MODULE SPECIFICATION

Module code	
Module title in Polish	**Mechanika I wytrzymałość materiałów 2**
Module title in English	**Mechanics and Materials Strength 2**
Module running from the academic year	**2016/2017**

A. MODULE IN THE CONTEXT OF THE PROGRAMME OF STUDY

Field of study	**Environmental Engineering**
Level of qualification	**first cycle** (first cycle, second cycle)
Programme type	**academic** (academic/practical)
Mode of study	**full-time** (full-time/part-time)
Specialism	All
Organisational unit responsible for module delivery	**The Department of Strength of Materials and Concrete Structures**
Module co-ordinator	**Prof. Wiesław Trąmpczyński, PhD hab., Eng.** **Grzegorz Świt, PhD, Eng.**
Approved by:	**Prof. Wiesław Trąmpczyński, PhD hab., Eng.**

B. MODULE OVERVIEW

Module type	**core module** (core/programme-specific/elective HES*)
Module status	**compulsory module** (compulsory/optional)
Language of module delivery	**Polish/English**
Semester in the programme of study in which the module is taught	semester 3
Semester in the academic year in which the module is taught	winter semester (winter semester/summer semester)
Pre-requisites	**None** (module code/module title, where appropriate)
Yes	**Yes** (Yes/No)
ECTS credits	**4**

* elective HES – elective modules in the Humanities and Economic and Social Sciences

Mode of instruction	lectures	classes	laboratories	project	others
Total hours per semester	15	15		15	

C. LEARNING OUTCOMES AND ASSESSMENT METHODS

Module aims	The aim of the module is to acquaint students with the ability of identifying simple and complex strength cases, dimensioning rod sections from the condition of dimensioning. Other aims include assessing the safety of complex strength cases as well as stability analysis of single-branch rod structure elements.

Module outcome code	Module learning outcomes	Mode of instruction *(l/c/lab/p/ others)*	Corresponding programme outcome code	Corresponding discipline-specific outcome code
W_01	A student has fundamental knowledge on statics, physics, and mathematics, which is useful to solve simple tasks as regards materials strength.	l/c/p	IŚ_W01	T1A_W01 T1A_W02
W_02	A student has basic knowledge on physical and mechanical properties of basic materials applied in bent, stretched (compressed), and torsioned structures.	l/c	IŚ_W06	T1A_W03 T1A_W04 T1A_W05 T1A_W07
W_03	A student has basic knowledge on determining the distribution stresses in simple cases of materials strength.	l/c/p	IŚ_W14	T1A_W02 T1A_W06
U_01	A student can use basic safety criteria of constructions to determine the distribution of stresses.	l/c/p	IŚ_U01	T1A_U08 T1A_U09
U_02	A student is capable of self-education.	l/c/p	IŚ_U07	T1A_U05
U_03	A student can use appropriately selected calculation methods in solving simple tasks concerning materials strength and building structure mechanics.	l/c/p	IŚ_U12	T1A_U08 T1A_U09
K_01	A student can work individually.	l/c/p	IŚ_K01	T1A_K03
K_02	A student is responsible for the reliability of the obtained results of his/her works.	c/p	IŚ_K02	T1A_K02 T1A_K05
K_03	A student is responsible to his/her own work.	c/p	IŚ_K05	T1A_K03 T1A_K04

Module content:

1. Topics to be covered in the lectures

No.	Topics	Module outcome code
1	The concept of stress. A plane stress state. Main stresses. Mohr's circle. The concept of displacement. The definition of linear and angular deformation. Shape and volumetric deformations. Hooke's law.	W_01, W_03 U_01, U_02 U_03, K_01
2	Experimental fundamentals of materials strength. Clear stretching (pressing). Designing pressed rods (statically determinable cases).	W_02, U_01 U_02, U_03 K_01
3	Clear torsion. Rod torsion with circular, rectangular, and thin-walled section.	W_01, W_03 U_01, U_02 U_03, K_01

4	Clear bending. Simple bending. Designing beams under the safety condition. Selecting loads. Normal and tangent stresses during bending.	W_01, W_02 W_03, U_01 U_02, U_03 K_01
5	Axial bending of straight rods.	W_01, W_02 W_03, U_01 U_02, U_03 K_01
6	Eccentric compressing. Section core.	W_01, W_02 W_03, U_01 U_02, U_03 K_01
7	Complex strength (the concept of hypotheses).	W_01, W_02 W_03, U_01 U_02, U_03 K_01
8	The stability of a straight rod. Elastic and elastic-plastic range. Energy method.	W_02, U_01 U_02, U_03 K_01

