COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematics [S1Bud1>MAT1]

Course

Field of study
Civil Engineering

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
0

Other (e.g. online)
0

Tutorials
30

Projects/seminars
0

Number of credit points

5,00

Coordinators

dr Alicja Dota
alicja.dota@put.poznan.pl

Lecturers

dr Kamila Tomaszyk
kamila.tomaszyk@put.poznan.pl

dr Jarosław Mikołajski
jaroslaw.mikolajski@put.poznan.pl

dr Alicja Dota
alicja.dota@put.poznan.pl

Prerequisites

Knowledge of mathematics in the extended high school area. The ability to obtain information from the indicated sources, to think logically, associate facts, analyze problems and apply the right conclusions.

Course objective

To acquaint students with extended mathematical knowledge in the field of differential and integral calculus of one variable functions, to develop the ability to apply it in engineering and to prepare them for effective study of physics, chemistry and specializations.

Course-related learning outcomes

Knowledge:
Student

1. Knows the concept of sequence of numbers.
2. Knows the concept of derivative, methods of solving and its applications.
3. Knows the concept of indefinite integral and methods of solving it.
4. Understands the concept of definite integral and its interpretation.

Skills:
Student
1. Is able to determine monotonocity and limit of the sequence.
2. Can calculate the derivative and apply it to determine the limit, monotonicity, maxima, minima of functions of single variable.
3. Is able to calculate indefinite and definite integral, measures of areas, the length of curves, volumes and surface areas of solids of revolution.

Social competences:
The graduate is ready to critically evaluate his or her knowledge. The graduate understands the need for and knows the possibilities of continuous learning - improving professional, personal and social competences.

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: written exam/exams to check theoretical knowledge and the abillity of its practical use.
Exam is passed
if student gains 50% of all points.
Tutorials: 1 written test during the semester and activity during tutorials.
Range of grades:
50% - 3.0
60% - 3,5
70% - 4,0
80% - 4,5
90% - 5,0

Programme content

Differential and integral calculus of functions of one variable

Course topics

LECTURE
1.Composite functions. Inverse functions, cyclometric functions.
2. Sequences (monotonocity and limit, Euler"s number).
3. Limit and continuity of a function.
4.The derivative (definition, interpretation and applications - the tangent line, the differential, the L"Hopital"s Rule).
5. Mean ValueTheorems with applications - monotonicity, maxima, minima, convexity and the points of inflection).
6. Indefinite integral (integration by substitution and by parts, integration of rational, trigonometric and irrational functions).
7. Definite integral (definition, interpretation and properties, improper integral, applications -calculation of measure of areas, the length of curves, volumes and surface areas of solids of revolution).
8. Functions in parametric form. Functions in polar coordinates. Special curves. Integration of functions in parametric form and in polar form.
9. Improper integral.
10. Number series and function series.
Tutorials:
1. Basic functions (composite functions, determining formulas and drawing graphs of inverse functions).
2. Sequences (monotonocity and limits with particular emphasis on the number e).
3. The limit of a function. Asymptotes of functions.
4. The derivative (evaluation and applications - l"Hopital"s Rule, extrema and monotonocity, convexity and

the points of inflectio).
5. Indefinite integral (integration by substitution and by parts, integrals of rational , trigonometric and irrational functions).
6. Definite integral (calculation of measure of areas, the length of curves, volumes and surface areas of solids of revolution).
7. Number series and function series.

Teaching methods

1. Interactive lecture with questions to the group of students which is supported by solving examples on board.
2. Classes during which students solve tasks on board.Teacher"s detailed assessment of students" solutions followed by discussion and comments.

Bibliography

Basic
1. M. Mączyński, J. Muszyński, T. Traczyk, W. Żakowski, Matematyka - podręcznik podstawowy dla WST, PWN, t. I - Warszawa 1979, t. II - Warszawa 1981.
2. J. Mikołajski, Z. Sołtysiak, Zbiór zadań z matematyki dla studentów wyższych szkół technicznych, Wydawnictwo PWSZ w Kaliszu, cz. II - Kalisz 2010.
3. M. Gewert, Z. Skoczyłaś, Analiza Matematyczna 1 i 2 - Definicje, twierdzenia, zwory, Oficyna Wydawnicza GIS, Wrocław 2021 i Wrocław 2019.
4. M. Gewert, Z. Skoczyłaś, Analiza Matematyczna 1 i 2- Przykłady i zadania, Oficyna Wydawnicza GIS, Wrocław 2021 i Wrocław 2019.

Additional
1. G. Decewicz, W. Żakowski, Matematyka t. I. WNT, Warszawa 2003.
2. F. Leja, Rachunek różniczkowy i całkowy. PWN, Warszawa 2008.
3. I. Foltyńska, Z. Ratajczak, Z. Szafrański, Matematyka cz. I i II, Wydawnictwo Politechniki Poznańskiej, Poznań 2001.
4. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach, t. I, PWN, Warszawa 2006.
5. W. Stankiewicz, Zadania z matematyki dla wyższych uczelni technicznych, PWN, Warszawa 2003.

Breakdown of average student's workload

	Hours	ECTS
Total workload	145	5,00
Classes requiring direct contact with the teacher	62	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	83	3,00