DOCTORAL PROGRAMME
IN
MATHEMATICS, COMPUTER SCIENCE, STATISTICS

Director prof. Alessandra Sestini

XLII cycle – academic year 2026/2027

SCIENTIFIC AREA	
ADMINISTRATIVE OFFICE	Department of Mathematics and Computer Science "U. Dini" (DiMaI)
PARTNERS INSTITUTIONS	University of Perugia
WEB	www.phdmatinfstat.unifi.it
CURRICULA	**1.** Mathematics **2.** Computer Science **3.** Statistics
	POSITIONS AVAILABLE: 14 Positions with Scholarship: 12 Positions without Scholarship: 2* ** standard ranking only*
RANKING LIST FOR STANDARD POSITIONS SCHOLARSHIPS AVAILABLE: 9	**6** - University of Florence **3** - University of Perugia
RANKING LIST FOR SPECIFIC RESEARCH TOPICS SCHOLARSHIPS POSITION AVAILABLE: 2	**2** - Department of Mathematics and Computer Science "U. Dini" **Thematic 1**: "Computer science scholarship "Self-Aware, Explainable and Trustworthy Decision-Making Systems" Decision-making systems should build on the following pillars: i) self-awareness and confidence in their decisions, ii) collaboration between multiple independent decisors, potentially based on Artificial Intelligence (AI) or Machine Learning (ML) strategies, iii) reliable system design, activating recovery strategies in case the decision could not be trusted, and iv) transparency and traceability of the full decision-making process from the input to the output, enabling verification and validation processes to safely deploy self-aware and trustworthy decision-making systems in the wild. The PhD student will first investigate on the main topics above and will then develop techniques to ensure decision-makers are correct or, when not possible, aware of their uncertainty, potentially activating alternative strategies and enabling a trustworthy inference process. Previous knowledge on reliable software/systems engineering, explainability and trustworthy AI/ML will constitute additional merit during the selection process. **Thematic 2**: "Computer science scholarship "Methodologies for Critical AI-Enabled Systems Design, Verification, Validation and Certification" This research focuses on selected aspects of the design and especially the evaluation of safe, resilient and secure systems, especially those whose functionalities are AI/ML based. The PhD student shall investigate current qualitative and/or quantitative

	methods for the identification, analysis, classification, and mitigation of threats and hazards, and applicable domain standards for certification. Then, they will have to explore and compare newer standards that focus on AI-based systems (e.g., ISO/PAS 8800, ISO/IEC 22440) against traditional safety standards, understanding new implications and deriving methodologies, processes and mechanisms to ensure that autonomous AI-based systems could comply with guidelines dictated by those standards, and being safely deployed in their intended operational scenarios. Research experience and knowledge on the topics will constitute additional merit during the selection process.
RANKING LIST FOR SPECIFIC RESEARCH TOPICS SCHOLARSHIPS POSITION AVAILABLE: 1 *(subject to the grant of funding)*	Agenzia per la Cybersicurezza Nazionale – ACN **Call for funding of 30 scholarships in cybersecurity** **Thematic**: "Computer science scholarship "Runtime Detection and Post-Detection Reconstruction of Advanced Persistent Threat (APT) Scenarios" The increasing complexity and interconnection of digital systems expose infrastructures to advanced threats, including Advanced Persistent Threats (APTs), which are characterized by multi-step attacks, long duration, and the ability to evade traditional defense systems. In this context, it is essential to develop innovative solutions for continuous monitoring, timely detection, and comprehensive understanding of cyber-attacks. This PhD scholarship focuses on the development of data-driven systems for the runtime detection of advanced intrusions and for the subsequent reconstruction of attack scenarios. In particular, the project aims to design intrusion detection systems (IDS) capable of identifying complex patterns through temporal and semantic correlation of events, leveraging Machine Learning (ML) and Artificial Intelligence (AI) techniques. In parallel, post-detection analysis mechanisms will be developed to reconstruct the attacker's path, even in the presence of incomplete information, using causal analysis techniques and graph-based representations. The PhD student will initially investigate the state of the art in intrusion detection, anomaly detection, and cyber threat intelligence, and will then define innovative methodologies and tools for data collection, analysis, and correlation. The activity will include the development of prototypes and their validation in realistic scenarios, also through collaborations with public institutions and industry partners. **Please note: scholarship will be awarded ONLY if the respective funding will be granted**
Further information on Cybersicurezza Call	The procedures for the management, implementation, reporting, and funding of the scholarship are governed by the "Disciplinare", with particular reference to the following articles: Article 4 (Obligations of the PhD student recipient) 1. The PhD student recipient of the scholarship funded by the Agency must carry out the research project in line with what is indicated in the Research Project Fact Sheet approved for the funding. 2. The PhD student recipient of the scholarship funded by the Agency must comply with the obligations related to intellectual property aspects as outlined in the following Article 5. Article 5 (Intellectual property and research results) 1. Universities may not use, for advertising purposes or any other promotional activity, the name, trademark, or other distinctive sign of the Agency except to disclose the funding of the PhD scholarships.

