Università degli Studi di L'Aquila - Dipartimento di Ingegneria e Scienze dell'Informazione e Matematica

Course catalogue

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Programme of Integrated course "Advanced Analysis"

This course is composed of 2 Modules: 1) Advanced Analysis 1, 2) Advanced Anaysis 2

- Code: DT0114
- Type of course unit: Compulsory (Master Degree in Mathematics curriculum Generale), Compulsory (Master Degree in Mathematical Engineering curriculum Comune)
- Level of course unit: Postgraduate Degrees
- Semester: 1

Number of ects credits: (Master Degree in Mathematics) 6 (workload 150 hours), (Master Degree in Mathematical Engineering) 6 (workload 150 hours)

Teachers: Corrado Lattanzio

1	**Course objectives**	Knowledge of mathematical methods that are widely used by researchers in the area of Applied Mathematics, as Sobolev Spaces, distributions. Application of this knowledge to a variety of topics, including the basic equations of mathematical physics and some current research topics about linear and nonlinear partial differential equations.
3	**Course prerequisites**	Basic notions of functional analysis, functions of complex values, standard properties of classical solutions of semilinear first order equations, heat equation, wave equation, Laplace and Poisson's equations.
4	**Teaching methodsand language**	Lectures **Language**: English **Reference textbooks** • G. Gilardi, ***Analisi 3***. McGraw–Hill. • V.S. Vladimirov, ***Equations of Mathematical Physics***. Marcel Dekker, Inc.. • C.M. Dafermos, ***Hyperbolic Conservation Laws in Continuum Physics***. Springer. • L.C. Evans, ***Partial Differential Equations***. AMS. • M.E. Taylor, ***Partial Differential Equations, Nonlinear equations***. Springer. • H. Brezis, ***Sobolev Spaces and Partial Differential Equations***. Springer.
5	**Assessment methods**	Oral exam

Programme of Module "Advanced Anaysis 2"

- Code: DT0115
- Type of course unit: Compulsory (Master Degree in Mathematics curriculum Generale)
- Level of course unit: Postgraduate Degrees
- Semester: 2

Number of ects credits: (Master Degree in Mathematics) 6 (workload 150 hours)

Teachers: Stefano Spirito (stefano.spirito@univaq.it)

1	**Course objectives**	Aim of the course is the knowledge of advanced techniques of mathematical analysis and in particular the basic techniques of the modern theory of the partial differential equations.
2	**Course content and learning outcomes (dublin descriptors)**	Topics of the module include: • Abstract Measure theory • AC and BV functions. • Second order elliptic equations. • Variational methods. • Fourier transforms. On successful completion of this module, the student should : • Aim of the course is to acquire Knowledge and Understanding of Advanced Techniques of 'Mathematical Analysis. • applying the techniques learned to problems of partial differential equations • Acquire the ability to understand what methods and techniques can be used in

		various problems involving the partial differential equations. • Acquire the ability 'to expose, explain and elaborate concepts and advanced analysis techniques. • Acquire the ability 'to study and understand theorems and analysis techniques from books and advanced research products.
3	**Course prerequisites**	A good knowledge of the basic arguments of a course of Functional Analysis, in particular, a good knowledge of the theory of Lebesgue's integral ande the L^p spaces. The first module of the course, in particular a good knowledge of the theory of distributions and Sobolev spaces.
4	**Teaching methodsand language**	Lectures. **Language**: English **Reference textbooks** • L. Grafakos, ***Classical Fourier Analysis*** . • P. Cannarsa and T. D'aprile, ***Introduction to Measure Theory and Functional Analysis*** . • L. Evand and R. Garipey, ***Measure Theory and Fine Properties of Functions (Revised Edition)***. • L.C. Evans, ***Partial differential equations***.
5	**Assessment methods**	Written exams.