COURSE DESCRIPTION CARD - SYLLABUS

Course name
Selected topics in mathematics II [S1AiR1E>WDMII]

Course

Field of study
Automatic Control and Robotics

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
english

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
0

Other (e.g. online)
0

Tutorials
15

Projects/seminars
0

Number of credit points

2,00

Coordinators

dr hab. Maciej Ciesielski
maciej.ciesielski@put.poznan.pl

Lecturers

dr hab. Maciej Ciesielski
maciej.ciesielski@put.poznan.pl

Prerequisites

The knowledge from the area of linear algebra and calculus [K1_W01 (P6S_WG)]. The abilities of solving some problems of linear algebra and calculus [K1_U01 (P6S_UW)]. Awareness of the necessity to improve the knowledge and expertise, readiness to undertake a cooperation in the team [K1_K01 (P6S_KK)].

Course objective

The goal of the subject is to attain the knowledge from the area of the selected topics in mathematics and to get the skills that allow to apply the obtained knowledge to analize the mathematical problems.

Course-related learning outcomes

Knowledge:
Knows and understands to an advanced degree signal processing methods in the time and frequency domain; has a structured knowledge of signal and information theory [K1_W5 (P6S_WG)].
Skills:
Be able to use basic methods of signal processing and analysis in the time and frequency domain and extract information from analysed signals [K1_U9 (P6S_UW)].
Social competences:

Is ready to critically assess his/her knowledge; understands the need for and knows the possibilities of continuous training - improving professional, personal and social competence, is able to inspire and organize the learning process of others [K1_K1 (P6S_KK)].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Lecture:
- grading knowledge and abilities showed in an written exam
Exercises:
- testing knowledge and preparation to exercises,
- awarding practical knowledge obtained during the previous exercies and lectures,
- grading knowledge and abilities related with calculations,
- test for exercises and/or written elaboration (that can be made partially outside of exercises)

Programme content

1. Normed spaces, Hilbert spaces, linear operator.
2. Orthogonal functions and orthonormal functions, Gram-Schmidt procedure.
3. Fourier series, Fourier transform.
4. Theorem Bessel’s inequality.
5. Legendre differential equation, Hermite differential equation.
6. Integral equation, Fredholm integral equation of the first and second kind, Volterra integral equation, Abel integral equation.
7. Methods for finding a solution of the selected linear integral equation.
8. Gamma function and Bessel function.
9. Gradient operator, divergence operator, rotation operator, Laplace transform.

Teaching methods

Lectures – the lecture is organized with the multimedia presentations and complemeted with many examples, showing an application of the presented issues.
Exercises – discussing open problems, comprehensive analysis for selected problems in mathematics, initiation open discussion devoted to methods which might be used to solve problems related to selected topis in mathematics, grading homeworks.

Bibliography

Basic
1. Wstęp do analizy funkcjonalnej, J. Musielak, PWN 1989
2. Elementy analizy wektorowej, M. Gewert, Z. Skoczylas, GIS 2012
3. Równania całkowe, M. Krasnosielski, A. Koszelew, S. Michlin, PWN 1972
4. Elementary partial differential equations, R. Gribben, Van Nostrand Reinhold 1975
Additional
1. Beginning partial differential equations, P. O"Neil, 2008
2. Linear and nonlinear integral equations - methods and applications, A. Wazwaz, Springer 2011

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00