2. Topics to be covered in the classes

No.	Topics	Module outcome code
1	Designing stretched rods (taking dead load into consideration). Calculating stretching in stretched rods.	W_02, U_01 U_02, U_03 K_01, K_02 K_03
2	Designing the section of a bent beam under the safety condition (selecting an optimal load).	W_01, W_02 U_01, U_02 U_03, K_01 K_02, K_03
3	Preparing the diagrams of the distribution of normal and tangent stresses in any beam section. Main stresses.	W_01, W_03 U_01, U_02 U_03, K_01 K_02, K_03
4	Calculating diagonally bent rods with circular and non-circular section: determining the position of an inertial axis, designing a section, preparing the solid of stresses in a dangerous beam section.	W_01, W_02 W_03,U_01 U_02, U_03 K_01, K_02 K_03
5	Calculating eccentrically compressed poles.	W_03, U_01 U_02, U_03 K_01, K_02 K_03
6	Assessing the safety of complex strength cases (hypotheses).	W_01, W_02 W_03, U_01 U_02, U_03 K_01, K_02 K_03
7	Selecting safe force for a slender axially pressed pole (elastic, elastic-plastic range). Energy Ritz method.	W_02, U_01 U_02, U_03 K_01, K_02 K_03

3. Topics to be covered in the project classes

No.	Topics	Module outcome code
1-2	Designing the section of a beam bent from the safety condition. Preparing the	W_01,W_02

	diagrams of the distribution of normal and tangent stresses in the assigned beam section.	W_03, U_01 U_02, U_03 K_01, K_02 K_03
3	Preparing the solid of stresses in a dangerous section of the axially bent beam.	W_01, W_02 W_03, U_01 U_02, U_03 K_01, K_02 K_03
4	Preparing the solid of stresses in a dangerous section of the eccentrically bent beam.	W_01, W_02 W_03, U_01 U_02, U_03 K_01, K_02 K_03
5	Assessing the safety of a rod operating in a complex stress state.	W_01, W_02 W_03, U_01 U_02, U_03 K_01, K_02 K_03
6-7	Selecting a safe force for a slender pole operating in the elastic and elastic-plastic range.	W_02, U_01 U_02, U_03 K_01, K_02 K_03

Assessment methods

Module outcome code	**Assessment methods** *(Method of assessment; for module skills − reference to specific project, laboratory and similar tasks)*
W_01	An examination and a test
W_02	An examination and a test
W_03	An examination and a test
U_01	An examination and a test
U_02	An examination and a test
U_03	An examination and a test
U_04	An examination and a test
K_01	An examination and a test
K_02	An examination and a test

D. STUDENT LEARNING ACTIVITIES

ECTS summary		
	Type of learning activity	**Study time/ credits**
1	Contact hours: participation in lectures	**15**
2	Contact hours: participation in classes	**15**
3	Contact hours: participation in laboratories	
4	Contact hours: attendance at office hours (2-3 appointments per semester)	**2**
5	Contact hours: participation in project-based classes	**15**
6	Contact hours: meetings with a project module leader	**8**
7	Contact hours: attendance at an examination	**5**
8		
9	**Number of contact hours**	**60** *(total)*
10	**Number of ECTS credits for contact hours** *(1 ECTS credit =25-30 hours of study time)*	**2,4**
11	Private study hours: background reading for lectures	**5**
12	Private study hours: preparation for classes	**5**
13	Private study hours: preparation for tests	**8**
14	Private study hours: preparation for laboratories	
15	Private study hours: writing reports	
16	Private study hours: preparation for a final test in laboratories	
17	Private study hours: preparation of a project/a design specification	**12**
18	Private study hours: preparation for an examination	**10**
19		
20	**Number of private study hours**	**40** *(total)*
21	**Number of ECTS credits for private study hours** *(1 ECTS credit =25-30 hours of study time)*	**1,6**
22	**Total study time**	**100**
23	**Total ECTS credits for the module** *(1 ECTS credit =25-30 hours of study time)*	**4**
24	**Number of practice-based hours** *Total practice-based hours*	**35**
25	**Number of ECTS credits for practice-based hours** *(1 ECTS credit =25-30 hours of study time)*	**1,4**

E. READING LIST

References	
Module website	