UNIVERSITÀ DI PARMA

MATHEMATICS

CYCLE	XXXVII
COORDINATOR	Prof.ssa Alessandra LUNARDI email: alessandra.lunardi@unipr.it Department of Mathematical, Physical and Computer Sciences
DURATION	3 anni
STARTING DATE OF THE PHD PROGRAM	01/11/2021
PARTNER INSTITUTION	• University of Modena e Reggio Emilia • University of Ferrara
PARTNER INSTITUTION FOR UNIVERSITY COOPERATION AGREEMENTS	• KU Leuven (Belgium) • Universidade do Minho (Portugal)

RESEARCH TOPICS (The candidate **MUST mandatorily** indicate one research topic in the ANNEX A)

- Statistical mechanics
- Probability
- Discrete mathematics and combinatorics
- Algebraic and geometric topology of manifolds
- Partial differential equations
- Differential equations and dynamical systems
- Calculus of variations and applications to variational problems
- Infinite dimensional analysis
- Mathematical models and methods in complex systems
- Mathematical methods in quantum mechanics
- Modelization and scientific calculus
- Numerical methods for integral equations
- Numerical optimization and applications
- Combinatorial optimization
- Sequential, parallel and real-time algorithms
- Hoplf algebras and quantum groups
- Projective differential geometry
- Complex analysis and geometry
- Differential geometry
- History of mathematics
- Mathematics education
- Thermomechanics of countinuous media
- Exterior differential systems
- Kinetic methods in physical, economics, and social sciences
- Number theory
- Artificial intelligence
- Automatic reasoning

TRAINING OBJECTIVES

The main purpose is to produce highly qualified experts in the field of Mathematics, with advanced expertise on mathematical models and methodologies, exploitable also in interdisciplinary applications. This aim is achieved through lectures, talks, participations to workshops and research periods in other institutions which introduce PhD students to research work and allow them to establish work contacts which may continue even after the attainment of the PhD diploma. The education is addressed to the skills to recognise significant research problems, to find their solutions and to pass down the results to other people,

	through research papers or talks. At the end of the program the PhD student should be able to make autonomous research work, to produce original and relevant results and to integrate into the international scientific community.
ADMISSION REQUIREMENTS	Regardless of age and citizenship, applicants holding at least one of the following academic qualifications can apply for admission: − Laurea specialistica or Laurea magistrale (second cycle master's degree) − Laurea Vecchio Ordinamento (degree obtained under the previous Italian regulations); − Second cycle Master's degree obtained abroad, equivalent to the above mentioned Italian degrees and recognized as suitable for the admission to doctoral program Undergraduate applicants may also submit applications with the obligation of getting their degree by **October 31st 2021.**

POSITION PUT OUT TO COMPETITION	**11**	With Scholarship	**11**

Position with Scholarship		
N°	***Funding entity***	***Research Topic, if any***
2	Scholarship funded by University of Parma (University funds)	---
3	Scholarship funded by University of Ferrara	---
3	Scholarship funded by University of Modena e Reggio Emilia	---
1	Scholarship co-funded by Fondazione Cariparma	---

Position with Scholarship LINKED TO SPECIFIC TOPICS (art. 11 of the Competition notice)

During the Oral Exam, applicants may express and / or confirm their interest to the Examination Board in being assigned a scholarship dedicated to a specific research topic.. The Board will express its judgement on eligibility to be assigned the scholarship in consideration of the specific competences, experience and specific aptitudes of the applicants.

N°	***Funding entity***	***BOUND RESEARCH TOPIC***
2	Scholarship funded by Hipert S.r.l.	• Artificial Intelligence for underwater navigation. The goal of the research is to improve underwater vehicle navigation by exploiting artificial intelligence and sensor fusion in tasks such as underwater object detection, semantic segmentation, localization and mapping. • SLAM and V-SLAM techniques for Autonomous Underwater Vehicles (AUVs). The aim of the research is to develop new SLAM-based techniques to improve the navigation of Autonomous Underwater Vehicles (AUVs).

