# 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://edu.epito.bme.hu/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).

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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

This Subject Datasheet is valid for:

Inactive courses

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# 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

0 00	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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