

## **Faculty of Engineering**

### **PhD programme in COMPUTER SCIENCE**

**Duration:** 3 years

**Academic year:** 2023/2024

**Start date:** 1<sup>st</sup> November 2023

**Official programme language:** English

**Website:** <https://www.unibz.it/en/faculties/computer-science/phd-computer-science/>

### **PROGRAMME CONTENTS**

The aim of the PhD programme is to allow students to acquire the abilities and skills to carry out independent research in the area of computer science. This also involves the ability to communicate ideas clearly and efficiently orally and in writing and the ability to work in groups.

In order to conclude the programme successfully, the PhD student has to elaborate a research topic independently and this research must contribute significantly to current knowledge in the area of computer science. Due to the time limits of the programme, PhD students will focus on their research work. To achieve this, they are supported by a structured PhD programme.

In the following, this structure is described in detail together with the procedures for the nomination of the supervisor, the definition of the research and study plan, and the examinations:

- The programme is divided into four phases, which end at months 6, 12, 24 and 36 respectively.
- For each PhD student, the PhD Course Committee nominates a supervisor, who is preferably chosen among its members. It can also nominate a co-supervisor who can provide additional support.
- Together with their supervisor, each student sets up a Research and Study Plan, which defines the research goal and the steps to achieve it. The latter include subjects where the student needs to deepen their expertise. The Research and Study Plan is updated continuously, taking into account both the progress that has been made and new developments that arise in the area of research during the course of the PhD work.
- There are four milestones at the end of the four phases at which students report on their work and at which the PhD Committee assesses their progress. The updated Research and Study Plan is one of the deliverables for each milestone.

### **AVAILABLE PLACES**

Total positions:	<b>12</b>
Positions with university grants:	<b>4</b>
Positions with other types of grants:	<b>2</b>
Positions without grant:	<b>3</b>
Positions MD 118/2023 under PNRR:	<b>3</b>

**Positions are divided as follows:**

<b>Financed by</b>	<b>No.</b>	<b>Research projects</b>
Free University Bolzano-Bozen (university)	4	<p>A1-Visual Anomaly Classification and Segmentation in Volumetric Data (Lanz)</p> <p>A2-Neural Radiance Fields for Novel-Scene Synthesis (Lanz)</p> <p>A3 -Video Search and Retrieval with Text Prompts (Lanz)</p> <p>A4-Explanations for a Human-centric AI (Zanker)</p> <p>A5-Building AI Assistants for Startups Using Large Language Models and Prompt Engineering (Wang)</p> <p>A6-Graph Data Management with Linear Algebra (Nutt)</p> <p>A7-Process Mining on Object Networks (Montali)</p> <p>A8-Ontology-driven Belief Propagation for Cybersecurity (Calvanese)</p> <p>A9-Learning Mappings in Virtual Knowledge Graphs (Calvanese)</p> <p>A10-Deep Learning for the Analysis of 3D Medical Images (Di Fatta)</p> <p>A11-Multi-task Learning in Deep Neural Networks (Di Fatta)</p> <p>A12-Analyzing time series with contextual data (Dignös)</p> <p>A13-Transforming and explaining data and knowledge, via ontological unpacking and data science methods for data preparation and reverse engineering (Franconi)</p> <p>A14-Strategy and Explainability for Knowledge Bases (Kutz)</p> <p>A15-Innovative Algorithms for Large Scale Scientific Computation (Carpentieri)</p> <p>A16-Neuro-Symbolic Artificial Intelligence for Business Process Analysis (Maggi)</p> <p>A17-Sparse Artificial Neural Networks for Intelligent Internet of Things (Liotta)</p> <p>A18-Smart wearable computing for cooperative e-health applications (Liotta)</p>
FBK Fondazione Bruno Kessler- TN <i>(bound research topic, to be chosen from among these three)</i>	2	<p>B1-Process mining: representation, prediction and explanation of temporal data (Dr. Ghidini)</p> <p>B2-Ethical and Sustainable Dialogue Management Systems (Dragoni)</p>
MD 118/2023 under PNRR: <i>(minimum 6 months abroad mandatory and 6 months of a</i>	3	<p>C1-Developing future digital workspaces to support sustainable remote work (Wang)</p>

<i>research or study stay in a public administration, company or research centre)</i>		C2- Art with and for AI: Towards Increased Trust (De Angeli) C3- Human Computer Interaction & Education (Gennari)
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For positions with and without a scholarship, you are asked to choose from the project proposals listed above.

