COURSE DESCRIPTION CARD - SYLLABUS

Course name
Partial differential equations [S2MwT1>PO1-RRC]

Course

Field of study
Mathematics in Technology

Year/Semester
1/2

Area of study (specialization)
Modelling in Technology

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes
0

Other (e.g. online)
0

Tutorials
15

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

knows the basic concepts of mathematical analysis; knows the basic issues of the theory of ordinary differential equations; freely uses the tools of mathematical analysis, in particular differential and integral calculus; knows methods of solving classical ordinary differential equations; knows the limitations of his knowledge and understands the need for further education

Course objective

Acquiring and consolidating the basic concepts and the ability to use the methods of partial differential equations on the basis of examples.

Course-related learning outcomes

Knowledge:
1. knows the relationship between the issues of the theory of partial differential equations and other branches of science

Skills:
1. knows the methods of solving classical partial differential equations, can use them in typical practical

problems, knows how to classify selected partial differential equations
2. is able to formulate selected physical problems in terms of partial differential equations
3. has the ability to independently search for information in the literature and the Internet.

Social competences:
1. is aware of the limitations of his knowledge and understands the need for further learning
2. is aware of the need to broaden and expand knowledge
3. understands the need to refer to intuition, both for their own understanding and for the popularization of abstract mathematics.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Colloquiums, oral questioning, homework

Programme content

1. Definition of a partial differential equation, basic concepts. Boundary and initial conditions.
2. First order linear and quasilinear partial differential equations, characteristics method, general solution.
3. The Hamilton-Jacobi equation and its complete integral.
4. Classification of second order quasilinear partial differential equations.
5. String equation.
6. Laplace equation.
7. Poisson equation.
8. The wave equation.
9. Diffusion equation.
10. Schrödinger equation.

Course topics

none

Teaching methods

1) Lectures:
- a lecture with a multimedia presentation supplemented with examples given on the blackboard,
- an interactive lecture with the formulation of questions to a group of students or to identified specific students,
- theory presented in relation to the current knowledge of students,
- presenting a new topic preceded by a reminder of related content, known to students from other subjects,
- taking into account various aspects of the presented issues,
- student activity during classes is taken into account when assigning the final grade.
2) Exercises:
- solving example tasks on the blackboard,
- initiating discussions on solutions,
- home task sets.

Bibliography

Basic
1. I. Foltyńska, Z. Ratajczak, Z. Szafrański, Matematyka dla studentów uczelni technicznych 3, Wydawnictwo Politechniki Poznańskiej, 2000.
2. W. Żakowski, W. Leksiński, Matematyka IV, WNT, 1984
Additional
1. M. Smirnow, Zadania z równań różniczkowych cząstkowych, PWN, 1970.
2. W. Pogorzeliski, Analiza Matematyczna IV, PWN, 1956.

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,00
Classes requiring direct contact with the teacher	45	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	45	1,50