Course title:	Structural Dynamics II	Course code:	ΔΟ0702
Credits:	6	Work load (hours):	157

Course level:	Undergraduate ☑	Graduate ☐
Τύπος μαθήματος:	Mandatory ☑	Selective ☐
Course category:	Basic ☐	Orientation ☑

Semester:	9ο	**Hours per week:**	4

Course objectives (capabilities pursued and learning results):

The main objective of this course is to help students understand the behaviour of structures under dynamic loading with particular emphasis in structural dynamics under seismic excitations. Several analysis methods for evaluating the structural response (forces and displacements) are being discussed.

- Dynamic degrees of building systems.
- Calculation of the seismic response of MDOF in plane dynamic systems.
- Dynamic simulation of 3D building systems with asymmetric plane view.
- Formulation of the 3D spatial stiffness matrix and the governing equations of motion.
- Center of twist and center of torsion.
- Torsion sensitivity of buildings.
- Calculation of the seismic response of asymmetric in plane 3D buildings using Response Spectrum Analysis according to EC8.
- Nonlinear time history analysis using time integration methodologies.

Prerequisites:

Structural Dynamics I

Instructor's data:

Name:	Konstantinos Tzaros
Level:	Teaching Staff
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Tel. – email:	2421074947/ ktzaros@gmail.com
Other tutors:	-

Specific course information:

Week No.	Course contents	Hours	
		Course attendance	**Preparation**
1	Forced vibrations in MDOF dynamic systems. Soil movement and equations of motion under earthquake excitation.	**4**	**8**
2	The Rayleigh damping model	**4**	**8**
3	The mode superposition method and the Response History Analysis.	**4**	**8**
4	Elastic and Inelastic Spectrums. The design spectrums of EC8.	**4**	**8**
5	The philosophy of the Seismic Code EC8.	**4**	**8**
6	The Response Spectrum Analysis for the calculation of the seismic response of MDOF	**4**	**8**
	The Lateral Static method.		
8	One storey buildings with asymmetric plan view.	**4**	**8**
9	Center of mass, center of stiffness, center of twist and center of torsion. Torsion sensitivity.	**4**	**4**
10	Earthquake response of multistorey buildings.	**4**	**8**

11	The Response Spectrum Analysis in multi storey buildings. Numerical Examples.	**4**	**4**
12	The Lateral method in regular in plan and height multi storey buildings. Numerical Examples.	**4**	**4**
13	Non linear Dynamic Analysis-The Newmark time integration method.	**4**	**4**
14	Numerical example of nonlinear response time history analysis in SAP2000.	**4**	**4**

Additional hours for:			
Class project	**Examinations**	**Preparation for examinations**	**Educational visit**
5	3	5	

Suggested literature:

1st Book: Anil Chopra, Δυναμική των Κατασκευών Θεωρία και Εφαρμογές στη Σεισμική Μηχανική, 3η Έκδοση, Μ. Γκιούρδας, Αθήνα 2008, (ISBN 960-512-541-2)

2nd Book: Ι.Θ. Κατσικαδέλης, Δυναμική Ανάλυση των Κατασκευών Θεωρία και Εφαρμογές, Συμμετρία, 2012 (ISBN 978-960-266-352-3)

Additional suggested literature

Eurocode 8 (CEN-Brussels)

R.W. Clough, J. Penzien, Dynamics of structures, McGraw-Hill, 1993.

M.N. Fardis, E. Carvalho, A. Elnashai, E. Faccioli, P. Pinto and A. Plumier, Designers' Guide to EN1998-1 and EN1998-5, Thomas Telford, 2005.

Teaching method *(select and describe if necessary* - **weight***):*		
Teaching	☑	60%
Seminars	☐	……%
Demonstrations	☐	……%
Laboratory	☐	……%
Exercises	☑	40%
Visits at facilities	☐	……%
Other *(describe):* ……	☐	……%
Total		100%

Evaluation method *(select)*- **weight:**				
	Γραπτά	*%*	*Προφορικά*	*%*
Homework	☐		☐	
Class project	☑	70	☐	
Interim examination	☐		☐	
Final examinations	☑	30	☐	
Other *(describe):* ……	☐		☐	