UNIVERSITY OF WARMIA AND MAZURY IN OLSZTYN

Faculty of Technical Sciences

Course title: MACHINE DYNAMICS

ECTS credit allocation (and other scores): 2,5

Semester: autumn

Level of study: ISCED-6 - first-cycle programmes (EQF-6)

Branch of science: Engineering and technology

Language: English

Number of hours per semester: 15 + 15 = 30

Course coordinator/ Department and e-mail: Prof. Grzegorz Zboiński, D.Sc., Ph.D., M.Sc./Department of Mechanics and Bases of Machine Design, zboi@uwm.edu.pl

Type of classes: classes and lectures

Substantive content

CLASSES: Numerical finite element solution of the problem of the natural vibration problem of a simple structure. Analysis of the influence of the boundary conditions, material properties, and numerical discretization on the analysis results.

LECTURES: Mechanical systems of one, finite and indefinite number of degrees of freedom, free vibration of conservative systems, modes and frequencies and their properties, vibrations of linear systems with constant and variable coefficients, solving them based on the conversion of second-order differential equations into first-order equations, solving homogeneous and non-homogenous differential equations. Vibrations of one-dimensional continuous systems (strings, bars and beams). Analysis of two-dimensional continuous systems (membranes and plates). Continuous three-dimensional systems, methods of their analysis.

Learning purpose: To gain the knowledge on the machine dynamics problems and to gain the ability to solve them numerically.

On completion of the study programme the graduate will gain:

Knowledge: Knowledge on principal problems of machine dynamics and methods of their solving.

Skills: Ability to formulate engineering problems of the dynamics of machines and to determine methods of their numerical solving. Ability to recognize a particular type of machine dynamics task, carry out its analysis and prepare its technological description.

Social Competencies: Ability to communicate and cooperate with others in the field of solving the problems of dynamics of machines.

Basic literature: R. C. Hibbeler, Engineering Mechanics. Dynamics. Eight Edition , Prentice-Hall, Upper Saddle River (NJ), 1989.

Supplementary literature: Z. Stojek, W. Zylski., Dynamika konstrukcji, Wyd. Polit. Rzeszowskiej., 1993 (in Polish). T. Chmielewski, Z. Zembaty, Podstawy dynamiki budowli, wyd. Arkady, 1998 (in Polish). W. Gawroński, J. Kruszewski, W. Ostachowicz, W. Wittbrodt, Metoda elementów skończonych w dynamice konstrukcji, wyd. Arkady, 1984 (in Polish)

The allocated number of ECTS points consists of: 1,28 + 1,22 = 2,5

Contact hours with an academic teacher: 32 hours

Student's independent work: 30,5 hours