Table S2.6.4. Form for the preparation of the course information sheets

Name of the subject: ***Experimental analysis of structures***

Code of the subject	Status of the subject	Semester	Number of ECTS credits	Class load
	Optional	I	10	2+0+2

Study programme for which it is organised:
Doctoral studies in sustainable development, MARDS

Dependency by other subjects: None

Objectives of studying this subject: The goal of this course is that PhD students: understand principles and procedures of experimental analysis of structures; use gained knowledge in the scientific research and in engineering practice regarding design, construction and maintenance.

Contents of the subject (teaching units, forms of students' individual work, forms of testing) presented per working weeks in the academic calendar:

Preparatory week	Consultation with supervisor, courses selection.
I week	Introduction – history, terminology, technical regulations.
II week	Types and methods of experimental analysis of structures in real objects and in laboratory conditions. Destructive & non-destructive methods of experimental analysis of structures.
III week	Testing equipment, measuring devices and instruments.
IV week	Testing models of structures.
V week	Connection with materials testing.
VI week	Static testing of structures – load application; measuring deflection, slope and cracks; measuring deformations.
VII week	Dynamic testing of structures and objects.
VIII week	Optical methods for determination of stress-strain state.
IX week	Defectoscopy of structures – methods of ultrasound, radiography, thermography; measuring devices; classification of defects.
X week	Hardness measuring by sclerometer. Determination of position and quantity of reinforcement in real structures.
XI week	Methodology of experimental analysis of structures. Testing programme and testing report.
XII week	Processing and interpretation of experimental data.
XIII week	Project task. Experimental and laboratory work. (individual work)
XIV week	Project task. Experimental and laboratory work. (consultation and review)
XV week	Project task. Experimental and laboratory work. (discussion and defence)

Methods of education: teaching (lectures and exercises), in combination with supervised work; consultations; project based teaching/learning; experimental and laboratory work; obtained knowledge and skills presentation

Student's load

Weekly	**In semester**
10 credits x 40/30 = **13.33 hours** Structure: **2** hours of lectures **2** hours of exercises **9.33** hours of individual work	**Lectures and final exam**: (13.33 hours) x 16 = **213.33 hours** **Necessary preparation** before the start of the semester (administration, enrolment, verification): (13.33 hours) x 2 = **26.66 hours** **Total workload for the course**: **10 x 30 = 300 hours** **Additional work** for preparing correction of the final exam, including taking the exam: **0 - 60 hours** (remaining time from the first and the second item to the total workload for the course of 300 hours) **Structure of the workload**: 213.33 hours (lectures and final exam) + 26.66 hours (preparation) + 60 hours (additional work)

Students' obligations during the teaching:

- regular attending lectures and other classes or adequate activity in supervised work
- conscientious and individual elaboration of homework and project tasks, as well as realisation

of experimental and laboratory work, with systematisation of material and adequately applied scientific research methodology
- individual elaboration of written exam, accompanied by oral discussion
- presenting obtained knowledge during the semester and at the final exam

Literature:

- J.W. Dally, W.F. Riley: *Experimental stress analysis*, 3rd edition, McGraw-Hill, 1991.
- R.T. Reese, W.A. Kawahara: *Handbook on structural testing*, PTR Prentice-Hall, 1993.
- J.S. Bendat, A.G. Piersol: *Random Data: Analysis and Measurement Procedures*, 4th edition, Wiley, 2010.
- R.S. Figliola, D.E. Beasley: *Theory and Design for Mechanical Measurements*, 6th edition, Wiley, 2014.
- N. Đuranović: *Eksperimentalna analiza konstrukcija mjernim trakama*, Građevinski fakultet, Univerzitet Crne Gore, 2008.
- N. Đuranović: *Uvod u ispitivanje konstrukcija sa primjerima*, Građevinski fakultet, Univerzitet Crne Gore, Podgorica, 2009.
- R. Vukotić: *Ispitivanje konstrukcija*, Građevinski fakultet, Univerzitet u Beogradu i Izgradnja, Beograd, 1998.
- R. Vukotić i R. Tošković: *Zbirka rešenih ispitnih zadataka iz ispitivanja konstrukcija*, Gros knjiga, Beograd, 1994.
- measuring equipment instructions and manuals
- current literature (scientific papers from international conferences and journals)

Learning outcomes (complied with the outcomes for the study programme):

Knowledge and understanding:

On completion of this course the student will be able to:
- understand and explain needs for and principles of experimental analysis of structures,
- understand different types and methods of experimental analysis of structures, as well as suggest adequate method for certain purpose,
- use testing equipment, measuring devices and instruments,
- realise different procedures of experimental analysis of structures,
- interpret experimental data,
- develop detailed programme of experimental research.

Transferable / Key skills and other attributes:
- Communication skills: oral defence of lab work, manner of expression at written examination.
- Use of information technology: use of software tools in experimental analysis of structures.
- Calculation skills: performing calculation operations during experiment planning and experimental data processing.
- Problem solving: developing experimental testing programme; facing different problems that may occur during the experiment, but might not have been foreseen, and creating adequate solutions; interpreting non-expected experimental results.

Forms of tests and evaluation:

Knowledge assessment is continuous during the semester, through pre-exam checks, and in the final exam. In total, student may collect max 100 points.
The following is assessed:
- experimental and laboratory work 50%,
- other semester activities (homework etc.) 20%,
- final exam 30%.

The final exam consists of written and oral part. Written part may be realised through project task. Grades (A, B, C, D, E, F) are adjoined to collected number of points, in line with the Law of Higher Education and study rules at the University of Montenegro.

Name and surname of teacher and associate:

Assoc.Prof. Biljana Šćepanović, Dr-Ing.

Particularities needed to be emphasized for the subject:

Note (if needed):