

DESCRIPTION OF THE COURSES

- Course code: **MMM2004**
- Course title: **MECHANICS AND STRENGTH OF MATERIALS**
- 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	-	-	-
<i>Number of hours/semester*</i>	30	15	-	-	-
<i>Form of the course completion</i>	Written test	Written test Home assignments	-	-	-
<i>ECTS credits</i>	2	1	-	-	-
<i>Total Student's Workload</i>	60	30	-	-	

- Level of the course (basic/advanced): **basic**
- Prerequisites: **Linear algebra, Calculus**
- Name, first name and degree of the lecturer/supervisor: **BELZOWSKI Andrzej, DSc**
- Names, first names and degrees of the team's members:
Rechul Zdzisław, DSc
Stasiński Jan, DSc
Strózyk Przemysław, DSc
- Year: **2** Semester: **4**
- Type of the course (obligatory/optional): **obligatory**
- Aims of the course (effects of the course):
Ability to solve engineering problems based on principles of mechanics and to analyze structural components of machines.
- Form of the teaching (traditional/e-learning): **traditional**
- Course description:
Principles of mechanics. Systems of forces and their reduction. Conditions of equilibrium. Friction. Geometry of masses, moments of inertia. Models of structural components. Internal forces, stress, strain, displacement. Experimental methods of evaluating mechanical properties of materials. Basic modes of member loading (tension–compression, torsion, shear, bending) –computational analysis and principles of strength design. Combined loads and theories of failure. Buckling. Plates and shells. Fatigue. Dynamics of rotating masses. Introduction to computer-assisted methods of analysis.
- Lecture:

<i>Particular lectures contents</i>	<i>Number of hours</i>
1. Engineering mechanics–what it's about. Principal definitions and axioms. Force, moment of a force about a point. Constraints.	2
2. Systems of forces–concurrent, general, couple. Conditions of equilibrium, reduction of forces.	2
3. Reduction of a plane system to a resultant. Reduction and equilibrium of a spatial force system. Supports. Active and passive forces.	2
4. Plane trusses. Internal and external static determinateness. Methods for determining internal forces.	2
5. Properties of plane figures. Steiner's theorem. Rotational transformation of	

moments of inertia.	2
6. Beams—internal forces and their graphs.	1
7. Strength of materials—underlying principles. De Saint Venant's principle. Young's modulus and Poisson's ratio. Stress and strain. Tensile test.	2
8. Design analysis of members in tension and compression. Permissible stress. Statically indeterminate systems. Cables.	2
9. Basic modes of member loading (torsion, shear).	2
10. Bending—stresses and displacements.	2
11. Combined loads and theories of failure.	2
12. Buckling. Thin-walled vessels.	2
13. Long-term loading. Fatigue.	1
14. Dynamics of rotating masses.	2
15. Introduction to computer-assisted methods of analysis.	2
16. Written test.	2

- Classes – the contents:
 1. Vector algebra: addition and subtraction of vectors, scalar and vector products.
Equilibrium of plane systems of concurrent forces.
 2. Plane and spatial systems of concurrent forces—systems of members and cables, 2D and 3D trusses.
 3. Friction. Properties of plane figures.
 4. Strength design of members in tension and compression. Shearing of joints.
 5. Strength design of members in torsion and bending.
 6. Combined loads and theories of failure. Thin-walled vessels.
 7. Dynamics of rotating masses.
 8. Written test.
- Seminars – the contents:
- Laboratory – the contents:
- Project – the contents:
- Basic literature:

J. Misiak, Mechanika techniczna. Statyka i wytrzymałość materiałów, WNT, 1996.

A. Jakubowicz, Z. Orłoś, Wytrzymałość materiałów, WNT, 1996.

Z. Brzoska, Wytrzymałość materiałów, WNT, 1972.

M. Niezgodziński, T. Niezgodziński, Zbiór zadań z wytrzymałości materiałów, WNT, 1997.

Z. Jaśniewicz, Zbiór zadań ze statyki, Oficyna Wydawnicza PWr., 2004.

C. Witkowski, Zbiór zadań z mechaniki, cz. II Dynamika, Oficyna Wydawnicza PWr., 2004.

W. Śródka, Trzy lekcje metody elementów skończonych, Oficyna Wydawnicza PWr., 2004.
- Additional literature:

B. Gabryszewska, A. Pszonka, Mechanika, Oficyna Wydawnicza PWr., 1997.

J. Zawadzki, W. Siuta, Mechanika ogólna, PWN Warszawa, 1971.
- Conditions of the course acceptance/creditation:

Lecture: Written test; Classes: Home assignments, Written test