

## DESCRIPTION OF THE COURSES

- Course code: **MMM 2010**
- Course title: **Technical Mechanics**
- Language of the lecturer: Polish

<i>Course form</i>	<i>Lecture</i>	<i>Classes</i>	<i>Laboratory</i>	<i>Project</i>	<i>Seminar</i>
<i>Number of hours/week*</i>	2	1	0	0	0
<i>Number of hours/semester*</i>	20	10			
<i>Form of the course completion</i>	Final examination	Examination			
<i>ECTS credits</i>	2	1			
<i>Total Student's Workload</i>	60	30			

- Level of the course (**basic**/advanced):
- Prerequisites: Analysis (calculus), linear algebra, physics.
- Name, first name and degree of the lecturer/supervisor: **Jerzy KALETA, Ph.D., Dr. Sc., Eng.**
- Names, first names and degrees of the team's members: Mirosław Bocian, Ph.D., Eng.; Grażyna Ziętek, Ph.D., Eng.
- Year:..... Semester:.....
- Type of the course (**obligatory**/optional):
- Aims of the course (effects of the course): The main purpose of the program is to gain experience by student of Electrical Engineering Faculty in foundations of static, kinematics and dynamics.
- Form of the teaching (**traditional**/e-learning)
- Course description: Force acting on rigid body. Moment of force. Reduction of force systems. Equilibrium conditions for plane and spatial force systems. Internal forces. Models and elements of mechanical systems. Kinematics of material point. Rigid body kinematics. Dynamics of systems of material points. Mass center principle. Moment and angular moment of discrete system. Mechanical systems. Rigid body dynamics. General movement. Plane rotations. Rotation about a fixed point. Dynamical reactions. Kinetic energy of rigid body. d'Alambert principle. Lagrange equations.
- Lecture:

<i>Particular lectures contents</i>	<i>Number of hours</i>
1. Force acting upon rigid body. Moment of force relative to point and pole. Shift of pole.	1
2. External forces, active and passive ones. Internal forces Systems of rods. Trusses	2
3. Forces and moments. Main moment and force vectors. Shifts of moment poles. Reduction of arbitrary spatial force system.	1
4. Straight beams. Evaluation of internal forces Schwedler theorem	2
5. Allowable stresses	1
6. Kinematic of moving point, trajectory, velocity, acceleration	1
7. Models and elements of mechanical systems. . Rigid body kinematics	1

8. Translational and rotational movement around fixed axis. Plane movement, velocity field, center of rotation at given moment of time. Rotation about a fixed point	2
9. Centroids, acceleration in plane movement	1
10. Mechanical systems. Composition of equations of movements	1
11. Basic problems in dynamics. One degree of freedom oscillations	1
12. Dynamics of systems of material points. Momentum and angular momentum of systems of points.	2
13. Dynamics of rigid body. Euler equations.	1
14. Work of elementary force, gravity force, elasticity forces, power, energy.	1
15. d'Alembert principle	1
16. Generalized forces, the second type Lagrange equations	1

- Classes – the contents: Evaluation of internal forces in rod system. Trusses. Beams, internal forces. Allowable stresses. Exemplary calculations of kinematics of moving point and kinematics of rigid body. Dynamics of moving point in free motion and constrained motion. Evaluation of velocity from equation of momentum and angular momentum. Typical calculations related to vibrations of conservative systems with one degree of freedom. Application of energy conservation law in potential field. Using of angular momentum principle for deriving of differential equation of simple mechanical systems motion. Calculations related to dynamics of rigid body rotary and plane motions.
- Seminars – the contents:
- Laboratory – the contents:
- Project – the contents:
- Basic literature:
  1. B.Gabryszewska, A.Pszonka, „Mechanika”, cz. II, Kinematyka i dynamika, PWr , 1986
  2. J.Zawadzki, W.Siuta, „Mechanika ogólna”, WNT, Warszawa 1971
  3. J. Misiak, „Mechanika ogólna. Dynamika”. Tom 2, WNT, Warszawa 1993
  4. M. Klasztorny, Mechanika. Statyka, kinematyka, dynamika, DWE, Wrocław 2000
  5. Misiak J., „Zadania z mechaniki ogólnej. Dynamika, część III, WNT, Warszawa 1992
  6. Nizioł J., „Metodyka rozwiązywania zadań z mechaniki”, WNT, Warszawa 1983
  7. Witkowski Cz., Zbiór zadań z mechaniki, cz. I, Kinematyka, OW PWr, Wrocław 1999
  8. Witkowski Cz., Zbiór zadań z mechaniki, cz. II, Dynamika, OW PWr, Wrocław 2003
  9. M. Kulisiewicz, S. Piesiak, Dynamika układów mechanicznych w zadaniach technicznych, PWr, 2002
  10. A. Gronowicz, Podstawy analizy układów kinematycznych, OW PWr, Wrocław 2003.
- Additional literature:
  1. B. Skalmierski, „Mechanika”, WNT, Warszawa 1982.
- Conditions of the course acceptance/creditation:
  - Lecture– Final examination (on the basis of exercise rating).
  - Exercises – written examination

\* - depending on a system of studies