

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
<b>Hours</b>	<b>3 weekly</b>
Lecture	1 weekly
Exercises	2 weekly
<b>Number of positions</b>	

**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>