design principles

B. Skills

1. The focus is on understanding, and on capability to apply the knowledge to new problems
2. see knowledge and topics,

C. Attitudes

1. cooperates with the lecturer and with fellow students,
2. ready to apply numerical computational tools,
3. is intent on understanding the behavior of structures subjected to eaerthquakes,
4. is intent on problem solving,
5. is attending to the classes as a responsible member of the community.

D. Autonomy and Responsibility

1. is open to the new information,
2. is able to think in system.

2.3 Methods

Lectures and oral communications, hoping the active contribution of students

2.4 Course outline

Hét	Előadások és gyakorlatok témaköre
1.	Earthquakes: sources, plate tectonics, messages of Karl Popper and Thomas Kuhn, measuring (scale and magnitude), seismic waves.
2.	Basics of vibration: basic notions, free and forced vibration, sources and role of damping, resonance, MDOF and continuous systems, summation theorems to calculate the eigenfrequency, modal analysis.
3.	cont.
4.	Design methods: basic methods in EC, support excitation by non-harmonic motion, amplification factors and response spectrum, response spectrum analysis, capacity design, performance based seismic engineering.
5.	cont.
6.	Design principles: messages of EC, favorable and unfavorable structures, Hugo Bachmann's advices, numerical considerations (based on Hugo Bachmans's advices).
7.	cont.
8.	Seismic resistant steel frames, development of design methodology, basic definitions and principles, structural damage definitions and parameters.
9.	cont.
10.	Dissipative structural typologies, dissipative joints and elements, behavior factor, capacity design approach.
11.	Global ductility of moment resistant frames, definitions, parameters affecting global ductility, illustration by examples, methods to determine global ductility.
12.	Local ductility of structural elements and joints, definitions, illustration by two-flange model, role of plastic plate buckling, methods to determine local ductility, cyclic ductility.
13.	Evaluation of behavior factor (q-factor) on the basis of global and local ductility.
14.	cont

The above programme is tentative and subject to changes due to calendar variations and other reasons specific to the actual semester. Consult the effective detailed course schedule of the course on the subject website.

2.5 Study materials

2.6 Other information

2.7 Consultation

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This Subject Datasheet is valid for:

Inactive courses

II. Subject requirements

Assessment and evaluation of the learning outcomes

3.1 General rules

3.2 Assessment methods

Teljesítményértékelés neve (típus)	Jele	Értékelt tanulási eredmények
		A.1-A.5; B.1-B.2; C.1-C.5; D.1-D.2

The dates of deadlines of assignments/homework can be found in the detailed course schedule on the subject's website.

3.3 Evaluation system

Jele	Részarány
Összesen	**100%**

3.4 Requirements and validity of signature

3.5 Grading system

Érdemjegy	Pontszám (P)
jeles (5)	
jó (4)	
közepes (3)	
elégséges (2)	
elégtelen (1)	

3.6 Retake and repeat

3.7 Estimated workload

Tevékenység	Óra/félév
Összesen	

3.8 Effective date

2 February 2022

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Inactive courses