

COURSE SYLLABUS	
Course code	1080-BU400-ISA-0303
Course name	Mechanics of Structures I
Course version	2027L
Level of education	first cycle programme
Form and mode of study	full-time study
Study profile	general academic profile
Field of study	Civil Engineering
Specialisation	-
Organizational unit	The Faculty of Civil Engineering
Implementing unit	The Faculty of Civil Engineering
Course unit	n/a
Course groups	-
Course status	Obligatory
Language of the course	English
Study stage code	BU000-S4-ISA-1080
Number of ECTS credits	4

Part I

01. Learning outcomes and the method of conducting classes

Learning outcomes	see table "Learning outcomes"
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Forms of classes and the number of hours in the semester

lectures	20,00 h
project	15,00 h
tutorials	15,00 h

02. ECTS balance

Number of ECTS credits	4
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Course workload	Hours	ECTS
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Total number of hours and ECTS credits for the course:

Hours and ECTS credits for courses involving direct participation of academic teachers	54	2,16
Hours and ECTS credits involving student's independent work	46	1,84
Total	100	4,00

Number of hours involving direct participation of academic teachers:

Hours connected with class participation	50
Other synchronous hours	4
Total	54

Number of hours involving student's independent work:

Hours for student's independent work	46
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03. Course content

Course content	The Euler theory of bars. Thermal loadings. Variational form of the equilibrium equations (or the virtual work equation), variational form of the compatibility equations (or the Maxwell-Mohr formula), theorem of Betti. Computing displacements of frames and plane arches. Statics of parabolic arches. Classification of trusses. The Force Method: trusses, frames, plane arches as well as pin-jointed grillages. Computing displacements in statically indeterminate bar structures. The Displacement Method for frames made from inextensional bars as well as the direct stiffness method for plane frames made from extensional bars.
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Table: Learning outcomes

Part I

Knowledge	
Outcomes code	W1
Description	Students understand the theory of bars and bar structures, are able to apply the most important methods of solution of static problems of such structures-the force method and the displacement method. They know how to formulate problems of statics of trusses and frames made from inextensible bars under static loads, subject to settlements of supports or subject to thermal loads. Students know the matrix displacement method in the scope of statics of plane frames.
Related field-of-study learning outcomes	K1_W01, K1_W03, K1_W04
Skills	
Outcomes code	U1
Description	Students are able to perform a complete static analysis of statically indeterminate bar systems made from straight or curved bars: know how to compute selected displacements or angles of rotation, how to construct the diagrams of stress resultants and reactions in continuous beams and plane frames. Students able to independently program the matrix method of displacements of trusses and frames.
Related field-of-study learning outcomes	K1_U01, K1_U03, K1_U23
Outcomes code	U2
Description	The student is able to use the theory of rods and rod systems, understands the concepts of: displacements, strains, stresses, internal forces; is able to set equilibrium conditions in problems with non-extensibility constraints using the virtual work equation specified for applications in the theory of trusses and plane frames. In addition, the student understands the Maxwell-Mohr formula, which relates deformation fields to displacements. Is able to prepare a model of a rod structure in the ROBOT program and is able to critically evaluate the results of computer analysis.
Related field-of-study learning outcomes	K1_U01, K1_U03, K1_U06, K1_U07, K1_U08
Outcomes code	U3
Description	Student is able to use the recommended literature; is able to prepare and defend homework.
Related field-of-study learning outcomes	K1_U05, K1_U23
Social competence	
Outcomes code	K1
Description	The student is ready to cooperate with colleagues during the group exercises, learning to work in a team. The student is ready to analyze issues accurately and without errors, learning about the responsibility associated with incorrect assessments of the work of the structure.
Related field-of-study learning outcomes	K1_K01, K1_K02

Part II

04. Year and semester of studies	
Year	2027L
Semester	4
05. Course leader and course teachers	
Course leader	Tomasz Lewiński
lectures	Tomasz Lewiński
tutorials	Tomasz Lewiński
project	Tomasz Lewiński
06. Course objective	

Part II	
Course objective	Gaining the ability to solve statics problems for any statically determinate bar systems: calculating internal forces, displacements, and angles of rotation of cross-sections; solving statics problems for flat, statically indeterminate bar systems: calculating internal forces, displacements, and angles of rotation of cross-sections. Evaluation of calculation results.
07. Teaching methods and techniques	
tutorials	exercise method
project	\$metoda �wiczeniowa, metoda projektowa
lectures	lecture
08. Methods of verifying learning outcomes	
Knowledge	
Outcomes code	W1
Description	Students understand the theory of bars and bar structures, are able to apply the most important methods of solution of static problems of such structures-the force method and the displacement method. They know how to formulate problems of statics of trusses and frames made from inextensible bars under static loads, subject to settlements of supports or subject to thermal loads. Students know the matrix displacement method in the scope of statics of plane frames.
Verification methods	written test:test oral test:defence of the homework homework assignment:homework in accordance with the Course Regulations:written exam
Skills	
Outcomes code	U1
Description	Students are able to perform a complete static analysis of statically indeterminate bar systems made from straight or curved bars: know how to compute selected displacements or angles of rotation, how to construct the diagrams of stress resultants and reactions in continuous beams and plane frames. Students able to independently program the matrix method of displacements of trusses and frames.
Verification methods	written test:test oral test:defence of the homework assessment of active class participation:assessment of the activity homework assignment:homework in accordance with the Course Regulations:written exam
Outcomes code	U2
Description	The student is able to use the theory of rods and rod systems, understands the concepts of: displacements, strains, stresses, internal forces; is able to set equilibrium conditions in problems with non-extensibility constraints using the virtual work equation specified for applications in the theory of trusses and plane frames. In addition, the student understands the Maxwell-Mohr formula, which relates deformation fields to displacements. Is able to prepare a model of a rod structure in the ROBOT program and is able to critically evaluate the results of computer analysis.
Verification methods	oral test:defence of the homework
Outcomes code	U3
Description	Student is able to use the recommended literature; is able to prepare and defend homework.
Verification methods	homework assignment:homework
Social competence	
Outcomes code	K1

Part II

Description	The student is ready to cooperate with colleagues during the group exercises, learning to work in a team. The student is ready to analyze issues accurately and without errors, learning about the responsibility associated with incorrect assessments of the work of the structure.
Verification methods	assessment of active class participation:assessment of the activity homework assignment:homework

09. Required and recommended reading list

Required reading	W. Zalewski, A. Allen, Shaping Structures. Statics, J. Wiley, New York, 1998.
Recommended reading	\$materiały dostępne na stronie mk.il.pw.edu.pl

10. Other information

Other information	In accordance with the Course Regulations.
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