Università degli Studi di Cagliari

| PhD Programme in<br>**MATHEMATICS AND COMPUTER SCIENCE**<br>Curriculum 1: Mathematics<br>Curriculum 2: Computer Science<br>Curriculum 3: Big Data | |
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| DISCIPLINARY SCIENTIFIC AREA | 01 - MATHEMATICS AND INFORMATICS; 13a - ECONOMICS |
| COORDINATOR | PROF. MICHELE MARCHESI |
| HEAD DEPARTMENT | DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE |
| DURATION | 3 YEARS |
| EDUCATIONAL OBJECTIVES AND RESEARCH TOPICS | The PhD programme in Mathematics and Computer Science covers a broad spectrum of disciplines, connected to each other on the cultural, methodological and applicative levels. The doctorate, through the practice of scientific research in leading sectors of Mathematics and Computer Science, aims to train people of an adequate cultural level, able to contribute to the current needs of innovation and development of the industry and the information society, both on the level of scientific creativity, and of design ability. In particular, the doctoral course is aimed at training specialists with advanced methodological and technical knowledge, as well as with adequate linguistic preparation. The doctoral activity is supported by professors and researchers belonging to groups actively engaged in research at international level, ensuring ample opportunities for exchange of doctoral students with prestigious Italian and foreign universities, research bodies and companies. The investigation themes offered by the three available curricula (Mathematics, Computer Science and Big Data) largely refer to the research activities of the members of the teaching staff, and concern both the fundamental and application aspects of many sectors of Mathematics and Information Technology. The training acquired during the PhD programme will allow our graduates to autonomously perform research and development in universities, in public and private research institutions, and in the industrial sector. In particular, the main employment opportunities envisaged are the continuation of university research activities, the coordination and direction of research and development activities in industries, public bodies or national and international research centers. The analysis and elaboration skills acquired by training through research will also allow to take paths leading to managerial tasks in both the private and public sectors, or to undertake your own activities as a consultant for public bodies, companies and software houses. |
| ELIGIBILITY AND OTHER REQUIREMENTS FOR CANDIDATES | All degrees awarded according to the Italian Ministerial Decrees no. 270/2004 (*laurea magistrale*) and no. 509/1999 (*laurea specialistica*); the regulations established before the Italian Ministerial Decree no. 509/1999 (*laurea*); academic qualification (2nd cycle university degree: Master-level) issued by a foreign university recognized as equivalent.<br>The foreign university degree must be evaluated as suitable and equivalent, in terms of duration, level of degree and fields of study to the degree listed above and providing access to PhD education in the |

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| | awarding country |
| ADMISSION TESTS | ASSESSMENT OF QUALIFICATIONS AND CURRICULUM VITAE, AND A VIDEO CONFERENCE INTERVIEW.<br>During the interview, the candidate will discuss his/her 3-year research project. The project (preferably written in English) must be uploaded along with the documents listed in art. 3 of the PhD notice of competition (*Annex A "Titoli valutabili e Curriculum Vitae'; Annex B 'Dichiarazione sostitutiva di certificazioni del/i titolo/i di accesso con esami e voti'; two-sided coloured scanned copy of a valid ID, with a clear photo*), within the deadline (file name: progetto_di_ricerca_surname_name - formatting requirements: min. 8,000 max 16,000 characters including spaces - excluding title, schemes, charts and bibliographic references). The project will be evaluated during the interview exclusively and must include:<br>- i) purpose of the proposed research project and the related curriculum – Mathematics; Computer Science; Big Data;<br>- ii) state of the art of research;<br>- iii) detailed workplan;<br>- iv) expected results;<br>- v) personal statement, i.e. max. 1,000 characters (including spaces) explaining the reasons prompting the candidate to apply for the PhD Programme.<br><br>During the interview, the candidate will discuss a personal three-year research project, which must be submitted in addition to the documents required in art. 3 of the notice of competition (*Annex A "Titoli valutabili e Curriculum Vitae'; Annex B 'Dichiarazione sostitutiva di certificazioni del/i titolo/i di accesso con esami e voti'; two-sided coloured scanned copy of a valid ID, with a clear photo*), within the deadline (file name: progetto_di_ricerca_surname_name).<br>The project (min. 8,000, max. 16,000 characters, title and references excluded), evaluated exclusively during the interview, should specify:<br>1. the object of the research and the related curriculum - among Mathematics, Computer Science and Big Data – as well as its disciplinary sector;<br>2. the phases of the project;<br>3. the *status quaestionis*;<br>4. the expected results;<br>5. a declaration of intents (max 1,000 characters, including spaces) to highlight the reason of the candidate's application.<br><br>More specifically, the candidate will focus on a topic he/she studied in depth, summarizing its fundamental concepts and results, but also explaining the most advanced and innovative aspects. The candidate will also have the opportunity of supposing the future perspectives of the project, considering its theorical and/or operational developments.<br>The interview will be <u>mainly in English</u> and will:<br>- verify the candidate's capacity of orientating among the main study fields of the PhD programme;<br>- assess the candidate's methodological knowledge and his/her analytical, elaboration and communicative skills;<br>- discuss with the Selection Committee the content of the research project. |
| ADMISSION TESTS FOR FOREIGN CANDIDATES APPLYING FOR | ASSESSMENT OF QUALIFICATIONS AND CV, VIDEO CONFERENCE INTERVIEW |

