

Basic/Essential Course Information	
Course title	MATHEMATICAL ANALYSIS III
Degree Course title	PHYSICS
ECTS	6
Mandatory attendance	NO
Course teaching language	ITALIAN

Teacher	Monica Lazzo	monica.lazzo@uniba.it
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ECTS details	Disciplinary area/broad field	SSD	ECTS
	Core	MAT/05	6

Time management and teaching activity type	Period	Year	Lesson type
	1st semester	1st	Lectures (32h) Recitations (30h)

Time management	Total hours	In-class study ours	Out-of-class study hours
	150	62	88

Course calendar	Starting date	Ending date
	25.09.2018	21.12.2018

Syllabus	
Prerequisites	Differential and integral calculus; numerical series. Foundations of linear algebra.
Expected learning outcomes (according to Dublin Descriptors) i	<p>Knowledge and understanding: Knowledge of theoretical aspects of two mathematical subject commonly used in various areas of Physics: principles of functional analysis and differential equations.</p> <p>Applying knowledge and understanding: Ability for inductive and deductive reasoning. Ability to explicitly solve and qualitatively analyze differential equations.</p> <p>Making judgements: Development of critical thinking to: distinguish between essential and nonessential assumptions; identify the most appropriate tools to solve a given problem; realize the limitations of techniques and methods.</p> <p>Communication skills: Ability to discuss mathematical results, providing supporting evidence by way of examples and counterexamples.</p> <p>Lifelong learning skills: Ability to study and understand mathematical topics. Ability to retrieve useful information from textbooks and other resources.</p>
Course contents summary	Sequences and series of functions. Ordinary differential equations.
Detailed syllabus	<p>Sequences and series of functions: Pointwise convergence. Uniform convergence. Uniform convergence and boundedness, continuity, integration, differentiation. Completeness of the space of bounded and continuous functions equipped with the supremum norm. Power series. Interval and radius of convergence. Uniform and absolute convergence. Differentiation and integration of power series. Taylor series. Analytic functions. Fourier series of periodic functions. Bessel's inequality and the Riemann-Lebesgue lemma. Pointwise and uniform convergence of Fourier series.</p> <p>Differential equations: Existence and uniqueness theorem for</p>

	<p>solutions of initial value problems. Regularity. Continuous dependence on initial data and parameters. Maximal solutions. Linear differential systems. Basic theory of homogeneous differential systems. Basis of solutions. Basic theory of non-homogeneous linear differential systems. Methods of solving non-homogeneous linear differential systems with constant coefficients. Method of undetermined coefficients and method of variation of parameters. Solutions of separable, homogeneous, Bernoulli, and Euler differential equations. Sketching, plotting and interpretation of solutions of differential equations.</p>
Textbooks	<p>C.D. Pagani, S. Salsa, <i>Analisi Matematica</i>, vol. 2, Zanichelli G.C. Barozzi, G. Dore, E. Obrecht, <i>Elementi di analisi matematica</i> Volume 2, Zanichelli V. Barutello, M. Conti, D.L. Ferrario, S. Terracini, G. Verzini, <i>Analisi matematica</i> Vol. 2, Apogeo E. Giusti, <i>Analisi Matematica 2</i>, Boringhieri W. Rudin, <i>Principi di analisi matematica</i>, McGraw-Hill</p>
Notes to Textbooks	Selected chapters only
Teaching methods	Classroom lectures and recitations, partially supported by instructional technology.
Assessment methods (% of final mark)	Written exam (50%), to assess problem solving skills; oral exam (50%), to assess theoretical knowledge and communication skills.
Evaluation criteria	<p>The student must: know basic notions on some functional spaces and the basic results on ordinary differential equations; be able to prove theoretical results, solve and qualitatively analyze some classes of differential equations; distinguish between essential and nonessential assumptions; discuss mathematical notions in a rigorous way; contextualize mathematical topics.</p>