COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematics

Course

Field of study
Sustainable Building Engineering

Year/Semester
1/2

Area of study (specialization)
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Profile of study
general academic

Level of study
First-cycle studies

Course offered in
english

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
0

Other (e.g. online)
0

Tutorials
15

Projects/seminars
0

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
dr hab. inż. Paweł Kolwicz, prof. PP
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Responsible for the course/lecturer:

Prerequisites

The student starting this module should have basic mathematical knowledge at the secondary school level and knowledge of the subject Mathematics from semester 1 of this field of study. Should have the ability to solve basic mathematical problems in the above-mentioned range. In addition, in the field of social competences, students must present attitudes such as honesty, responsibility, perseverance, cognitive curiosity, creativity, personal culture, respect for other people.

Course objective

To deliver of the basic (at the university level) mathematical knowledge in the field of algebra and mathematical analysis (as part of the semester 2 of this course), developing the ability to apply it in technical sciences and preparing the student for effective study of physics and other major subjects. Developing students' ability to solve problems in the above-mentioned fields.

Developing students' general skills in logical concluding and precise thinking.

Course-related learning outcomes

Knowledge

1. has knowledge of basic notions (function of many variables, partial derivative, double, triple integral, line integral, ordinary differential equation, surface of the second degree, number series, power funtion series).

2. knows the basic rules for calculating double limits, partial derivatives, double and triple integrals, knows the rules for solving the ordinary differential equations (basic types), knows the notion of a complex number.

Skills

1. is able to calculate the double limit, determine the partial derivative of a function, double, triple integral, line integral, find a solution of ordinary differential equation, can use the notion of complex number to interpret sets on the complex plane (basic examples).

Social competences

1. is able to think and act in a mathematically correct way in the area of mathematical analysis, linear algebra.

2. knows the limits of their own knowledge and understands the need for further education, understands the need for systematic work.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Tutorials

- continuous assessment - rewarding for the activity manifested in the discussion and cooperation in solving practical tasks,

- continuous assessment - rewarding the increase in the ability to use learned techniques,

- obtaining additional points for activity in classes (applies to lectures and tutorials), including the presentation of reports discussing additional aspects of issues, in particular the application of theory in other sciences or a reference to a place in the history of mathematics,

Skills acquired as part of the tutorials are verified on the basis of 2 tests carried out during approximately 7 and 15 weeks, consisting of several tasks with possible variable scores depending on their level of difficulty. Assessment threshold: 50% of all points.

Lecture

Knowledge gained during the lecture is verified by passing the exam in writing on the theoretical part of the subject with possible examples and practical tasks. A written test is a set of questions that are expected to be descriptively answered (using precise language of theory). Credit threshold: 50% of points. The final list of issues on the basis of which questions are prepared will be sent to students via e-mail via the university's e-mail system

Programme content

30 hours lecture and 15 hours tutorials

1. Complex numbers. Sets on the complex plane, 4 hours lecture and 2 hours tutorials.

2. Differential calculus of functions of many variables. Functions of many variables (definition, partial derivatives - Schwarz's theorem, total differential of the function, extremes of function of two variables, implicit function of one variable, differential, extremes, 8 hours of lecture and 4 hours of tutorials.

3. Ordinary differential equations (with separated variables, first-order linear, exact, second-order linear), 4 hours. lecture and 2 hours tutorials.

4. Multiple integrals and their geometric and physical applications, line integral and applications, 8 hours lecture and 4 hours tutorials.

5. Number and function series (convergence criteria, power series, Taylor's series), 6 hours of lecture, 1 hour of tutorials).

6. Tests during tutorials 2 hours.

Teaching methods

Lecture

1. a lecture in the form of a presentation using a projector, additional comments and figures on a blackboard with interactive questions to a group of students,

2. student activity (preparation of historical reports on mathematics related to the presented material, reports on the use of algebra and analysis in engineering sciences) during classes will be taken into account when issuing the final grade,

3. initiating discussions during the lecture,

4. theory presented in relation to the current knowledge of students from previous lectures,

Tutorials

1. providing a list of tasks to be solved for each subsequent meeting

2. problem solving on the board (using the presentation on the projector to recall the theory)

3. a detailed review of task solutions by the teacher and discussions on solutions.

Bibliography

Basic

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Additional

1. R. A. Adams, Calculus, Fourth Edition, Addison Wesley Longman 1999.

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13. R. Leitner, W. Matuszewski, Z. Rojek, Zadania z matematyki wyższej cz. 2, Warszawa 1999.

Breakdown of average student's workload

	Hours	ECTS
Total workload	80	3,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, preparation for tutorials, preparation for tests, solving tasks within own work) [1]	35	1,0

[1] delete or add other activities as appropriate