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| RESERVED POSITIONS SUPPORTED BY A SCHOLARSHIP | During the interview, the candidate will discuss a three-year research project, which must be submitted in addition to the documents required in art. 3 of the notice of competition (*certificate attesting the award of a 2nd level foreign degree needed to access a PhD programme, including exams and marks, with a translation in Italian or English; certificate attesting the award of a 1st level foreign degree, including and marks, with a translation in Italian or English; signed Curriculum Vitae preferably in EU format, in English or Italian; up to 3 reference letter(s), in English or Italian, on institutional letterhead paper, dated and signed by a university professor or expert in the PhD scientific area(s), following the prescriptions of each annex; additional qualifications, certifications, publications (up to 5) and work experiences, detailed in English or in Italian; two-sided coloured scanned copy of a valid ID, with a clear photo*), within the deadline (file name: research project_surname_name).<br>The project (min. 8,000, max. 16,000 characters, title and references excluded), evaluated exclusively during the interview, should specify:<br>1. the object of the research and the related curriculum - among Mathematics, Computer Science and Big Data – as well as its disciplinary sector;<br>2. the phases of the project;<br>3. the *status quaestionis*;<br>4. the expected results;<br>5. a declaration of intents (max 1,000 characters, including spaces) to highlight the reason of the candidate's application<br><br>More specifically, the candidate will focus on a topic he/she studied in depth, summarizing its fundamental concepts and results, but also explaining the most advanced and innovative aspects. The candidate will also have the opportunity of supposing the future perspectives of the project, considering its theorical and/or operational developments.<br>The interview will be in English and will:<br>- verify the candidate's capacity of orientating among the main study fields of the PhD programme;<br>- assess the candidate's methodological knowledge and his/her analytical, elaboration and communicative skills;<br>- discuss with the Selection Committee the content of the research project.<br>The reference letters must be written in English, following the form available at https://www.unica.it/unica/page/it/dottoratiricerca (How to apply for PhD selection: Guidelines and forms - Annex C), on letterhead of the University of the professor or expert in the scientific field(s) of the PhD programme, who signs and dates it. For foreign applicants, the dates of the video conference interviews will be communicated to the interested parties via email. |
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| SCHOLARSHIPS | 4 FUNDED BY THE UNIVERSITY OF CAGLIARI (FUNDS MUR PL), 1 OF WHICH RESERVED FOR FOREIGN CANDIDATES WITH A FOREIGN DEGREE;<br>2 FUNDED BY THE DEPT. OF MATHEMATICS AND COMPUTER SCIENCE<br>- RESEARCH TOPIC: 'ABATA - Blockchain applications for food provenance and traceability', CONTACT PERSON: Prof. Roberto Tonelli;<br>- RESEARCH TOPIC: 'Analysis and development of artificial intelligence methodologies for recommender systems', CONTACT PERSON: Prof. Gianni Fenu.<br>1 FUNDED BY CRS4, named after Gianluigi Zanetti:<br>RESEARCH TOPIC: 'Data intensive methods and techniques for scientific |

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| | and industrial problems'.<br>The recipients for those scholarships which are related to a specific topic will be selected among the candidates who will gain a suitable position in the ranking lists for the admission to the PhD programme, as well as a positive assessment as regards the adequacy of his/her CV to develop the specific topic.<br>An additional scholarship funded by INPS with a specific research topic - '*Studio delle applicazioni delle nuove tecnologie informatiche*' - reserved for the children and orphans of individuals registered for the Unified Management of Credit and Social Benefits, and of retired users of the Management for public employees, is also available. Scholarship recipients will be selected among the candidates who will gain a suitable position in the ranking lists for the admission to PhD programme for the academic year 2020/2021, upon INPS verification of the right to benefit. |
| POSITIONS WITHOUT SCHOLARSHIP | 2 |
| REFERENCE PERSON | PROF. MICHELE MARCHESI - EMAIL: marchesi@unica.it - TEL. +390706758722 |
| WEBSITE | http://dottorati.unica.it/matematicaeinformatica/ |