ADMISSION PROCEDURES	**Assessment of QUALIFICATIONS:** up to 60 points (a minimum score of 30 points will be required to be admitted to the Oral Exam) **ORAL EXAM:** up to 60 points **Minimum score for ELIGIBILITY**: 70/120
Foreign Language	Language the fluency of which shall be assessed during the Oral Exam: **ENGLISH**. The evaluation of the knowledge of this language will be oral and will consist in conversation and translation of a scientific text.

UNIVERSITÀ DI PARMA

THE INTERVIEW MAY BE HELD ALSO IN ENGLISH

LIST OF QUALIFICATIONS TO BE SUBMITTED AND THEIR ASSESSMENT

MANDATORY DOCUMENTS TO BE ATTACHED TO THE ON-LINE APPLICATION

ANNEX A	(art. 5 of the Competition notice)
Identification Document	Scanned Copy of a valid identity document with photo (i.e. identity card, passport)
Curriculum Vitae et studiorum	No specific CV format is required (see art. 4 of the Competition notice)
Abstract of degree thesis	Abstract of the second cycle master's degree thesis. Undergraduate applicants must submit the draft of the thesis approved by their supervisor (abstract/draft of the thesis: 10.000 characters including spaces)
Qualifications	**Certificates and academic transcript of records for both Bachelor' and Master' degrees** containing the following details for each degree held: (art. 4 of the Competition notice): University that granted the degree - Type of degree (first cycle/second cycle/single cycle) Name of the degree program - Date of graduation - Final mark - List of exams and corresponding scores (academic transcript of records) - Translation into Italian or English (only for degrees issued in languages other than Italian or English).

FURTHER QUALIFICATIONS THAT MAY BE ATTACHED TO THE APPLICATION, IF IN POSSESSION OF THE APPLICANT
(only qualifications attested by a document drawn up in Italian or in English)

Statement of Research interest	Short text – maximum 2 pages – in Italian or in English, aimed at explaining the candidate's reasons to attend the PhD program and at describing her/his specific research interests. It may contain the proposal for a research project.
Scientific Publications	Articles on national and international journals, contributions presented at conferences or symposia, book chapters etc.
Reference Letters	A maximum of 2 written by professors or researchers at the University of origin of the candidate or from other universities or from experts in the research areas working in public or private research facilities
Other Academic qualifications	First or second level Master's degree obtained in Italy and/or specialization degree in subjects consistent with the research topics of this PhD program
Other experiences (training, work, research, teaching, etc.)	Other qualifications attesting the suitability of the applicants (scholarships, awards, etc.)

EVALUATION CRITERIA

QUALIFICATION	EVALUTATION CRITERIA	POINTS
Curriculum Vitae et studiorum	Including academic career and postgraduate experience, accompanied by a statutory declaration in lieu of the certification of the exams passed with the relevant marks, as well as the final graduation mark.	**Up to 10 points**

Graduation thesis	Scientific content and presentation	**Up to 20 points**
Statement of Research Interest	Candidate's maturity and depth in the presentation of her/his interests, her/his motivation and a possible research project	**Up to 20 points**
Scientific publications	Scientific relevance of the results and their editorial positioning	**Up to 5 points**
Reference Letters	Significant presentation of the candidates in the letters, relevance of the qualifications for the PhD purposes.	**Up to 5 points**
ORAL EXAM	**EVALUATION CRITERIA**	**POINTS**
The ORAL PROOF consists in a presentation and discussion of the scientific interests of the candidate; it aims to find out the aptitude of the candidate for scientific research and her/his general knowledge of basic topics relevant to the subject matters of the PhD course	o knowledge of foreign languages: max 10 points o good argument concerning research interests: max 25 points o preparation on the topics of the PhD course: max 25 points	**Up to 60 points**

SCHEDULE OF THE ADMISSION EXAMS		
ORAL EXAM	**DATE**	14 September 2021
	TIME	10:00 am Italian time (with extension to 15 September at 09.00 am Italian time)
	PLACE	Department of Mathematical, Physical and Computer Sciences Parco Area delle Scienze, 53/A - Campus 43124 PARMA - ITALY
OTHER INFORMATION		For foreign candidates, the admission examinations may be held in English at the candidate's choice.