STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Dynamic of mechatronic devices		**1010252421010217653**
Field of study: **Mechatronics**	Profile of study (general academic, practical): **(brak)**	Year /Semester: **1 / 2**
Elective path/specialty: **all specialties**	Subject offered in: **English**	Course (compulsory, elective): **obligatory**
Cycle of study: **Second-cycle studies**	Form of study (full-time,part-time): **full-time**	
No. of hours: Lecture: **1** Classes: **1** Laboratory: **-** Project/seminars: **-**		No. of credits: **2**
Status of the course in the study program (Basic, major, other): **(brak)**	(university-wide, from another field): **(brak)**	
Education areas and fields of science and art: **technical sciences** **Technical sciences**		ECTS distribution (number and %): **2 100%** **2 100%**

Responsible for subject / lecturer:

Dr habil. eng. Marian W. DOBRY
email: marian.dobry@put.poznan.pl
tel. + 48 61 665 2347
Faculty of Mechanical Engineering and Management
ul. Piotrowo 3 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge engineering: mathematics, mechanics, strength of materials, materials, vibration theory, the basics of machine design
2	**Skills**	Can describe the motion of mechatronic systems, can describe the automatic systems can solve differential equations of motion systems, is able to design mechatronic systems
3	**Social competencies**	Understands the need for learning

Assumptions and objectives of the course:

Get to know the needs and possibilities of applications of mechatronic devices in practice, knowledge of the design and operation of modeling of modern mechatronic components, mastering the methods of mathematical modeling the dynamics of complex mechatronic systems, knowledge of the dynamics of digital simulation methods mechantronic equipment, monitoring equipment and production processes

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Students have knowledge of the dynamic analysis of mechanical systems. They know the equipment used in mechatronic systems and their operation. They know the methods of dynamic optimization design of machinery and equipment. - [K_W04]

2. Students have knowledge of the use of active and semi-active devices in the operation of machinery and equipment - [K_W02]

3. Students know the dynamic properties of active and semi-active devices, the description of the dynamic characteristics and their applications. They know the traffic stabilization methods of machine elements using semi active suppression of transient processes in technological machines. They know the method to evaluate the efficiency of energy use semi-active systems - [K_W06; K_W16]

Skills:

1. Obtaining information from technical literature and the Internet on the dynamics and mechatronic systems - [K_U01]

2. Students are able to model and make a synthesis of mechatronic subsystems structures in complex system and carry out the analysis of dynamic - [K_U11; K_U14]

3. Students are able to carry out an dynamic analysis of machines and mechatronic devices and to evaluate the energy dynamics of the systems studied by numerical simulation. - [K_U20]

Social competencies:

1. Understands the need for lifelong learning; can inspire and organize the learning process of other - [K_K01; K_K07]
2. Is aware of the role of the optimization of mechatronic systems in the modern economy and its importance to society and the environment - [K_K02]
3. Able to establish priorities for the implementation of a specific task - [K_K04]

Assessment methods of study outcomes

EXAM: consisting of 2 parts:

1) The tasks of the dynamic range of mechatronic systems,

2) three general questions concerning the theory. (the correct solution to the problem 2 points for answering each of the questions - 1 point.

Grading scale: less than 2.6 points - ndst., 2.6 ÷ 3.0 - dst, 3.1 ÷ 3.5 points. - dst + 3.6 ÷ 4.0 points. - db, 4.1 ÷ 4.5 points. - db + 4.6 ÷ 5.0 pts. - vg).

Exercise: Assessment based on a correct solution of the problem on the test grading. (scale ratings of 60% for the task ? dst, from 60.1% to 70% - dst +, from 70.1 to 80% - db, from 80.1% to 90% -db +, from 80.1 to 90% - vg)

Course description

Lectures:

1. Dynamic analysis of mechatronic systems
2. Dynamic optimization design of mechanical and bio-mechatronic systems
3. Application semi-active vibration reduction in the dynamic design optimization of mechanized hand tools
4. Semi-active Methods used in the operation of construction machinery and equipment
5. Dynamic analysis of magnetorheological dampers, theory and applications
6. Semiaktywne suppression of transient processes in technological machines
7. The method of assessing the effectiveness of energy use semi-active systems

Exercise:

Dynamic analysis of concrete mechanical structures of mechatronic systems, physical and mathematical modeling mechatronic systems, solving developed mathematical models, analysis of dynamic strength (fatigue) examined structure elements of mechatronic systems

Basic bibliography:

1. Cannon R.H. jr. ?Dynamika układów fizycznych? WNT. Warszawa 1973 r.
2. Parszewski Z. ?Drgania i Dynamika Maszyn? WNT. Warszawa 1982 r.
3. Dobry M.W. ?Optymalizacja przepływu energii w systemie Człowiek - Narzędzie - Podłoże (CNP). Rozprawa habilitacyjna. Seria ?Rozprawy? nr 330. ISSN 0551-6528, Wydawnictwo Politechniki Poznańskiej, Poznań, marzec 1998 r.
4. Preumaont A., Seto K., Active Control of Structures, A John Wiley & Sons, Ltd, Publication, ISBN-978-0-470-03393-7, 2008
5. Dobry M.W., Podstawy diagnostyki energetycznej systemów mechanicznych i biomechanicznych, Wyd. Naukowe Instytutu Technologii Eksploatacji ? PIB, Poznań ? Radom, 2012 r.

Additional bibliography:

1. Marchelek K. ?Dynamika obrabiarek? WNT. Warszawa 1974 r.

Result of average student's workload

Activity	Time (working hours)
1. Lectures	15
2. Exercise	15
3. Preparing to pass lectures	15
4. Preparing to pass classes	15
5. Lectures credit ? exam	3
6. Discuss the results of the exam	2

Student's workload

Source of workload	hours	ECTS
Total workload	50	2
Contact hours	35	2

Practical activities	15	1