PhD Programme Table - 38th cycle
NRRP "National Recovery and Resilience Plan" Call for Applications

Section "Available Positions and Scholarships" integrated on 13/07/2022	
Section "Available Positions and Scholarships" integrated on 18/07/2022	
Section "Available Positions and Scholarships" integrated on 22/07/2022	
Section "Available Positions and Scholarships" modified on 27/07/2022	

PROGRAMME'S NAME	COMPUTER SCIENCE AND ENGINEERING
DURATION	3 years
PROGRAMME START DATE	01/11/2022 (DD/MM/YYYY)
LANGUAGES	English
COORDINATOR	Prof. Davide Sangiorgi (davide.sangiorgi@unibo.it)
RESEARCH TOPICS	Detailed list at the bottom of the present document
PhD POSITIONS	36
ADMISSION PROCEDURE	Qualifications and research proposal evaluation Oral examination

Available Positions and Scholarships

Pos. n.	Financial Support	Description	Positions linked to a specific research topic
1	PhD Scholarship Ex M.D. 351/2022 - PA	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 1, Investment 4.1 (MD 351/2022) – Public Administration	Models, Architectures and Technologies for Big Data-driven Digital Twin for Smart Cities
2	PhD Scholarship Ex M.D. 351/2022 - PA	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 1, Investment 4.1 (MD 351/2022) – Public Administration	Modeling, analysis and efficiency of administrative procedures in the PA
3	PhD Scholarship Ex M.D. 351/2022 - PA	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 1, Investment 4.1 (MD 351/2022) – Public Administration	Natural language processing tools to improve the effectiveness of communication
4	PhD Scholarship Ex M.D. 352/2022	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by Bonfiglioli Consulting	Data Science and Digital Twin for industrial processes
5	PhD Scholarship Ex M.D. 352/2022	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and	Research and develop the tools, both hardware and software and best pratices

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1

		Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by LHP Europe	according to SDG standard to assist SMEs in a more sustainable, efficient future
6	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by Maggioli Spa	Relational Deep Language Models for Text and Data Mining Solutions
7	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by Onit Group srl	Edge-AL data-drive digital twins methodologies and tools integrated with Internet of Things (iot) platforms for predictive analysis of production contexts, samrt building and smart city
8	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by Cineca Consorzio Interuniversitario	Artificial Intelligence and innovation manager
9	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by Eyecan.ai Srl	Computer vision: Advanced neural rendering techniques for the generation of digital twins of objects and scenes
10	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by THE EDGE COMPANY S.r.l.	Neural Network Design through Neural Architecture Search
11	*Executive PhD*	Position reserved for employees of AFEA Srl	Study and design of middleware for distributed architectures in the healthcare sector: FHIR-compliant big data analytic and interoperability standards between federated e-health platforms
12	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by SACMI IMOLA	People Analytics and Digital Transformation
13	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by IMOLA INFORMATICA SPA	Serverless models and technologies to enable new sustainable Cloud Continuum environments for QoS application
14	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by Arca Tecnologie	Quality-constrained Networking for Industry 5.0 Scenarios
15	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by Rekeep Spa	Edge-enabled Digital Twin for smart mobility and facility management
16	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by Rekeep Spa	Edge-enabled Digital Twin for Energy Management

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2

17	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by HPE	Artificial Intelligence and innovation management
18	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by Marposs Spa	Use af autoenconding tecnique for anomaly detection in a scalable, multivariate, soft real time industrial environment applied to IoT, edge and cloud system
19	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by MER MEC S.p.A.	Artificial Intelligence and innovation management
~~20~~	~~*PhD Scholarship Ex M.D. 352/2022*~~	~~Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by THE EDGE COMPANY S.r.l.~~	~~Neural Network Design through Neural Architecture Search~~
21	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by FAAC SPA	Application of AI techniques to the smart mobility and parking systems industry: vehicle identification, improvement of the input / output flow, occupancy optimization (site saturation coefficient)
22	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by SACMI IMOLA	Domain Knowledge Integration in Machine Learning systems applied to the design of automatic machines
23	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by MARK ONE	Search for Industry 4.0 solutions for the interconnection of additive manufacturing systems and the development of AI systems for data collection and analysis
24	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by SACMI IMOLA	Machine vision: Research in the field of vision systems for the identification and measurement of three-dimensional pieces, with integrated quality control
25	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by AUSL della Romagna	Introduction of a Digital Twin ecosystem in the healthcare sector to support strategic, clinical and process governance
26	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by G.D. Spa	Machine learning tools for multimodal analysis and assistance in the development of controllers in the context of automatic packaging machines
27	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by G.D. Spa	Machine learning tools for multimodal analysis and assistance in the development

			of controllers in the context of automatic packaging machines
28	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by Lamborghini Automobili	Application of artificial intelligence algorithms for a super sports car manufacturer
29	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by Pollution	Informed Machine Learning for Odors-Perception-Oriented Analysis of Gas-Chromatographic Data
30	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by Dallara Automobili Spa	Computing optimization of a vehicle dynamic simulation model
31	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by Dallara Automobili Spa	Study of a predictive algorithm for generating a digital twin of the processing flow of composite materials
32	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by SCM GROUP	AI data control room
33	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by Marchesini Group	Artificial intelligence and innovation manager
34	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by Ducati Motor	Development and application of innovative methodologies of data analysis and machine learning for the monitoring of production vehicles and the definition of the related mission profiles
35	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by Ferrari	artificial intelligence and innovation management
36	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by Ferrari	artificial intelligence and innovation management
37	*PhD Scholarship Ex M.D. 352/2022*	Funded by the EU - NextGenerationEU with funds made available by the National Recovery and Resilience Plan (NRRP) Mission 4, Component 2, Investment 3.3 (MD 352/2022) and by Ferrari	artificial intelligence and innovation management

