STUDY MODULE DESCRIPTION FORM

Name of the module/subject **(-)**		Code **1010101111010113278**
Field of study **Civil Engineering First-cycle Studies**	Profile of study (general academic, practical) **(brak)**	Year /Semester **1 / 1**
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: **30** Classes: **15** Laboratory: **-** Project/seminars: **15**		No. of credits **7**
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 %) **7 100%** **7 100%**

Responsible for subject / lecturer:

dr hab. inż. Ryszard Dzięcielak
email: ryszard.dziecielak@put.poznan.pl
tel. 665-2150
Faculty of Civil and Environmental Engineering
ul. Piotrowo 5 60-965 Poznań

Responsible for subject / lecturer:

dr inż. Maciej Przychodzki
email: maciej.przychodzki@put.poznan.pl
tel. 665-2697
Faculty of Civil and Environmental Engineering
ul. Piotrowo 5 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of the vector calculus and the mathematical analysis.
2	**Skills**	Capability to apply the vector calculus and calculate derivatives and integrals of simple functions.
3	**Social competencies**	Understanding the necessity of constant actualization and complementation of knowledge and skills.

Assumptions and objectives of the course:

The aim of this subject is to prepare the student to be able to solve two- and three-dimensional static tasks and simple problems of dynamics of particles systems and rigid bodies.

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

Knowledge:

1. Student knows the equilibrium conditions for two- and three-dimensional forces sets - [K_W04]
2. Student knows methods of calculation of internal forces in statically determined plane bar systems - [K_W04]
3. Student knows the principle of virtual work - [K_W04]
4. Student knows laws of dynamics of particles system and rigid body - [K_W04]

Skills:

1. Student can determine reactions in two- and three-dimensional bar systems - [K_U04]
2. Student can determine internal forces in two- dimensional statically determined bar systems - [K_U04]
3. Student can apply the principle of virtual work to determine reactions and internal forces - [K_U04]
4. Student can apply laws of dynamics for analysis of movement of simple particles systems and rigid bodies - [K_U04]

Social competencies:

1. Student can work independently on specific task - [K_K01]
2. Student is responsible for the accuracy of obtained results of his work and their interpretation - [K_K02]
3. Student can formulate conclusions and describe results of his own work - [K_K09]

Assessment methods of study outcomes

2 written tests during the semester,
5 individual exercises,
Written and oral examination.

Course description

Elements of vector calculus, moment of a vector about a point, and about a given axis. Principles of statics. Moment of a couple and its properties. Reduction of a system of forces. Resultant equilibrium of a system of forces. Constrains, degrees of freedom. Conditions of geometrical invariability of a system of rigid bodies. Statically determined systems. Internal forces in beams and frames. Differential equilibrium equations of bars. Internal forces in statically determined trusses. Friction and the laws of dry friction. Rolling resistance. Center of gravity of a body , areas and lines. Moments of inertia of masses. Kinematics of particles. Kinematics of rigid bodies. The Newton?s laws of dynamics. Free vibrations, damped vibrations, damped forced vibrations. Kinetics of particles. Kinetics of rigid bodies. Kinetic energy, potential energy. Principle of work and energy. Principle of virtual work and its applications.

Basic bibliography:

1. J. Leyko, Mechanika ogólna. T. 1, Statyka i kinematyka, T. 2, Dynamika, PWN,Warszawa 2006
2. J. Misiak, Mechanika ogólna. T. 1, Statyka i kinematyka, T. 2, Dynamika, WNT Warszawa 1998
3. Z. Cywiński, Mechanika budowli w zadaniach. Układy statycznie wyznaczalne, PWN Warszawa 1999

Additional bibliography:

1. F. P. Beer, E. R. Johnston, Vector Mechanics for Engineers, Statics, International Student Edition, McGraw-Hill Book Company Japan, Tokyo 1984
2. J. F. Shelley, Engineering Mechanics, Dynamics, McGraw-Hill Book Company 1980

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	30
2. Participation in tutorials	15
3. Participation in projects	15
4. Solving and preparing of project tasks	16
5. Consultations	5
6. Preparation to the written tests	16
7. Independent research of the literature	10
8. Preparation to the examination	30
9. Examination	3

Student’s workload

Source of workload	hours	ECTS
Total workload	140	7
Contact hours	65	2
Practical activities	15	1