STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Model Order Reduction of Linear Systems		**1010803121010844623**
Field of study: **Communications Technologies**	Profile of study (general academic, practical): **general academic**	Year /Semester: **1 / 2**
Elective path/specialty: **-**	Subject offered in: **Polish**	Course (compulsory, elective): **elective**
Cycle of study: **Doctoral studies**	Form of study (full-time,part-time): **full-time**	
No. of hours: Lecture: **15** Classes: **-** Laboratory: **-** Project/seminars: **-**		No. of credits: **2**
Status of the course in the study program (Basic, major, other): **other**	(university-wide, from another field): **university-wide**	
Education areas and fields of science and art: **technical sciences** **Technical sciences**		ECTS distribution (number and %): **2 2%** **2 2%**

Responsible for subject / lecturer:

Prof. dr hab. inż. Wojciech Bandurski
email: wojciech.bandurski@put.poznan.pl
tel. 061 665 3848
Wydział Elektroniki i Telekomunikacji
ul. Piotrowo 3A 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	PhD student has a basic knowledge regarding matrix algebra and the dynamics of linear linear systems.
2	**Skills**	Is able to formulate and to solve the state equations describing linearsystems. Knowladge of the Fourier, Laplace, Z transformations.
3	**Social competencies**	Knows the limitations his own knowledge and skills, understands the need for ongoing education.

Assumptions and objectives of the course:

Getting to know with the basic algorithms of reduction of large linear dynamic systems.

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

Knowledge:

1. Has basic knowledge about methods of reduction of multi-input linear systems. - [SD_W01]
2. Is familiar with the basic reduction algorithms for linear dynamic systems. - [SD_W03]

Skills:

1. Able to solve typical tasks and problems associated with the reduction of high-order of linear systems. - [SD_U01]
2. Has the ability to apply reduction algorithms dynamic high-order of linear systems. - [SD_U03]

Social competencies:

1. Able to lead the scientific discussion. - [UD-K01]
2. He is aware of the need to constantly improve his knowledge and skills. - [SD-K02]

Assessment methods of study outcomes

1.Starting the a selected reduction algorithm
2.The use of this algorithm to the selected linear system (e.g. circuit).
3.Presentation of the results obtained in steps 1 and 2.

Course description

1.Fundamental descriptions of of linear systems.
2.Algorithms that use Krylov subspace.
3.Vector fitting algorthms.
4.Stability and passivity of reduced systems.

Basic bibliography:

1. W.H.A. Schilders et all, Midel Order Reduction, Theory, Research Aspects and Applications, Springer-Verlag Berlin Heidelberg, 2008
2. W. Bandurski, Methods of analysis and simulation of high-speed interconnects in digital circuits, (in Polish), Wydawnictwo Politechniki Poznańskiej, 2006.

Additional bibliography:

1. G.W. Stewart, Matrix Algorithms, vol.1, vol.2, SIAM, 1998.
2. X.-D. Tan Sheldon and Lei He, Advanced Model Order Reduction Techniques on VLSI Design, Cambridge Univ. Press, 2007.

Result of average student's workload

Activity	Time (working hours)
1. Lectures.	15
2. The search for literature and literature studies.	15
3. Preparation of a program for solving the problem of reduction of for the selected system.	10
4. Individual consultations to the subject matter.	5
5. Preparation of the presentation of solved problem.	5
6. Presentation of the solved problem of reduction.	2

Student's workload

Source of workload	hours	ECTS
Total workload	52	2
Contact hours	20	1
Practical activities	10	1