



UNIVERSITÀ  
DEGLI STUDI DI TRIESTE

Area dei Servizi Istituzionali  
Settore Servizi agli studenti e alla didattica  
Ufficio Dottorati di ricerca

ATTACHMENT 10

LAST REVISED 10/05/2018

**PhD IN  
EARTH SCIENCE, FLUID-DYNAMICS AND MATHEMATICS. INTERACTIONS AND METHODS  
OVERVIEW**

<b>IN BRIEF</b>	
<b>Lines of research</b>	1 Environmental fluid mechanics, fluid mechanics in industrial and technological processes, and in biological systems 2 Solid and fluid earth geophysics and geology 3 Mathematical methods and modeling in fluid mechanics and in geophysics, differential equations and inverse problems: qualitative, computational, and numerical aspects.
<b>Administrative location</b>	University of Trieste
<b>Organizing Department</b>	Department of Mathematics and Geosciences
<b>Partner University Department</b>	Department of Engineering and Architecture
<b>Duration</b>	3 years
<b>Attendance abroad that entitles to a scholarship increase - min. max. of months for each PhD student (over 3 years)</b>	0 - 12
<b>Official language</b>	English The entrance exams, training activities (courses, seminars, schools, ...), the preparation of annual reports, the drafting and defense of the thesis are to be given in English.
<b>Subject Areas (in alphabetical code order)</b>	01 MATHEMATICS AND INFORMATICS 04 EARTH SCIENCES 08b CIVIL ENGINEERING 09 INDUSTRIAL AND INFORMATION ENGINEERING
<b>Macro Research Fields (in alphabetical code order)</b>	01/A MATHEMATICS 01/B INFORMATICS 04/A EARTH SCIENCES 08/A LANDSCAPE AND INFRASTRUCTURAL ENGINEERING 09/C ENERGY, THERMOMECHANICAL AND NUCLEAR ENGINEERING 09/G SYSTEMS ENGINEERING AND BIOENGINEERING
<b>Scientific Disciplinary Sectors (in alphabetical code order)</b>	GEO/02 STRATIGRAPHY AND SEDIMENTOLOGY GEO/03 STRUCTURAL GEOLOGY GEO/06 MINERALOGY GEO/07 PETROLOGY AND PETROGRAPHY GEO/10 SOLID EARTH GEOPHYSICS GEO/11 APPLIED GEOPHYSICS GEO/12 OCEANOGRAPHY AND PHYSICS OF THE ATMOSPHERE ICAR/01 HYDRAULICS ICAR/02 HYDRAULIC STRUCTURES, MARITIME ENGINEERING AND HYDROLOGY INF/01 INFORMATICS ING-IND/10 THERMAL ENGINEERING AND INDUSTRIAL ENERGY SYSTEMS

	ING-IND/34	INDUSTRIAL BIOENGINEERING
	MAT/05	MATHEMATICAL ANALYSIS
	MAT/08	NUMERICAL ANALYSIS
<b>Domain European Research Council</b>	PE	PHYSICAL SCIENCES AND ENGINEERING
<b>ERC Panels</b>	PE10	EARTH SYSTEM SCIENCE: PHYSICAL GEOGRAPHY, GEOLOGY, GEOPHYSICS, ATMOSPHERIC SCIENCES, OCEANOGRAPHY, CLIMATOLOGY, ECOLOGY, GLOBAL ENVIRONMENTAL CHANGE, BIOGEOCHEMICAL CYCLES, NATURAL RESOURCES MANAGEMENT
	PE1	MATHEMATICS: ALL AREAS OF MATHEMATICS, PURE AND APPLIED, PLUS MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE, MATHEMATICAL PHYSICS AND STATISTICS
	PE8	PRODUCTS AND PROCESSES ENGINEERING: PRODUCT DESIGN, PROCESS DESIGN AND CONTROL, CONSTRUCTION METHODS, CIVIL ENGINEERING, ENERGY SYSTEMS, MATERIAL ENGINEERING