	2. Without prejudice to the moral right of authorship of the PhD students, the ownership of the research results of the projects funded by the Agency will be shared equally (50%) between the Agency and the University. Consequently, the University will promptly inform the Agency – via Certified Electronic Mail (PEC) to the address acn@pec.acn.gov.it – of the existence of research results so that the Agency, within the following sixty days, may express its possible intention to waive its right via Certified Electronic Mail (PEC) to the address acn@pec.acn.gov.it. In such a case, the University will acquire full ownership of the research results. Article 9 (Revocations, non-allocation of scholarships, withdrawals, terminations, and cessations) 1. The Agency will proceed with the total revocation of the funding, with the consequent obligation for the University to return any amounts already disbursed, in the following cases: a) failure to start the doctoral program in the XLI doctoral cycle within the established deadlines; b) interruption of the courses due to reasons attributable to the University itself; c) failure to comply with the obligations incumbent on the University as outlined in the Call and the Implementation Regulations; d) implementation of the research project in a manner different from that approved for funding. 2. In the case of the PhD student recipient failing to obtain the doctoral degree, or if the PhD student recipient is not positively evaluated for the renewal of the scholarship, or if they renounce it, partial revocation of the funding will occur, with the obligation to return the amounts disbursed following the last annual report submitted by the University to the Agency. Amounts not yet disbursed will be considered not due, and payments will be interrupted. 3. The University will notify the Agency of any withdrawals by the PhD student, whether regarding the position or the scholarship, even if related to a portion of the course.
STUDY/RESEARCH PERIODS ABROAD	3 months
DOCUMENTS REQUIRED FOR THE ADMISSION	● Copy of the Identification Document ● **Self-certification** for qualifications obtained in Italy (laurea triennale, specialistica o magistrale o ciclo unico) with list of exams taken, credits and related grade, title of the thesis and graduation mark (using this **template** or similar forms containing the required information) ● Qualifications obtained abroad (Bachelor's and Master's Degrees or combined cycle Degree) with a list of all exams taken, credits and related grade, rating scale, title of the thesis and graduation mark *The same documentation except for the final mark must be submitted by those who will graduate within the 31/10/2026*
DOCUMENTS REQUIRED FOR THE EVALUATION	**MANDATORY** ● Curriculum vitae et studiorum ● List of completed examinations with marks and with the Weighted average of the exams both for Bachelor's and Master's Degrees (or equivalent) ● Research Project **OPTIONAL** ● Publications

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<tr><td></td><td>

- Any other qualification document

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<tr><td>RESEARCH PROJECT</td><td>The research project, consisting of 5,000 characters including references and notes, excluding spaces, may be discussed during the interview, possibly contributing to the evaluation of the aptness of the applicant for research.
The candidate may present the same project for the standard scholarship and for any scholarship with specific research topic and separate ranking lists he/she intends to apply to, or alternatively may present different projects for each scholarship, indicating clearly to which scholarship each project refers.</td></tr>
<tr><td>INTERVIEW MODE</td><td>In person
In the application form candidates may ask to conduct the interview remotely</td></tr>
<tr><td>FURTHER INFORMATION</td><td>The interview can be conducted in English language.
The interview is aimed to evaluate the basic preparation and the research potential of the candidate and may include the discussion of the research project, Master’s thesis, curriculum and other possible qualifications.
For specific research topic scholarships part of the interview will be focused on the discussion of the topic.</td></tr>
<tr><td>EVALUATION MARKS</td><td>
<table>
<tr><th>parameter</th><th>minimum score</th><th>maximum score</th></tr>
<tr><td>Curriculum vitae, academic career, research project, publications and other scientific qualification documents.</td><td>40/120</td><td>60/120</td></tr>
<tr><td colspan="3">Applicants who obtain a mark of at least 40/120 in the evaluation of the above parameters will be admitted to the interview</td></tr>
<tr><td>Interview</td><td>40/120</td><td>60/120</td></tr>
<tr><td colspan="3">Eligibility is achieved with a minimum score of 80/120</td></tr>
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<tr><th colspan="4">EXAMINATION SCHEDULE</th></tr>
<tr><th></th><th>DATE</th><th>TIME</th><th>PLACE</th></tr>
<tr><td>INTERVIEW</td><td>13,14,15 July 2026</td><td>09:00 a.m.</td><td>Centro Didattico Morgagni
Viale Morgagni 40,44- Firenze</td></tr>
<tr><td colspan="4">The list of the candidates admitted to the interview and the final ranking will be published at the page PhD courses</td></tr>
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ENROLLMENT ROUNDS

Enrollment must be completed within the specified mandatory deadlines, under penalty of exclusion
(as per Art. 12 of the Call for Applications - Annex 1)

	Opening Date	**Deadline for Enrollment**
Enrollment (successful candidates)	Ranking's publication date (by July 31, 2026)	by **11.59 pm** (CEST) on **August 25th 2026***
1st round (eligible candidates)	from **31st August 2026**	by **11.59 pm** (CEST) on **September 7th 2026**
2nd round (eligible candidates)	from **10th September 2026**	by **11.59 pm** (CEST) on **September 17th 2026**

** Please note that the University will be closed from August 8th to August 23th, 2026.*

Subsequent reassignment of vacant positions:
The reassignment of any residual positions after the first two rounds will be activated on **every Tuesday until October 27th**, with a mandatory enrollment deadline set for the following Friday (11:59 PM CEST). It is the sole responsibility of the candidate to check their personal reserved area
No personal communications will be sent to candidates.
Technical instructions for enrollment can be found **here**