

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Strength of Materials		Code 1010102111010113818
Field of study Civil Engineering Second-cycle Studies	Profile of study (general academic, practical) (brak)	Year /Semester 1 / 1
Elective path/specialty -	Subject offered in: english	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 30 Classes: 15 Laboratory: - Project/seminars: 15		No. of credits 4
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 4 100% 4 100%
Responsible for subject / lecturer: dr hab. inż. Adam Glema, prof. nadzw. email: adam.glema@put.poznan.pl tel. +48 61 665 2104 Wydział Budownictwa i Inżynierii Środowiska ul. Piotrowo 5 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	has knowledge of mathematics and physics (engineering mechanics and strength of materials) that is useful for the formulation, modeling materials and solving problems related to the construction and development of the overall design; knows the theory of design and analysis of rod systems in statics, dynamics and stability; knows the most commonly used building materials and their properties.
2	Skills	able to perform static analysis, linear stability and bearing capacity of the evaluation of critical states and limit load design for simple bar systems statically determinate and indeterminate; uses information technology, Internet and other sources to search for information, communication and software acquisition to support the work of the designer.
3	Social competencies	draws conclusions and describes the results of its own and is responsible for the accuracy of the results of their work and their interpretation and is communicative media presentations.
Assumptions and objectives of the course: Knowledge of the characteristics and behavior of the structural material according to the time [t (s)], the temperature [T (C)], the pressure [P (Pa)], the strain rate [$\dot{\epsilon}$] ($1/s$) frequency [ω] ($1/s$). During the exercises, students will acquire skills of design calculation, analysis and design of components and structures, taking into account the phenomena and processes in finite dimensions of space and time, realizing individual and team design exercise.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. has advanced knowledge of the theory of materials, modeling materials - [K_W01] 2. advanced topics in strength of materials, construction and building - [K_W04]		
Skills:		
1. able to conduct a hazard analysis in the implementation and operation of buildings and implement appropriate measures and safety - [K_U11] 2. able to plan and carry out laboratory experiments leading to the evaluation of the quality of materials used and the strength of the elements of buildings - [K_U12] 3. is able, according to scientific principles using scientific workshop to formulate and carry out preliminary work on a research to resolve the structural problems - [K_U17]		
Social competencies:		

- | |
|--|
| 1. independently complements and extends knowledge in modern processes and technologies in the construction industry - [K_K01] |
| 2. can - in performing specific tasks - work independently, to work in a team and manage a team - [K_K03] |

Assessment methods of study outcomes

The starting date of the course, the 26 February 2013

Credit terms of design exercises:

19 MARCH 2013: project 1

09 APRIL 2013: project 2

23 APRIL 2013: project 3

21 MAJA 2013 on: project 4

04 JUNE 2013: project 5

CREDIT LECTURES written part: max. test: 15 questions x 7 points = 105 points the oral part:

Deadline for receiving credit - Tuesday, 4 June 2013, at. 12:00, room 18

Deadline for completion of the correction - Friday, 20 September 2013, h. 9:30, room 18

The extraterm III - Friday, 27 September 2013, h. 9:30, room 18

Course description

1. Introduction. Name and scope of the course. The scope and timing of this exercise. The method of evaluation. Literature.
2. Harmonic motion of discrete systems. The transition from discrete mechanics to the continuum mechanics. Derivation of the wave equation as an example strings.
3. Waves. Wave propagation speed. Group velocity. Dispersion. Modulation. Wave phenomena. Types of waves.
4. Rheological and viscous properties of building materials. Calculation of shrinkage in the concrete beam.
5. Strength of the material at elevated temperatures. Dimensioning of steel structure elements in fire.
6. Material defects. Defects detection.
7. Summary of the course. The scope and form of credit course.

Project tasks:

1 Task 0 Moodle preliminary tasks 0-3 points.

2 Task 0.1 Setting up a personal profile Moodle 0-3 points.

3 Task 1.1 Consultation Project 0-4 points.

4 Task 1.2 Definition of the wave. Wave equation. Types and characteristics of the waves. [the project team] 0-11 points.

5 Task 2.1 Consultation Project 0-4 points.

7 Task 2.2 speed and the propagation time of the wave front, stress, thermal, acoustic and pressure of the air, water, soil, steel, concrete and wood. [personal project] 0-11 points.

8 Task 3.1 Consultation Project 0-4 points.

9 Task 3.2 Rheological and viscous properties of building materials. [personal project] 0-11 points.

10 Task 4.1 Consultation Project 0-4 points.

13 Task 4.2 Tensile strength of the material at elevated temperatures. Dimensioning of steel beams in fire. [personal project] 0-15 points.

14 Task 5.1 Consultation Project 0-4 points.

15 Task 5.2 Material defects. Defects detection [team project] 0-11 points.

15 Task 6 Activity 0-15 points.

R A Z E M max 100 points

Basic bibliography:

1. F.C. Crawford, Waves, Berceley Physics Course vol. III, McGraw-Hill Education, New York, 1986
2. H. Kolsky, Stress Waves in Solids, Oxford University Press, London, 1953
3. A. Bodnar, M. Chrzanowski, P. Latus, Reologia konstrukcji prętowych, Wydawnictwo Politechniki Krakowskiej, 2006
4. M. Maślak, Trwałość pożarowa stalowych konstrukcji prętowych. ISBN: 0860-097X-370, Wydawnictwo Politechniki Krakowskiej, Kraków 2008
5. Eurocode EN-1991-1-1
6. Eurocode EN-1991-1-2

Additional bibliography:		
1. . L. Drobiec, R. Jasiński, A. Piekarczyk, Diagnostyka konstrukcji żelbetowych, Tom 1: Metodologia, badania polowe, badania laboratoryjne betonu i stali, Wydawnictwo Naukowe PWN, 2010		
2. . M. Rucka, Guided wave propagation in structures, Modelling, experimental studies and application to damage detection, Monografie, nr 106, Wydawnictwo Politechniki Gdańskiej, Gdańsk, 2011		
Result of average student's workload		
Activity	Time (working hours)	
1. Participation in activities	45	
2. Consultation tasks	10	
3. Literature study	20	
4. Projects elaboration	30	
5. Final study and preparation for test	5	
Student's workload		
Source of workload	hours	ECTS
Total workload	110	4
Contact hours	55	2
Practical activities	55	2