WHO'S WHO	
<b>Chair</b>	Prof. Pierpaolo Omari - Department of Mathematics and Geosciences – University of Trieste – phone +39 040.558.2619; email <a href="mailto:omari@units.it">omari@units.it</a>
<b>Vice</b>	Prof. Stefano Maset – Department of Mathematics and Geosciences – University of Trieste – phone + 39 040.558.2675; email <a href="mailto:maset@units.it">maset@units.it</a>
<b>PhD Academic Board</b>	<a href="#">List of members</a>
<b>Web site</b>	<a href="https://web.units.it/dottorato/esfm/en">https://web.units.it/dottorato/esfm/en</a>
<b>Email</b>	<a href="mailto:esfm.adm@units.it">esfm.adm@units.it</a>
<b>Course description and objectives</b>	<p>This PhD Course aims at the advanced training of students in the field of the Earth System Science, through a multidisciplinary approach, where specific skills integrate with modeling and computational tools that allow to effectively tackle complex problems. Special attention is devoted to the interactions between Mathematics, Scientific Computing, Data Science, Fluid Dynamics, and Earth Sciences.</p> <p>This course promotes the preparation of students through the investigation of the scientific themes developed by the research groups belonging to the departments and the research institutions directly involved in the program, as well as through international collaborations with qualified foreign structures that provide students with the opportunity to attend training programs abroad.</p> <p>In the field of Earth Science, advanced methods of investigation are developed in geological, geophysical, atmospheric, oceanographic, and climatological fields, with applications to the study of composition, structure, stratigraphy, evolution, and dynamics of our planet, from the close surface up to the deep structures and the characteristics at a global scale. Special attention is paid to issues related to reduction of natural risks, finding of georesources, climate changes.</p> <p>In the context of fluid mechanics, the study of motion of the fluids is mainly addressed with reference to their transport properties, dispersion and mixing in environmental, industrial, biological processes, as well as to their interaction with the solid elements.</p> <p>The laws, which these disciplines are based on, are generally expressed by highly complex mathematical models. The qualitative and quantitative study of such models requires the development and the application of sophisticated mathematical tools, and it represents a relevant and topical research field even from the mathematical point of view. Mathematical and computational modeling also requires an integrated use of different tools: methodologies for management and analysis of large amounts of information; tools for description, identification, multi-scale simulation of complex systems; methods for optimizing diagnosis and processes. In conclusion, Mathematics, Scientific Computing, and Data Science pervade the entire program, playing a central and unifying role.</p>

<p><b>Job placement opportunities</b></p>	<p>The program of this course is designed to prepare students to pursue different careers in research, teaching and industrial use of high technologies in the fields of earth science, fluid mechanics, applied mathematics, and their interactions. The students will be in contact with several local and international environments and gain an important experience in both theoretical and applied problems that originate in the disciplines mentioned above. In addition, the students will develop familiarity and competence in using the most advanced tools (both modeling and experimental) for the analysis of complex physical systems, which will be of great use for future activity in public or private research centers, or for any work in companies with high technological content.</p> <p>The Doctoral School of Environmental and Industrial Fluid Mechanics and the Doctoral Course in Earth Science and Fluid Mechanics, which the present course is a natural continuation and expansion of, have systematically partnered during the last ten years with the departments of several research institutions and services, such as INOGS, ICTP, ISMAR-CNR, ENEA, ARPA-FVG, as well as with various industries in the area. The scholarships funded by such institutions, or factories, and their very presence, stem from their need to acquire highly specialized personnel in the topics addressed in this doctoral program. The students of this course will then have, as a natural outlet, post-doctoral grants, or employments, within the organizations themselves.</p>
<p><b>Main cooperating international Universities and Research Institutions</b></p>	<ol style="list-style-type: none"> <li>1 Princeton University, U.S.A.</li> <li>2 Technische Universiteit Eindhoven, Low Countries</li> <li>3 University of California Irvine, U.S.A.</li> <li>4 École Polytechnique Fédérale de Lausanne, Switzerland</li> <li>5 Universidad Complutense de Madrid. Spain</li> </ol>