PHYS-216 **Mathematical methods for physicists**

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Cursus	Sem.	Type
Physics	BA4	Obl.

Language of teaching	English
Credits	3
Session	Summer
Semester	Spring
Exam	Written
Workload	90h
Weeks	14
Hours	**3 weekly**
Lecture	1 weekly
Exercises	2 weekly
Number of positions	

Summary

This course complements the Analysis and Linear Algebra courses by providing further mathematical background and practice required for 3rd year physics courses, in particular electrodynamics and quantum mechanics.

Content

The course consists of a series of problems that illustrate the use of several mathematical methods (mostly taught in other courses): linear algebra, real and complex analysis, vector calculus, differential equations, Sturm-Liouville theory, special functions, Fourier series, Fourier transforms, theory of distributions, variational calculus, elements of group theory, probability and statistics.

Learning Prerequisites

Required courses

Analyse I, II and III. Linear algebra I and II Physics I, II, and III.

Recommended courses

Linear Algebra I and II.
Analysis I, II, III and IV.
Probability and Statistics.
Analytical Mechanics.

Learning Outcomes

By the end of the course, the student must be able to:
- Solve Physics and Mathematical problems using an appropriate method taught during the first two years of Bachelor.

Transversal skills

- Demonstrate the capacity for critical thinking

Teaching methods

Ex cathedra lecture and assisted exercises in the classroom

Assessment methods

written exam

Supervision

Assistants   Yes

Resources

Bibliography

The main reference for the course is the book by Arfken:
G. B. Arfken, H. J. Weber, and F. E. Harris
"Mathematical Methods for Physicists, A Comprehensive Guide"
 7th edition, Academic Press 2013.
Hard copies and electronic version available through EPFL library.

Ressources en bibliothèque

• Mathematical Methods for Physicists, A Comprehensive Guide

Moodle Link

• https://go.epfl.ch/PHYS-216