POLITECHNIKA POZNAŃSKA

EUROPEJSKI SYSTEM TRANSFERU I AKUMULACJI PUNKTÓW (ECTS)

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

COURSE DESCRIPTION CARD- SYLLABUS

Course name
  Difference 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
  3/5
Profile of study
  general academic
Course offered in
  Polish
Requirements
  elective

Number of hours

Lectures
  30
Tutorials
  15

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

To pass on to students knowledge from difference equations and its appliacations in mathematical modeling. To develop students ability of solving simple difference equations and analyzing phenomena and building theirs mathematical models. To form students ability of team working.

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Course-related learning outcomes

Knowledge

- one knows most basic definition and theorems and theirs proofs from general linear difference equations theory;

- one can explain goal and meaning of simple discrete models;

- one knows connections between issues from difference equations theory and other theoretical and applied mathematics sections.

Skills

- to solve simple difference equations;

- to construct discrete mathematical models, used also in other sections of mathematics;

- to carry out proofs, also using, if need it, tools from other sections of mathematics.

Social competences

- the ability to cooperate in team, to fulfill obligations entrusted by devanning work in team, understanding necessity of systematic work;

- independency in looking for information in literature, also in different language;

- acting in coherence with basic ethical principals.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures: evaluation of knowledge and preparation of presentation.

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

Programme content

Update: 10.09.2020r.

- preliminaries, difference calculus;

- linear first order difference equations;

- dynamics of first order difference equations, equlibrium points, criteria of asymptotic stability of equilibrium points;

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- general theory of linear difference equations;

- linear homogeneous equations with constant coefficients;

- linear nonhomogeneous equations: method of undermined coefficients;

- nonlinear equations transformable to linear equations;

- applications of difference equations in biology, and economics.

Teaching methods

Lectures:

- Lecture with mulimedia presentation accompanied with examples presented on the blackboard and with questions to the group of students.
- The students' activity is taken into account during the final evaluation (the students prepare and deliver the presentations in small groups).

Tutorials:

- Solving problems on the board.
- Initiating discassion about the solutions.

Bibliography

Basic

- D. Bobrowski, Systemy dynamiczne z czasem dyskretnym, zagadnienia deterministyczne, Wydawnictwo PP, 1994.

- S. Elaydi, An Introduction to Difference Equations, Undergraduate Texts in Mathematics, Springer, New York, USA, 2005.

Additional

- I. Koźniewska, Równania rekurencyjne, PWN 1972.

- R. Agarwal, Discrete oscillation theory, Hindawi Publishing, 2005.

- R. Agarwal, D. O'Regan, Infinite interval problems for differential, difference and integral equations, Kluwer Academic Publ., 2001.

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Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4
Classes requiring direct contact with the teacher	70	3
Student's own work (literature studies, preparation for tutorials, preparation for tests/exam, project preparation)	30	1

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