Program	Type of studies (cycle)	Third cycle
	Name of the program	Doctoral Studies in Mathematical and Computer Science

Course

Course title	**Advanced topics in mathematical analysis**			
Course code	Semester	Course status	ECTS credits	Contact hours
PMAT 601	I	elective	10	30

Aims and intended learning outcomes	The course aims to deepen and systematize advanced knowledge of mathematical analysis through specialized topics aligned with students' research interests, with particular emphasis on abstract thinking, mathematical rigor, and the methodological foundations of scientific research. Upon successful completion, students are expected to critically analyze current mathematical results and relevant scholarly literature; independently formulate and solve complex mathematical problems; apply advanced theoretical and methodological approaches in mathematical analysis; and present their research results clearly and precisely in accordance with high academic standards.

Course content/topics

The course content is not fixed. The instructor(s) develop a course syllabus based on students' prior knowledge and research interests, subject to approval by the Study Council. Possible topics include:

- Metric and normed spaces, compactness and completeness
- Hilbert spaces and orthogonal representations
- Topological spaces and continuous maps
- Ergodic measures and ergodicity
- Analytic and meromorphic functions and their asymptotic behavior
- Distribution of zeros of analytic functions and representations by infinite products and series
- Asymptotic methods and limiting behavior of functions of a complex variable
- Special functions and analytical methods in applications
- Other topics in current research in mathematical analysis and its applications.

LITERATURE

[1] Walter Rudin, Functional Analysis, 2nd ed., McGraw-Hill, 1991.
[2] Walter Rudin, Real and Complex Analysis, 3rd ed., McGraw-Hill, 1987.
[3] Cesar E. Silva and Alexandre I. Danilenko (eds.), Ergodic Theory, Springer, Encyclopedia of Complexity and Systems Science Series, 2023.
[4] Elias M. Stein and Rami Shakarchi, Complex Analysis, Princeton University Press, 2003.
[5] G. E. Andrews, R. Askey and R. Roy, Special Functions, Cambridge University Press, 1999.
[6] Other relevant literature as specified in the course syllabus.

Grading

	Criterion	Points	Cut-off points
1.	Homework		
2.	Project		
3	Final exam		
	Total	100	55