



## Course Syllabus

<b>Course Code</b>	<b>Course Title</b>	<b>ECTS Credits</b>
ARCH-432	Fundamentals of Earthquake Engineering	4
<b>Prerequisites</b>	<b>Department</b>	<b>Semester</b>
ARCH-212	Architecture	Spring
<b>Type of Course</b>	<b>Field</b>	<b>Language of Instruction</b>
Elective	Architecture	English
<b>Level of Course</b>	<b>Lecturer(s)</b>	<b>Year of Study</b>
1 <sup>st</sup> Cycle	Dr Tonia Sophocleous Lemonari	4 <sup>th</sup>
<b>Mode of Delivery</b>	<b>Work Placement</b>	<b>Corequisites</b>
Face to face	N/A	-

### Course Objectives:

The main objectives of the course are to:

- Introduce the basic geological mechanisms causing earthquakes
- List the characteristics of ground shaking relevant to buildings
- Explain the basic structural requirements for seismic resistance
- Provide an overview of the philosophy of seismic design
- Enable readers to grasp the concepts and then readily apply them to their seismic resistant designs following a non-mathematical approach that focuses upon the principles and practice of seismic resistant design
- Provide an overview of seismic force resisting systems
- Introduce the principles of designing a structural system (i.e. kinetic mechanism) capable of resisting seismic forces both safely and economically
- Explain the role of structures and statics as they relate to earthquake engineering fundamentals.
- Explore the potential for innovative configuration design of a system for seismic resistance

### Learning Outcomes:

After completion of the course students are expected to be able to:

1. Apply background knowledge on Structural Principles to discuss Seismic Resisting Structures behavior

2. Recognise the necessity to safeguard a building against seismic damage
3. Illustrate the steps involved in designing a ductile structural system (i.e. a kinetic mechanism).
4. Evaluate why architects need to design earthquake resistant buildings
5. Demonstrate a general interest on the earthquake phenomenon and concepts on seismic resistant design
6. Design and defend key concepts with accompanying visual material.
7. Demonstrate the effect of kinetic mechanism configuration (plan and section) on seismic performance.
8. Evaluate the seismic behavior with quality and quantity criteria
9. Design drawings of a kinetic structure to communicate seismic behavior

### **Course Content:**

- Where, why and when earthquakes occur
- Basic geological mechanisms causing earthquakes
- Characteristics of ground shaking relevant to buildings
- Factors that influence levels of seismic force
- basic principles of seismic resistance for buildings;
- Seismic hardware Dampers. Seismic isolators
- Dangers of poor configuration during a quake
- The architectural seismic design concept; How architects and structural engineers achieve ductile structures
- Basic structural requirements for seismic resistance as an integral part of the design process.
- Horizontal structure necessary for seismic resistance. Diaphragms.
- Vertical structure. Its difference from the structure resisting gravity forces.
- 'Kinetic mechanism' proposal from a seismic perspective
- Demonstration of the most suitable kinetic structures in different scales (mini-application, structures 2d, 3d, mega structure)
- Well-configured seismic resisting systems
- Structural form and details, alternative solutions for seismic response
- Qualitative verifications of conceptual kinetic design alternative solutions for seismic response

### **Learning Activities and Teaching Methods:**

The teaching method in this course consists of Lectures, Case Study analysis, Guest lecturing, Pin ups, Tutorials, Sketchbook, Poster, Paper, Presentations.

**Assessment Methods:**

Participation, Discussion each week, Pin-ups for Midterm 1&2, Poster, Final Presentation drawings/models and written documentation paper.

**Required Textbooks / Readings:**

<b>Title</b>	<b>Author(s)</b>	<b>Publisher</b>	<b>Year</b>	<b>ISBN</b>
Seismic Design for Architects Outwitting The Quake	Andrew Charleson	Architectural Press (an imprint of Elsevier)	2008	978-0-7506-8550-4

*Extended lecture notes related to the lectures are utilized.*