



Module/Subject Syllabus Summary
Mechanical Engineering
 Master Degree Studies

Subject:	Identification of mechanical systems
Subject type:	<i>Specialized</i>
Subject code:	
Year:	
Semester:	
Form of studies:	<i>Full-time course</i>
Type of classes and hours per semester:	<i>L+LP 60</i>
Lecture	30
Exercise	0
Laboratory practice	30
Project	0
ECTS points:	3
Form of credit:	<i>Examination</i>
Lecture language:	<i>English</i>

Subject objective	
C1	Students become familiar with mathematical and physical basics of mechanical systems identification
C2	Students learn methods of systems identification, including identification experiments
C3	Students will learn and apply in practice the method to identify the mechanical system

Prerequisites in knowledge, skills and other competencies	
1	General mechanics
2	Mathematical analysis
3	Metrology

Educational effects	
	Knowledge:
EK 1	Student has the knowledge of systems theory and modelling
EK 2	Student has knowledge of selected methods of identification signals
EK 3	Student has the knowledge of selected methods of signals identification
	Skills:
EK 4	Student can apply known methods to identify the object or mechanical system
EK 5	Student is able to prepare and carry out basic identification experiment
EK 6	Student can carry out identification of object or system basing on the results of the experiment
EK 7	Student is able to select optimal model the analyzed system
	Social competencies:
EK 8	The student understands the role of knowledge and skills for the optimal design of mechanical systems
EK 9	The student is aware of the need to spread the culture of technology in terms of



KAPITAŁ LUDZKI
 NARODOWA STRATEGIA SPÓJNOŚCI



UNIA EUROPEJSKA
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 w ramach Europejskiego Funduszu Społecznego

	acquired knowledge within the society and in the immediate vicinity
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Curriculum content of Subject	
Form of classes - Lecture	
	Curriculum content
W1	Introduction to the method of the system identification
W2	<i>Signals and methods of signals processing</i>
W3	Modelling of mechanical systems
W4	<i>Vehicles modelling</i>
W5	<i>Aeroplane modelling</i>
W6	Design of identification experiments
W7	<i>Research methods of dynamics of vehicle motion</i>
W8	Testing methods of the volatile properties of the aircraft
W9	Practical applications of the identification methods
W10	Simulators
Class form: laboratory practice	
	Curriculum content
L1	Signals identification - introduction
L2	Identification of the wheel – base system
L3	Identification of car control system
L4	Identification of the lateral dynamics of the vehicle by the impulse forcing method
L5	Identification of the lateral dynamics of the vehicle by the harmonic forcing method
L6	<i>Vehicle dynamics identification</i>
L7	Identification based on a study of the characteristics of unit motion

Teaching methodology	
1	Lecture with multimedia presentation
2	<i>Fieldwork</i>

Student workload	
Form of activity	Average hours to complete activity
Teacher contact hours, including:	
Attendance at lectures	30
Attendance at laboratory practice	30
Total student work time, including:	
Preparation do Laboratory practice	15
Total student work time	75
Total ECTS for the subject:	3
Total of ECTS for practical classes (exercise, laboratory practice, projects)	2

Basic reference literature	
1	<i>Ljung L., System identification, PTR Prentice Hall, NJ, USA, 1999</i>
2	<i>Klein V., Morelli E., Aircraft System Identification, AIAA, USA 2006</i>
3	<i>Zimmer A., Englot A., Identyfikacja obiektów i sygnałów, Politechnika Krakowska, 2005</i>
Complementary reference literature	
1	<i>Zieliński T. Cyfrowe przetwarzanie sygnałów, WKiŁ, 2009</i>
2	<i>Giergiel J., Uhl T., Identyfikacja układów mechanicznych, PWN, Warszawa 1990</i>
3	<i>Bubnicki Z., Identyfikacja obiektów sterowania, PWN, Warszawa `1974</i>

Educational effect matrix					
Educational effect	Specific educational effect reference to curriculum-wide effects (PEK)	Subject objective	Curriculum content	Teaching methodology	Evaluation methods
EK 1	MBM2A_W01 +++ MBM2A_W08 +	[C1]	[W1, L1, L2, L3]	[1, 2]	[O1, O2, O2]
EK 2	MBM2A_W01 ++	[C2]	[W2, W3, L2, L3]	[2, 4]	[O1, O2, O2]
EK 3	MBM2A_W07 +++	[C3]	[W3, W4, L1, L2, L3]	[2, 3]	[O1, O2, O2]
EK 4	MBM2A_U12+ ++ MBM2A_U18+ + MBM2A_U19+ +	[C1, C2]	[W1, W2, L1]	[1, 2]	[O1, O2, O2]
EK 5	MBM2A_U12+ +	[C1, C2]	[W1, W2, W3, W4, L2, L3]	[1, 2]	[O1, O2, O2]
EK 6	MBM2A_U18+ ++ MBM2A_U19+ +	[C1]	[W1, W2, L1, L2]	[1, 2]	[O1, O2, O2]
EK 7	MBM2A_U18+ + MBM2A_U19+ +	[C1, C2]	[W1, L1, L2, L3]	[1, 2]	[O1, O2, O2]
EK 8	MBM2A_K02+ +	[C1, C2, C3]	[W1, W4, W5]	[1, 2]	[O1, O2, O2]
EK 9	MBM2A_K06+ +	[C1, C2, C3]	[W1, W2, W3, W4, W5]	[1, 2]	[O1, O2, O2]

Evaluation methods and criteria		
Evaluation method symbol	Evaluation method description	Pass threshold
O1	The examination of the whole subject	60%
O2	<i>Written assessment of</i> laboratory exercises	55%
O3	Reports of laboratory exercises	100%

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