

## COURSE DESCRIPTION

<b>Name of the Course:</b>		<b>Engineering seismology and earthquake engineering</b>					
<b>Specialization Code:</b>		<b>U02.07.ICV.IZ.M24.</b>		<b>Course Code:</b>		<b>1.DD.OB03</b>	
<b>Year of study:</b>	<b>1</b>	<b>Semester:</b>	<b>1</b>	<b>Examination form:</b> (E-Exam; Co- Colloquy; P-Project; P/F-Passed/Failed)	<b>E</b>	<b>ECTS credits granted (CR):</b>	<b>E (Co)</b> <b>6</b> <b>P (P/F)</b>
<b>Course Category:</b> (DF- Fundamental; DD- General engineering; DS-Specialty engineering; DC-Complementary; PR-Practical stage)							<b>DD</b>
<b>Course Type:</b> (OB-Compulsory; OP-Elective; FC-Facultative)							<b>OB</b>
<b>Number of hours per semester:</b> Total of hours per week (TH) x Number of weeks per semester							
<b>TOTAL :</b>	112	<b>Individual study (IS):</b>		70	<b>Contact hours (C + S;L;P):</b>		42
<b>Academic staff member in charge:</b> (Full name, Academic position and Department)				<i>Demetriu Sorin, professor &amp; Alexandru Aldea, assoc-prof.</i>			

Faculty	Engineering in foreign languages Master study programme	Number of contact hours per semester				
		Total	Course	Seminar	Laboratory	Project
Field	Civil Engineering	42	28		14	
Specialization	Structural Engineering					

### Course objectives - Description of the main competences:

Acquire the basic knowledge on the characterization of seismic ground motion and structural seismic motion, on the computation of seismic ground response and of structural seismic response, on the evaluation of seismic action for design

### Content description:

<b>1. COURSE</b>	<ol style="list-style-type: none"> <li>1. Earthquake phenomena. Characterisation of seismic sources. Seismologic parameters and their inter-relations. Classification of earthquakes. Destructive earthquake associated phenomenon. 3 h</li> <li>2. Historical and instrumental seismology. Major earthquakes – case studies. Spatial, temporal and intensity earthquake distributions. Macro seismic and instrumental seismic intensity. 2 h</li> <li>3. Data bases for studying earthquakes: earthquake catalogues and earthquake records catalogues 1 h</li> <li>4. Seismic waves: wave types (P, S, surface waves), seismic waves velocity and propagation characteristics 1 h</li> <li>5. Seismic instrumentation in free field and in boreholes. Seismic instrumentation of buildings. Seismic networks – configuration and characteristics 1 h</li> <li>6. Processing and correction of seismic records and their use in earthquake engineering. Characterisation of seismic motion severity 2 h</li> <li>7. Site effects. Seismic ground response – modeling and instrumental evidences 2 h</li> <li>8. Seismic response spectra. Characteristics, spectral representations 2 h</li> <li>9. Seismic response computation by Modal analysis. Modal superposition criteria. Methods for differential equations integration 6 h</li> <li>10. Seismic action in seismic design regulations. Evaluation of seismic forces for design. 4h</li> <li>11. Dynamic characteristics identification for structures and ground using seismic records 4h</li> </ol>
<b>2. Seminar / Laboratory / Project / Practical stage</b>	<ol style="list-style-type: none"> <li>1. Data bases for seismicity studies – websites. Major earthquakes – case studies 2 h</li> <li>2. Data bases for earthquake records – websites. Case studies 1 h</li> <li>3. Characteristics of intensity, duration and spectral characteristics of seismic motions 1 h</li> <li>4. Linear and equivalent linear seismic site response computation 2 h</li> <li>5. Computation of response spectra for important seismic motions 1 h</li> <li>6. Computation of structural seismic response using response spectra. Methods for numerical integration 2 h</li> <li>7. Seismic action and seismic response according to seismic design regulations: P100-1-2006, EC8 si ASCE 7-05 3 h</li> <li>8. Building modal parameters identification –case studies 1 h</li> <li>9. Instrumental identification of soil-structure interaction effects 1 h</li> </ol>

<b>3. Bibliography</b>	<ol style="list-style-type: none"> <li>1. Zareian, F., Krawinkler, H. (2009). Simplified performance based earthquake engineering. John Blume Earthquake Engineering Center, Report no. 169. <a href="https://blume.stanford.edu/sites/default/files/TR169_Zareian.pdf">https://blume.stanford.edu/sites/default/files/TR169_Zareian.pdf</a></li> <li>2. Rose School 2008 Engineering Seismology course <a href="http://daveboore.com/short_course_lectures_and_labs.html">http://daveboore.com/short_course_lectures_and_labs.html</a></li> <li>3. Zareian, F., Krawinkler, H. (2009). Simplified performance based earthquake engineering. John Blume Earthquake Engineering Center, Report no. 169. <a href="https://blume.stanford.edu/sites/default/files/TR169_Zareian.pdf">https://blume.stanford.edu/sites/default/files/TR169_Zareian.pdf</a></li> <li>4. Rose School 2008 Engineering Seismology course <a href="http://daveboore.com/short_course_lectures_and_labs.html">http://daveboore.com/short_course_lectures_and_labs.html</a></li> <li>5. Bachmann, H. Principes de base pour la conception parasismique des bâtiments. <a href="http://www.ac-grenoble.fr/webcurie/bio/seismes/BACHMFR.PDF">http://www.ac-grenoble.fr/webcurie/bio/seismes/BACHMFR.PDF</a></li> </ol>
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Criteria to be considered for the final mark	Weight of each criterion in the final mark (%)
1. Exam defence (final examination)	60%
2. Appreciation during the entirely semester	
2.1 Seminar activity	
2.1 Laboratory activity	10%
2.2 Project activity (the project has not a distinct final mark)	
3. Periodical examinations	
3.1 Written / oral examination	
3.2 Home works, reports, essays etc.	30%
4. Other criteria (to be specified)	
Short description of the final evaluation procedure: written examination (theory and applications)	

Estimation of the total number of hours per semester requested for the individual study (IS)			
Type of individual activity	No. of hours	Type of individual activity	No. of hours
1. Study of the course notes	16	8. Preparation of the final examination	16
2. Study of the compulsory bibliography	8	9. Advisory class participation	
3. Study of the supplementary bibliography	6	10. Practical documentation on site	
4. Preparation of specific activities		11. Additional documentation on library	
5. Preparation of home works	18	12. Internet network documentation	6
6. Preparation of periodical written examinations		13. Others (to be specified)	
7. Preparation of periodical oral examinations		<b>TOTAL number of hours</b>	

**Signature of the Academic Staff member in charge:**

**Date:** 15.04.2013

**Demetriu Sorin**

**Alexandru Aldea**