

MODULE SPECIFICATION

Module code	
Module title in Polish	Mechanika budowli 1
Module title in English	Structural Mechanics 1
Module running from the academic year	2016/2017

A. MODULE IN THE CONTEXT OF THE PROGRAMME OF STUDY

Field of study	Civil Engineering
Level of qualification	First cycle <i>(first cycle, second cycle)</i>
Studies profile	Academic <i>(academic/practical)</i>
Mode of study	Full-time <i>(full-time / part-time)</i>
Specialism	
Organisational unit responsible for module delivery	The Department of Mechanics, Metal Structures and Computer Methods
Module co-ordinator	Urszula Radoń, PhD, Eng.
Approved by	Marek Iwański, Professor

B. MODULE OVERVIEW

Module type	Core module <i>(core/programme-specific/elective HES*)</i>
Module status	Compulsory module <i>(compulsory / non-compulsory)</i>
Language of module delivery	English
Semester in the programme of study in which the module is taught	Semester 4
Semester in the academic year in which the module is taught	Winter semester <i>(winter / summer)</i>
Pre-requisites	None <i>(module code/module title, where appropriate)</i>
Examination required	No <i>(yes / no)</i>
ECTS credits	3

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

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

C. LEARNING OUTCOMES AND ASSESSMENT METHODS

Module aims	The aim of the module is to acquire the ability to calculate internal forces and displacements in statically determinate rod structures with the use of the Force Method and to construct the influence lines and the envelopes of internal forces in statically determinate rod structures.
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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 knows basic laws of mechanics.	l/c	B_W07	T1A_W03 T1A_W04 T1A_W07
W_02	A student knows principles of calculation of statically determinate and indeterminate rod structures.	l/c/p	B_W07	T1A_W03 T1A_W04 T1A_W07
U_01	A student can calculate the displacements of statically determinate and indeterminate rod structures.	l/c/p	B_U09	T1A_U03 T1A_U05 T1A_U07 T1A_U09 T1A_U13 T1A_U14
U_02	A student can determine internal forces in statically indeterminate rod structures with the use of the Force Method.	l/c/p	B_U09	T1A_U03 T1A_U05 T1A_U07 T1A_U09 T1A_U13 T1A_U14
U_03	A student can prepare the influence lines and envelopes of internal forces in statically determinate structures.	l/c/p	B_U09	T1A_U03 T1A_U05 T1A_U07 T1A_U09 T1A_U13 T1A_U14
K_01	A student can work individually.	c/p	B_K01	T1A_K01 T1A_K03 T1A_K04
K_02	A student is responsible for the reliability of the obtained results.	c/p	B_K02	T1A_K02 T1A_K05 T1A_K07
K_03	A student can formulate conclusions and describe the results of his/her own work.	p	B_K04	T1A_K01 T1A_K07

Module content:

1. Topics to be covered in the lectures

No.	Topics	Module outcome code
1	Basic assumptions of the mechanics of continuum. A differential equation of equilibrium. The principle of virtual work in virtual state of displacements and virtual state of loads.	W_01
2	Maxwell-Betti reciprocal work theorem and Rayleigh theorem. Utilising the principle of virtual work to calculate displacements in statically determinate structures.	W_01 U_01
3	Static determinacy and non-determinacy of rod structures. Geometric invariability of engineering structures. The algorithm of the Force Method.	W_01 W_02

		U_01 U_02
4-6	The application of the method of forces to determine internal forces in statically indeterminate beams, frames, trusses, grillage, mixed systems, systems with static, thermal, and kinematic loads. Calculating displacements in statically indeterminate systems.	W_01 W_02 U_01 U_02
7	Preparing the influence lines of support reactions, internal forces and envelopes of internal forces in statically determinate systems.	W_01 W_02 U_03

2. Topics to be covered in the classes

No.	Topics	Module outcome code
1-4	Calculating of displacements in statically determinate systems.	W_01 U_01 K_01 K_02
5-8	Calculating of internal forces and displacements in a statically indeterminate beam with the Force Method.	W_01 W_02 U_01 U_02 K_01 K_02
8-12	Calculating of internal forces and displacements in a statically indeterminate frame with the Force Method.	W_01 W_02 U_01 U_02 K_01 K_02
13-15	Preparing the influence lines of reactions, internal forces and the envelopes of internal forces in statically determinate systems.	W_01 W_02 U_03 K_01 K_02

3. Topics to be covered in the projects

Project number	Topics	Module outcome code
1	Calculating of nodal displacements and sketching a deflection line of a statically determinate beam. Determining nodal displacements in frames.	W_01 U_01 K_01 K_02 K_03
2	Preparing the diagrams of internal forces in a statically determinate beam and frame with the use of the Force Method. Check of calculations.	W_01 W_02 U_01 U_02 K_01 K_02 K_03
3	Preparing the influence lines of reactions, internal forces and the envelopes of internal forces in statically determinate systems.	W_02 U_03 K_01 K_02

		K_03
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Assessment methods

Module outcome code	Assessment methods <i>(Method of assessment; for module skills – reference to specific project, laboratory and similar tasks)</i>
W_01	A test and a project
W_02	A test and a project
U_01	A test and a project
U_02	A test and a project
U_03	A test and a project
K_01	A test and a project
K_02	A test and a project
K_03	A project

C. 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)	1
5	Contact hours: participation in project-based classes	15
6	Contact hours: meetings with a project module leader	2
7	Contact hours: attendance at an examination	
8		2
9	Number of contact hours	50 <i>(total)</i>
10	Number of ECTS credits for contact hours <i>(1 ECTS credit =25-30 hours of study time)</i>	2
11	Private study hours: background reading for lectures	
12	Private study hours: preparation for classes	
13	Private study hours: preparation for tests	5
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	15
18	Private study hours: preparation for an examination	
19		5
20	Number of private study hours	25 <i>(total)</i>
21	Number of ECTS credits for private study hours <i>(1 ECTS credit =25-30 hours of study time)</i>	1
22	Total study time	75
23	Total ECTS credits for the module <i>(1 ECTS credit =25-30 hours of study time)</i>	3
24	Number of practice-based hours	33

	<i>Total practice-based hours</i>	
25	Number of ECTS credits for practice-based hours <i>(1 ECTS credit =25-30 hours of study time)</i>	1.3