1. Course number and name

RB-S1-19-W1F-2A, Selected Engineering Problems - Mechanics

2. Credits and contact hours*

6 ECTS, lectures: 30 hours**, classes: 15 hours**, project: 15 hours**

3. Instructor's or course coordinator's name

Halina Witek, CEng, PhD, Assoc. Prof.

4. Text book, title, author, and year

- F.P. Beer, E.R. Johnston Jr.: „Vector Mechanics for Engineers". McGraw-Hill 1984
- J.L. Meriam, L.G. Kraige: „Engineering Mechanics, Statics". John Wiley & Sons 1987

5. Specific course information

a. brief description of the content of the course (catalog description)

Lectures:

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:

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:

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

b. prerequisites or co-requisites

No prerequisites and additional requirements

c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program

Required.

6. Specific goals for the course

a. specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic

The student can:

- do calculations of the cross-sectional geometry,
- create and solve equations of equilibrium for statically determinate two dimensional structures.

The student is able to:

- determine internal forces for members of trusses,
- determine the functions of internal forces for statically determined beams and can draw diagrams of these functions,
- draw diagrams for statically determined frames.

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

K1A_W04, K1A_U03, K1A_U12

7. Brief list of topics to be covered

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.

*- Consultations were not included in the contact hours

**-per semester