

Mathematics 1: One-variable calculus and algebra (0000186)

Course size *(nominal values; actual values may depend on programme)*

Credits 5.0

Study time 150 h

Course offerings and teaching methods in academic year 2024-2025

A (semester 2)

English

Incheon

seminar

lecture

Lecturers in academic year 2024-2025

Rao, Shodhan

KR01

lecturer-in-charge

Offered in the following programmes in 2024-2025

[Bachelor of Science in Environmental Technology](#)

crdts

5

offering

A

[Bachelor of Science in Food Technology](#)

5

A

[Bachelor of Science in Molecular Biotechnology](#)

5

A

[Joint Section Bachelor of Science in Environmental Technology, Food Technology and Molecular Biotechnology](#)

5

A

Teaching languages

English

Keywords

University calculus, Linear algebra, Determinants, Linear equations, Matrices, Eigenvalues and Eigenvectors

Position of the course

The aim of the course is to impart and upgrade the fundamental knowledge of single-variable calculus and linear algebra that is necessary for engineering applications. The course will acquaint students with the mathematical techniques and methods that are mandatory in the framework of advanced engineering courses.

Contents

- 1 Differential calculus: Formal definition of limits, mean value theorem, transcendental functions, applications of differentiation, Euler's formula, De Moivre's Theorem.
- 2 Integration: Riemann Integral, improper integral, applications of integration in geometry and physics.
- 3 Linear algebra: Systems of linear equations, vectors, matrices, row reduction algorithm, linear combinations, span and linear independence of vectors, matrix algebra, matrix inversion, determinants and their applications, eigenvalues, eigenvectors and diagonalization of matrices.

Initial competences

Secondary school knowledge of mathematics.

Final competences

- 1 Appreciate and understand abstract concepts in linear algebra.
- 2 Analyse and apply the right mathematical technique to solve simple problems in related fields including mechanics and chemistry.
- 3 Abstract relevant information from a given real life problem description.
- 4 Apply relevant methods from one-variable calculus and/or linear algebra to solve real life engineering problems.
- 5 Possess scientific skills such as analytical reasoning, critical reflection and problem solving capability.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Seminar, Lecture

Study material

Type: Slides

Name: Lecture slides

Indicative price: Free or paid by faculty

Optional: no

Language : English

Type: Other

Name: Lecture notes provided in the class

Indicative price: Free or paid by faculty

Optional: no

Language : English

References

R.A. Adams & C. Essex, "Calculus: a Complete Course", Eighth Edition, Pearson.

David C. Lay, "Linear Algebra and its applications", Fourth Edition, Addison-Wesley.

James Stewart, "Calculus", 7th Edition, International metric version, Brooks/Cole
Cengage Learning, 2012.

L.E. Spence, A.J. Insel, S.H. Friedberg, "Elementary linear algebra", Second Edition,
Pearson, 2008.

Course content-related study coaching**Assessment moments**

end-of-term and continuous assessment

Examination methods in case of periodic assessment during the first examination period

Written assessment with open-ended questions

Examination methods in case of periodic assessment during the second examination period

Written assessment with open-ended questions

Examination methods in case of permanent assessment

Participation, Written assessment with open-ended questions

Possibilities of retake in case of permanent assessment

examination during the second examination period is not possible

Calculation of the examination mark

Participation (coached exercises): 5%

Non-periodic evaluation (midterm) - Written exam with open questions: 15%

Periodic Evaluation (Final Exam) - Written exam with open questions: 80%