STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Structural Mechanics**		Code **1010101141010110048**
Field of study **Civil Engineering First-cycle Studies**	Profile of study (general academic, practical) **(brak)**	Year /Semester **2 / 4**
Elective path/specialty **-**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **First-cycle studies**	Form of study (full-time,part-time) **full-time**	
No. of hours Lecture: **15** 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. Jerzy Rakowski, prof. nadzw.
email: jerzy.rakowski@put.poznan.pl
tel. +48 61 665 2489
Wydział Budownictwa i Inżynierii Środowiska
ul. Piotrowo 5 60-965 Poznań

Responsible for subject / lecturer:

dr inż. Przemysław Wielentejczyk-
email: przemyslaw.wielentejczyk@put.poznan.pl-
tel. +48 61 665 2471-
Wydział Budownictwa i Inżynierii Środowiska-
ul. Piotrowo 5 60-965 Poznań-

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of the following subjects: mathematics, theoretical mechanics,strength of materials and structural mechanic (3rd semester) covered during Civil Engineering or other similar type of studies up to the Bachelor of Science degree.
2	**Skills**	Capability to apply the aquired knowledge and obtain futher information from the literature. One is capable to apply the theoretical knowledge to solve practical problems.
3	**Social competencies**	Awareness about necessity of expending the theoretical knowledge in order to justify its application during the professional career. Understanding the necessity of constant education.

Assumptions and objectives of the course:

Calculation of frames using the stiffness method. Calculation of critical load for elastic frames. Knowledge of basic concepts in dynamics of bar systems and determination of natural frequencies and dynamic coefficients.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Student knows the relations between displacements and loads in statics, stability and dynamics of of simple linear beams. - [K_W03]
2. Student knows methods of forming models of plane structures with concetrated masses. - [K_W03]
3. Student knows the influence of large axial forces on internal forces and displacements in plane frames. - [K_W03]

Skills:

1. Student can compute the distribution of internal forces and deformations of plane bar structures caused by arbitrary external loads, thermal and kinematic effects. - [K_U04]
2. Student can formulate equilibrium conditions for frames according to the second order theory. - [K_U04]
3. Student can compute the eigen frequencies and amplitudes of forced vibrations of frames with concentrated masses. - [K_U04, K_U06]

Social competencies:

1. Student is capable to work individually as well as in the team - [K_K02]
2. Student is aware of the responsibility arising from the accuracy of obtained results and is able to provide the interpretation - [K_K02]
3. Student is aware of the necessity of constant education and knowledge expansion - [K_K10]

Assessment methods of study outcomes

Written tests and exercises. The lectures will be summerised by written exam.

1) Exam:

-two terms: first one during the regular examination period, second during the last chance examination period - each exam lasts 3 hours - each student receives test with individual and unique problems - the final mark is the summation of all the answers provided to the given problems, passing note in the scale 2= fail, 5= very good can be granted after obtaining at least 50% of the maximum amount of points

2) Tutioring sessions:

- two written tests during the semester

- each student receives the set of unique problems which must be solved and descrived individually (projects) -number of projects: 2

- during the tutoring sessions the individual help will be granted and the solving problems knowledge will be tested

- final grade for each project will be based on the quality of the project as well as the result of the quiz

- dates of each quiz will be set at the beginning of the semester

Course description

Stiffness method for kinematically indeterminate frames. Slope-deflection formulae for beams with axial force. Second order theory and determination of critical loads. Stability of plane frames. Foundations of structural dynamics. Free and forced vibrations with and without damping for one-degree-of-freedom system. Dynamics of simple frames with discrete mass distribution. Vibrations of beams with continuous mass distribution. Slope-deflection formulae for beams in the case of harmonic excitation of supports.

Basic bibliography:

1. M. Guminiak, J. Rakowski, Zbiór zadań z mechaniki budowli, wydanie drugie poprawione i uzupełnione, Wydawnictwo PWSZ w Pile, 2009

2. M. Guminiak, J. Rakowski, Mechaniki budowli, Zbiór zadań z elementami ujęcia komputerowego, Wydawnictwo PWSZ w Pile, 2011

3. W. Nowacki Mechanika budowli PWN Warszawa 1974

4. Z. Dyląg i in Mechanika budowli (t.I+II) PWN Warszawa 1989

5. Z. Cywiński Mechanika budowli w zadaniach (t.I+II) PWN Warszawa 1976

Additional bibliography:

1. Skrypt internetowy, Mechanika Budowli, www.intranet.put.poznan.pl

Result of average student's workload

Activity	Time (working hours)
1. .Completing the project during tutoring sessions along with its elaboration	45
2. .Preparation to the written tests and exam	35
3. .Independent research of the available literature and solving additional problems	20

Student's workload

Source of workload	hours	ECTS
Total workload	150	4
Contact hours	30	2
Practical activities	30	2