COURSE OUTLINE

(1) GENERAL

SCHOOL	**UNIVERSITY OF THESSALY**		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**ΔΟ0702**	**SEMESTER**	9th
COURSE TITLE	STRUCTURAL DYNAMICS 2		

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	6
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, specialized general knowledge, skills development*	Specialized general knowledge
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK
IS THE COURSE OFFERED TO ERASMUS STUDENTS	
COURSE WEBSITE (URL)	https://eclass.uth.gr/courses/CIV_U_332/

(2) 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*

- Identification of the dynamic degrees of freedom of multi-story building structures.
- Calculation of the seismic response of multi-story two-dimensional dynamic systems.
- Creation of numerical simulations for three-dimensional building structures with asymmetric floor plans.
- Determination of the mass and stiffness matrices for three-dimensional building structures and formulation of the equations of motion for seismic excitation.
- Determination of the center of elastic rotation.
- Evaluation of the torsional resistance of single-story structures.
- Determination of the torsional sensitivity of multi-story structures.
- Calculation of the seismic response of multi-story building structures for the design earthquake according to Eurocode 8 and EAK2000.

- Calculation of the stress quantities of the structural elements of multi-story building structures for the design earthquake according to Eurocode 8 and EAK2000.

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*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking Working in an interdisciplinary environment*
Production of new research ideas	*……*
	Others…
	…….

The course strengthens the technical and intellectual abilities of the students, preparing them for work as engineers and for postgraduate studies. It exposes students to computational techniques and design methods used in modern earthquake engineering practice for Civil Engineers.

By the end of the course, students should be able to demonstrate/possess the following:

➢ Ability to perform basic deterministic seismic risk analysis for a specific area, and the ability to understand and follow a report on probabilistic seismic risk analysis for a region.

➢ Ability to construct design spectra as well as inelastic spectra.

➢ Ability to evaluate new and existing structures following methods from seismic codes.

➢ Ability to carry out preliminary design and dimensioning for structural reinforcement, following classical seismic strengthening methods, as well as methods of seismic isolation and/or energy dissipation systems.

(3) SYLLABUS

1) Dynamic response of single-degree-of-freedom systems
2) Dynamic response of multi-degree-of-freedom systems
3) Torsional response of structures
4) Earthquake-resistant design of structures
5) Introduction to nonlinear analysis
6) Determination of targeted capacity
7) Seismic isolation of structures
8) Applications of the course in engineering research

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	

TEACHING METHODS

The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis

Activity	*Semester workload*
Lectures	56 hours
Study lecture notes	25 hours
Unguided study	56 hours
Preparation for exams	30 hours

of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc. *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*	Exams	3 hours
	Course total	***170 hours***

STUDENT PERFORMANCE EVALUATION ***Description of the evaluation procedure*** *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* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Evaluation Language: Greek The evaluation is conducted through: a) Optional exercises to be submitted weekly (10% of the final grade) b) An optional project spanning the whole semester (15% of the final grade) c) The final written examination at the end of semester (75% of the final grade or 100% if the optional exercises and project were not submitted).

(5) ATTACHED BIBLIOGRAPHY

-Suggested bibliography:

Anil Chopra, **Dynamics of Structures: Theory and Applications to Earthquake Engineering**, 3rd Edition, Prentice Hall, 2007 (ISBN 960-512-541-2)

- Related academic journals:

1. Ελληνικος Αντισεισμικός Κανονισμός 2000.
2. Eurocode 8 (CEN-Brussels)
3. Bruneau, M., Uang, C-M, and Whittaker, A. S., 1997, **Design of Ductile Steel Structures**, McGraw-Hill
4. Dowrick, D., 1989, **Earthquake Resistant Design**, Wiley, New York, NY
5. FEMA, 2000, **Prestandard and Commentary for the Seismic Rehabilitation of Buildings**, Report No. FEMA 356, Washington, D,C.
6. FEMA 2000, **NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures**, Reports No. FEMA 367 (Provisions) and 368 (Commentary), Washington, D,C.
7. ICBO, 2000, **International Building Code**, International Conference of Building Officials, Whittier, CA
8. Kramer, S., 1996, **Geotechnical Earthquake Engineering**, Prentice Hall, NJ
9. Naeim, F. (ed), 2000, **The Seismic Design Handbook**, 2nd Edition, Kluwer Academic Publishers
10. Newmark, N. and Rosenblueth, E., 1971, **Fundamentals of Earthquake Engineering**, Prentice Hall, New York, NY
11. Newmark, N. and Hall, W., 1982, **Earthquake Spectra and Design**, EERI, Oakland, CA
12. Priestley, M. J. N. and Paulay, T., 1992. **Seismic Design of Reinforced Concrete and Masonry Buildings**