## ENTRY REQUIREMENTS

The selection is open to applicants who possess the academic qualifications set out in art. 2, of this call, general part.

### Other requirements:

In order to apply for the PhD program in **COMPUTER SCIENCE** applicants must have sufficient knowledge of English.

The prerequisites for admission to this doctoral programme include having acquired an appropriate educational degree, and/or have worked in the PhD course fields, in particular being able to demonstrate a deep knowledge of the fundamental techniques and methods used in computer science.

## LANGUAGE REQUIREMENTS

The official language of the PhD programme is English. Therefore, applicants must have very good knowledge of English.

The proficiency in English will also be assessed during the interviews.

## ONLINE APPLICATION AND DOCUMENTS REQUIRED

The application must be submitted online as per art. 3 of this call, general part. In addition to the documentation acquired by art. 3 for this PhD programme in Computer Science you must also upload:

- **Curriculum vitae (CV)** in English (possibly following the EU format that can be downloaded here <https://europass.cedefop.europa.eu/en/documents/curriculum-vitae>). The CV must be updated with all data and information of the current year 2022.
- **Presentation letter -Attachment A** (In English, PDF format: it is mandatory to use the relative template in section "Attachments"): Highlight your reasons for applying to the doctoral programme in Computer Science, your motivations for choosing **unibz** (in particular the Faculty of Computer Science) and your career perspective after completing your PhD. Include a brief discussion of your general research interests, of questions and objectives you are interested in, and add a summary of the skill set you already acquired (for instance in your master level research) as well as techniques and methodologies you are interested in to learn and apply in your PhD research;
- **Research proposal – Attachment B** (In English, PDF format: it is mandatory to use the relative template in section "Attachments"). In this document, the applicant should indicate up to THREE preferences selected from the list of Research Projects presented in the call (see section "*Research projects- details*"). Briefly motivate your choices, and develop **ONLY the first choice** into a more detailed proposal. Your proposal should therefore include:
  - the titles of your selected top choices for a PhD research project, together with an outline of a research project based **on Topic 1**, i.e. your first choice. In the sketched research project, include a) a discussion of the state of the art of your chosen Topic 1; b) Aims and Objectives of your envisaged research; c) a discussion of research methodology.

**Other documents (facultative) to be included in the application if available:**

- The PDF of up to three of your best publications (excluding theses);
- up to a maximum of 2 academic reference letters written in English provided by an university professor or by a researcher of research institutions, describing the work carried out and the quality of the same (*the letters MUST be signed*). The letters can be sent per email directly by the referees to the email address [phd.engineering@unibz.it](mailto:phd.engineering@unibz.it) (please indicate in the subject of the email: "Reference for "NAME and SURNAME" of the candidate)

**ADMISSION PROCEDURE**

The selection is based on:

- the evaluation of each applicant's profile based on their curriculum vitae, qualifications, presentation letter and research proposal;
- the coherence with the research themes identified in the faculty's specific part of the call;
- the evaluation of the reference letters and the publications, and
- an interview.

The following points will be awarded:

- up to a maximum of 50 points for the curriculum, qualifications and publications:
  - Educational and working curriculum (up to 35 points)
  - Experience abroad, participation at summer schools and conferences, contribution to research projects, scholarships (up to 10 points)
  - Publications (up to 5 points)
- up to a maximum of 5 points for the reference letters;
- up to a maximum of 10 points for the presentation letter and the research proposal on the basis of congruence with the research topics proposed in the call.

The Evaluation Committee will select the best applicants on the basis of a comparative assessment. Candidates that have obtained at least **45 points** in the evaluation of their application documents will be admitted to the next stage of the selection process. This will consist of an interview in which also the knowledge of English of the applicant will be assessed. The interviews will take place in video-call (Skype, MS Teams, etc.). Up to a maximum of **35 points** will be awarded for the interview. The final score is the sum of the score for the evaluation of the application documents, and of the score for the interview. The maximum score obtainable is 100.

Applicants that have obtained a final score of at least **70/100** are considered eligible. Eligible applicants will be ranked according to their final score. The top eligible applicants will be admitted according to the number of available places with and without grant, according to their order in the ranking list. The remaining eligible applicants will be put on a waiting list. Applicants in the waiting list will be admitted to the program in case an already admitted applicant is not available or withdraws their application.