POLITECHNIKA POZNAŃSKA

EUROPEJSKI SYSTEM TRANSFERU I AKUMULACJI PUNKTÓW (ECTS)

pl. M. Skłodowskiej-Curie 5, 60-965 Poznań

COURSE DESCRIPTION CARD- SYLLABUS

Course name
Ordinary differential equations

Course

Field of study
Mathematics in Technology
Area of study (specialization)
—
Level of study
first-cycle studies
Form of study
full-time

Year/Semester
2/3
Profile of study
general academic
Course offered in
Polish
Requirements
compulsory

Number of hours

Lectures
30
Tutorials
30

Laboratory classes
—
Projects/seminars
—

Other (e.g. online)
—

Number of credit points
4

Lecturers

Responsible for the course/lecturer::

dr hab. Małgorzata Migda

Responsible for the course/lecturer::

—

Prerequisites

Basic knowledge from linear algebra and mathematical analysis.

Course objective

The introduction of basic concepts and theorems of the theory of differential equations; introducing students to the basic methods of finding and analising the properties of the solutions of ordinary differential equation.

Course-related learning outcomes

Knowledge

POLITECHNIKA POZNAŃSKA

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- student knows the majority of basic definitions and theorems in the general theory of differential equations. Student knows the connections between topics from the general theory of dfferential equations with other areas of theoretical and applied mathematics.

Skills

- student is able to solve basic types of differential equations. Student is able to solve systems of linear differential equations with constant coefficients.

Social competences

- student understand necessity of systematic work and developing of their skills. Student is able to solve problems and work in team. Student is able search out some information in literature, also in different language.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures: lecture: written test.

Tutorials: classes: evaluation of two written tests and the direct activity during the classes.

Programme content

Update: 31.01.2020r.

- preliminaries – the definition of a differential equation and its solutions; geometrical interpretation of integration of the equation; examples of problems leading to differential equations;

- equations with separated variables, the Cauchy problem;

- homogenuous differential equations, first order linear differential equations;

- nonhomogenuous differential equations – the method of variation of parameters;

- nonhomogenuous differential equations – the method of undetermined coefficients;

- Bernoulli and Riccati differential equations;

- exact differential equations, the integrating factor;

- Lagrange and Clairaut differential equations;

- the Picard's Existence Theorem and the Peano theorem, the Picard iterative process;

- second order differential equations reduced to first order differential equations;

POLITECHNIKA POZNAŃSKA

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- Euler differential equations;

- higher order differential equations with constant coefficients;

- the Laplace transform, basic definition and properties, the inverse Laplace transform, applications;

- systems of linear differential equations; solving linear systems – the Eigenanalysis method, the elimination method.

Teaching methods

Lectures: lecture with multimedia presentation accompanied with examples presented on the blackboard, theory presented with connections of current knowledge from previous lectures and with questions to the group of students;

Tutorials: solving problems on the board, initiating discassion about the solutions.

Bibliography

Basic

- N. M. Matwiejew, Metody całkowania równań różniczkowych zwyczajnych, PWN Warszawa 1982.

- A. Palczewski, Równania różniczkowe zwyczajne (teoria i metody numeryczne z wykorzystaniem komputerowego systemu obliczeń symbolicznych), Wyd. Naukowo-Techniczne, Warszawa 1999.

- M. Gewert, Z. Skoczylas, Równania różniczkowe zwyczajne. Teoria, przykłady, zadania,Oficyna Wydawnicza GiS, Wrocław 2011.

- W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach, t. 2, Wydawnictwo Naukowe PWN, Warszawa 2013.

- A. Sołtysiak, Część II, Wydawnictwo Naukowe UAM, Poznań 2004.

Additional

- N. M. Matwiejew, Zadania z równań różniczkowych zwyczajnych, PWN, Warszawa 1976.

- J. Mikołajski, Z. Sołtysiak, Zbiór zadań z matematyki dla studentów wyższych szkół technicznych, cz.III, Kalisz 2008.

- I. Foltyńska, Z. Ratajczak, Z. Szafrański, Matematyka dla studentów studiów technicznych dla pracujących, Wydawnictwo PP 1992.

- R. Rudnicki, Wykłady z analizy matematycznej, PWN 2006.

Breakdown of average student's workload

POLITECHNIKA POZNAŃSKA

EUROPEJSKI SYSTEM TRANSFERU I AKUMULACJI PUNKTÓW (ECTS)

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	Hours	ECTS
Total workload	110	4
Classes requiring direct contact with the teacher	72	3
Student's own work (literature studies, preparation for tutorials, preparation for tests/exam, project preparation)	38	1

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pl. M. Skłodowskiej-Curie 5, 60-965 Poznań

4