Applicants awarded with Ex M.D. 351/2022 or Ex M.D. 352/2022 PhD scholarships shall have specific obligations (i.e. mandatory research periods abroad and/or in a firm) during their PhD programme. For detailed information, refer to the Call for Applications, articles 1.2 and 1.3, and to the text of the law.
For any other eventual PhD positions, a 3-month research period abroad is mandatory.

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4

Admission Exams

The admission exams detailed schedule shall be published **starting from July 12th, 2022:**
- on the University website, selecting the relevant PhD Programme > "More information", at the bottom of the page in the section "Notices";
- on Studenti Online (select "summary of the requests in progress" > "see detail" and open the .pdf file at the bottom of the page). **No personal written communication will be sent to applicants**.

Required and Supporting Documents to be attached to the application

All the documents listed below **shall be drawn up in English or in Italian**. In case of documents originally issued in any other language (e.g. identity document, qualifications), an official translation is required.

Only qualifications obtained **during the last 5 calendar years** shall be taken into consideration, except for the University Degree. The Admission Board will assess the relevance of the supporting documents to the PhD Programme.

REQUIRED DOCUMENTS	
Identity document	Valid identity document with photo (i.e. identity card, passport)
Curriculum Vitae	No specific CV format is required
Degrees	Documents attesting the awarding of the first and second cycle degrees, the exams taken and the marks obtained (see Art. 3 of the Call for Applications)
SUPPORTING DOCUMENTS	
Research proposal	Multi-annual research proposal (**drawn up in Italian or in English**), with special emphasis on the activities to be completed during the first-year course. The proposal must meet the following requirements: - **it cannot exceed 20,000 characters**, including spaces and formula possibly used. This figure does not include: the title of proposal, the outline, references and images (such as graphs, diagrams, tables, etc. - if present); - **it must include**: the state of the art; description of the proposal; expected results; articulation of the proposal and implementation times; references. The research proposals that successful applicants shall carry out during their PhD career may possibly differ from the one proposed at the application stage. This shall be defined together with the supervisor and approved by the Academic Board.
Thesis abstract	Abstract of the **second cycle degree thesis (drawn up in Italian or in English)**. Graduands applicants may submit the draft of the thesis. Abstracts cannot exceed 5,000 characters, including spaces and formula possibly used. The above figure does not include: the title of the thesis, the outline, references, and images such as graphs, diagrams, tables etc.
Reference letter/s	**No more than 3 reference letters** signed by Italian and international academics and professionals in the research field, which do not form part of the Admission Board, attesting the suitability of the applicant and his/her interest in the scientific research. Letters shall be uploaded following the procedure on Studenti Online, detailed in the Call for Applications (Art. 3.2).
Publications	Lists of publications (i.e. monographs, articles on scientific journals) and minor publications (conference papers, etc.), in Italian or in English
Other documents	- Postgraduate vocational programmes and/or specialisation programmes relevant to the PhD Programme - Teaching activity carried out at university level - Research activity of any kind - whether basic, applied, translational, etc. - carried out in any capacity, including when covered by research grants, and as a staff member of research projects - Documents attesting the knowledge of foreign languages - Study periods completed by applicants outside their countries of origin (e.g. Erasmus programme or other similar mobility programmes) - Other qualifications attesting the suitability of the applicants (scholarships, prizes, etc.)

Evaluation criteria*

Scores will be expressed in points out of 100, as follows.

1. Qualifications and research proposal evaluation

Minimum score for admission to the oral examination: 30 points, Maximum score: 50 points

Second cycle degree (Master's) final mark. Graduands shall be evaluated according to the Weighted Average Mark (WAM)	10 points max
Consistency of the Second cycle degree final thesis with the main topics of the PhD programme	10 points max
Publications	5 points max
Curriculum Vitae evaluation (e.g. reference letters, other qualifications)	10 points max
Research proposal (scientific value, structure and feasibility of the proposal)	15 points max

2. Oral examination

Minimum score for eligibility: 30 points, Maximum score 50 points

English language proficiency	10 points max
Research proposal presentation and general knowledge of issues encompassed by the PhD Programme	40 points max

Oral examination aims to assess the suitability of the applicant for scientific research as well as the general knowledge of issues encompassed by the PhD Programme (see the list of research topics at the bottom of the present document).
During the oral examination, the applicant's English proficiency shall be assessed.
The oral examination is carried out in Italian or English.
* Possible further evaluation criteria will be available on the University website, selecting the relevant PhD Programme > "More information"

Research Topics

- Distributed systems and algorithms
- Programming languages and systems
- Computer networks and applications
- Software engineering
- Formal methods and semantics of programming languages
- Artificial intelligence
- Real-time and fault-tolerant systems
- Parallel algorithms and probabilistic algorithms
- Image Processing
- Bioinformatics and biometric systems
- Information systems and databases
- Concurrency theory
- Security
- Logical foundations of computer science
- Multimedia systems