SYLLABUS

Name: ***Selected Engineering Problems - Mechanics (BudAB>SI1SEPMEC19)***
Name in Polish:
Name in English: ***Selected Engineering Problems - Mechanics***

Information on course:

Course offered by department: Faculty of Civil Engineering
Course for department: Silesian University of Technology

Default type of course examination report:

EGZ

Language:

English

Course homepage:

https://platforma2.polsl.pl/rb/course/view.php?id=625

Short description:

1) Basic information on cross-section geometry.
2) Fundamentals of statics of statically determinate two dimensional structures - calculation of support reactions.
3) Internal forces in two dimensional structures - drawing diagrams of internal forces.

Description:

LECTURES: 30h
Centroids of areas. Rectangular and polar moment of inertia. Products of inertia. Transfer and rotation of axes. Principal (maximum and minimum) moments of inertia and principal axes of inertia. Fundamental concepts and principles of statics. Vector operations. Resultant of several concurrent forces. Resolution of a force into components. Unit vectors. Equilibrium of a particle. External and internal forces. Moment of a force about a point. Rectangular components of the moment of a force. Moment of a couple. Resolution of a given force into a force at 0 and a couple. Reduction of a system of forces to one force and one couple. Reactions at supports and connections for a two-dimensional structure. Equilibrium of rigid bodies. Analysis of trusses by the method of joints and by the method of sections. Internal forces at section. Various types of loading and support. Distributed loads on a beam. Shear and bending-moment diagrams. Relations among load, shear and bending moment.

CLASSES: 15h
Determination the location of the centroid, the principal axes and value of principal moment of inertia. Determination the reactions at supports for beams, trusses and frames. Analysis of trusses. Drawing the shear and bending moment diagrams for beams and frames.

PROJECT: 15h
There are three project to perform: Project No 1 – Determination the location of the centroid, the principal axes and value of principal moment of inertia.; Project No 2 – Drawing the axial forces, shear and bending moment diagrams for beams. Project No 3 – Drawing the axial forces, shear and bending moment diagrams for frames
Students are required to prepare reports on four tasks:
P1: Determination the location of the centroid, the principal axes and value of principal moment of inertia.
P2: Calculating forces in truss members.
P3: Drawing the axial forces, shear and bending moment diagrams for beams.
P4: Drawing the axial forces, shear and bending moment diagrams for frames.
Project reports are solved independently under the guidance of the instructor and using the resources available at the platform.

Bibliography:

[1] Witek H.: Selected Issues Of Mechanics Examples And Tasks Of Plane Figures Geometry, Monografia, Wydawnictwo Pol. Śl., Gliwice 2019.
[2] Beer F.P., Johnston E.R. Jr.: Vector Mechanics for Engineers, McGraw-Hill 1984.
[3] Meriam J.L., Kraige L.G.: Engineering Mechanics. Statics, John Wiley & Sons 1987.

Learning outcomes:

KNOWLEDGE:
(1) Knows the principles of modeling and analysis of bar structures in the statics - [the learning outcome K1A_W04]

SKILLS:
(2) Can perform calculations in the field of geometry of figure masses flat - [the learning outcome K1A_U03]
(3) Can calculate the values of support reactions for plane statically determinate systems - [the learning outcome K1A_U03]
(4) Is able to determine the internal forces for members of trusses -the learning outcome K1A_U03]
(5) Is able to analytically determine functions of internal forces for statically determinate complex beams and draw corresponding graphs - [the learning outcome K1A_U03, K1A_U12]
(6) Can draw diagrams of internal forces for statically determinate plane frames - [the learning outcome K1A_U03, K1A_U12]

Assessment methods and assessment criteria:

Prerequisites: none

Conditions for passing the course:
Knowledge from the lectures will be checked at the test or at theoretical part of the exam Tt. Completing the lecture based on obtaining at least 4 out of 8 points from the test written during the semester or during the exam.
During the semester a student is required to pass the exercises' tasks from 3 basic units:
T1 Cross-sectional geometry.
T2 Calculation of internal forces for multi-span beams.
T3 Calculation of internal forces for frames.
This assessment takes place during the tests or during the exam (at least 5 out of 10 points per each exercises' task).
Final test grade T=(Tt+T1+T2+T3)/38*5
The student is obliged to prepare reports from 4 project tasks in accordance with the teacher's guidelines. Credits in the project assignments are obtained according to the schedule presented by the teacher. The positive grade from each project is required to get credits for this course (at least 1 out of 5 points per each report).

Final grade from the project P=(P1+P2+P3+P4)/4
Final grade for the course O=(2*T+P)/3

In order to transfer partial grades, the student should contact the instructor within the first two weeks of the semester.

The syllabus is valid from the winter semester of the 2025/2026 academic year, and its content is not subject to change during the semester.

Element of course groups in various terms:

Course group description	First term	Last term
missing group description in English (BudAB-S1-2019-sem1)	2020/2021-Z	

Course credits in various terms:

<without a specific program>

Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	6	2020/2021-Z	