ERASMUS+
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Incoming student mobility

Name of UNIOS University Unit: Faculty of Civil Engineering and Architecture Osijek

COURSES OFFERED IN FOREIGN LANGUAGE
FOR ERASMUS+ INDIVIDUAL INCOMING STUDENTS

Department or Chair within the UNIOS Unit	Department for Materials and Structures

Study program	University Graduate Study of Civil Engineering – module Structural Engineering

Study level (bachelor/master)	Master (graduate) level

Course title	Earthquake Risk
Course code (ISVU)	169694
Language of instruction	English
Course content	The course provides theoretical knowledge on earthquake risk – seismic hazard, elements exposed to risk and vulnerability function modelling – and trains students to apply this knowledge to the earthquake risk assessment of a selected urban area. Topics covered: • Introduction to earthquake risk; definitions of basic terms; components of risk. • Exposure of elements at risk in the area considered; use of Geographic Information Systems (GIS) for processing and visualising exposure model data. • Building databases; field work with students – collection of building data. • Seismic hazard: basic concept of seismic hazard assessment; types of approaches; deterministic and probabilistic seismic hazard analysis. • Seismic vulnerability: empirical, analytical and hybrid methods – damage probability matrices, damage index methods, rapid visual screening; analytically derived vulnerability (fragility) curves, capacity spectrum method; vulnerability coefficients. • Damage scales. • Assessment of social and economic losses; overview of existing methodologies for estimating earthquake-induced losses.
Prerequisites for enrolment (if any)	None

Learning outcomes	Upon completion of the course, the student will be able to: 1. List and explain the basic elements of earthquake risk; 2. Explain the concept of seismic hazard assessment; 3. Define seismic vulnerability assessment methods; 4. Analyse the differences between individual seismic vulnerability assessment methods; 5. Explain the application of individual seismic vulnerability methods; 6. Describe methods for assessing social and economic losses; 7. Describe the concepts of existing methodologies for estimating earthquake-induced losses.
Basic Literature	1. Hadzima-Nyarko, M., Nikić, D., Morić, D. (2018). Potresno inženjerstvo – procjena oštetljivosti zgrada (Earthquake Engineering – Seismic Vulnerability Assessment of Buildings). Faculty of Civil Engineering Osijek (in Croatian). 2. Oliveira, C. S., Roca, A., Goula, X. (eds.) Assessing and Managing Earthquake Risk. Springer, Dordrecht. ISBN 978-1-4020-3524-1. 3. Coburn, A., Spence, R. (2002). Earthquake Protection, 2nd ed. John Wiley & Sons.
Additional Literature	1. Dowrick, D. J. (2009). Earthquake Resistant Design and Risk Reduction, 2nd ed. John Wiley & Sons. 2. Tesfamariam, S., Goda, K. (eds.) (2013). Handbook of Seismic Risk Analysis and Management of Civil Infrastructure Systems. Woodhead Publishing.
Form of teaching	Lectures, seminars and workshops, exercises (including field work – collection of building data)
Form of assessment	Continuous assessment during the semester: attendance, class activity, seminar paper (team semester project prepared during exercises) and its presentation. Grading criteria: 50% seminar paper, 30% presentation, 20% writing quality and documentation. Students who are not exempted through continuous assessment take an oral exam. Grades: 50–59% sufficient (2), 60–74% good (3), 75–89% very good (4), 90–100% excellent (5).
Number of ECTS	5
Class hours per week	4 (2 hours of lectures + 2 hours of exercises per week; 30+30 hours per semester)
Period of realization (summer/winter semester)	Winter semester
Teacher(s) + Email address	Prof. Marijana Hadzima-Nyarko, PhD – mhadzima@gfos.hr
Assistant(s) + Email address(es)	