

## PhD programme in Computer Science

**Duration:** 3 years

**Academic year:** 2024/2025

**Course start date:** 01/11/2024

**Course language:** English

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

### COURSE PROGRAMME

The aim of the programme is for doctoral students to acquire the ability to carry out independent research in the field of computer science. This includes the ability to communicate ideas effectively both orally and in writing, and the ability to work in a team.

To successfully complete the study programme, the doctoral student must independently develop a research topic in such a way as to significantly expand the state of knowledge in the field of computer science. In view of the time limitation of the programme, it is necessary for the doctoral students to concentrate their efforts on research work. In view of this, doctoral students are supported by the structure of the research programme.

This structure is explained in more detail below, together with the measures relating to the appointment of the supervisor, the formulation of the research and study plan and the moments for verification:

- The programme is divided into four phases, ending in months 6, 12, 24 and 36 respectively.
- For each doctoral student, the Board of Lecturers appoints a supervisor and at least one co-supervisor. At least one of the supervisors must be a member of the Scientific committee.
- Together with the team of supervisors, the doctoral student draws up a research and study plan, which defines the research objectives and the steps necessary to achieve them. These include the study of topics whose knowledge is necessary for the doctoral candidate's research work. The doctoral student periodically updates his/her research and study plan, considering the progress made and new developments that emerge in the field of research.

Each of the phases ends with a review stage during which the doctoral student presents his/her work, and the Scientific Board assesses the progress made. The updated research and study plan is one of the fundamental results of each follow-up moment.

### STUDY PLACES

Total places:	<b>11</b>
Places with a university scholarship:	4
Places with other types of scholarships:	2
DM 630/2024 places from PNRR:	2
Posts without scholarship:	3

#### The posts are divided as follows:

Financed by	No.	Research Projects
Free University of Bozen/Bolzano (athenaeum)	4	<b>A1:</b> Scientific Machine Learning Using Physics-Informed Neural Networks: Algorithms and Applications <b>A2:</b> Characterization and Optimization of Structural Properties in Multi-task Deep Learning <b>A3:</b> Computational solutions for association graphs on large scale genetic data

		<p><b>A4:</b> Computer Vision and Multimodal Learning</p> <p><b>A5:</b> Artificial Intelligence methods for edge computing and smart sensing</p> <p><b>A6:</b> Automated Decision Making, Recommendation Systems and Decision Support</p> <p><b>A7:</b> Knowledge in Time</p> <p><b>A8:</b> Knowledge and Data</p> <p><b>A9:</b> Knowledge Representation</p> <p><b>A10:</b> Knowledge and Cognition</p> <p><b>A11:</b> Knowledge and Processes</p> <p><b>A12:</b> Dynamical Systems on Complex Networks (MOON)</p> <p><b>A-13:</b> Innovative Solutions for Computing Education</p> <p><b>A14:</b> ECHO: Creating feedback loops and facilitating team learning based on the metrics-based analysis of microservice-based software architectures.</p> <p><b>A15:</b> Digital Persona for Startup Development</p>
FBK Fondazione Bruno Kessler (TN) <i>(restricted research topic to be chosen among these two)</i>	2	<p><b>B1:</b> Evolving Fuzzy Systems with Interpretability and Trustworthiness for Regression Problems</p> <p><b>B2:</b> Causality in AI &amp; Deep Learning</p>
DM 630/2024 from PNRR:	2	<p><b>C1:</b> Anomaly Detection and Segmentation in X-ray CT scans (in collaboration with MICROTEC SRL, supervisor prof. Oswald Lanz)</p> <p><b>C2:</b> Data Based Actions: A Recommender System for Sustainable Sinter Component Production (in collaboration with GKN Sinter Materials SPA, supervisor prof. Markus Zanker, co-supervisor prof. Angelika Peer)</p>

\*This is only a partial list of available projects. Other topics that relate to the research activities of the members of the PhD teaching board may also be proposed by applicants. (N.B.: *the list of board members can be found at the link:*

<https://www.unibz.it/en/faculties/engineering/phd-computer-science/members-of-the-scientific-committee-phd-in-computer-science/>

## ADMISSION REQUIREMENTS

The selection is open to candidates who possess the qualifications set out in Article 2 of this call, general section.

### Other requirements:

Knowledge of the English language is required for admission to the PhD programme in Computer Science.

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

## LANGUAGE SKILLS REQUIRED

The official language of instruction is English. Therefore, applicants are required to have an excellent knowledge of English.

Proficiency in English will also be assessed during the interviews.

## ONLINE APPLICATION AND REQUIRED DOCUMENTS

The application must be submitted exclusively online as per art. 3 of this call for applications, general part.

In addition to the documentation required by art. 3, for the PhD in Computer Science you must upload:

- **Curriculum Vitae (CV)** in English (possibly according to the European format downloadable here: <https://europass.cedefop.europa.eu/it/documents/curriculum-vitae>). The CV must be updated with data and information for the current year.
- **Cover letter - Attachment A** (in English in PDF format: you must use the relevant template in the "Attachment" section). Highlight your reasons for applying to the PhD programme in Computer Science, your reasons for choosing unibz (in particular the Faculty of Engineering) and your career prospects after completing your PhD. Include a brief discussion of your general research interests, the questions and objectives you are interested in, and add a summary of the skills you have already acquired (e.g. in master's level research), as well as the techniques and methodologies you are interested in learning and applying in your PhD research.
- **Research proposal - Attachment B** (in English in PDF format: you must use the relevant template in the "Attachments" section). In this document, you must indicate up to a maximum of THREE preferences among the research projects selectable from the list published in the call (see section "Research projects – details"). You may optionally also indicate another research topic that particularly interests you, considering the research topics addressed by the current members of the Doctoral College. You will in any case have to develop a single project proposal. The proposal should therefore include:
  - the title of the research project you intend to carry out, together with an outline of the project, including:
    - a) a discussion of the state of the art;
    - b) aims and objectives of the planned research;
    - c) a discussion of the research methodology.

### Additional documents to be attached to the application if available:

- A PDF file of up to THREE of your best publications (excluding theses);
- up to a maximum of TWO reference letters written in English by supervising university professors or researchers from research institutes, describing the type and quality of the work carried out (*letters MUST be signed*). Alternatively, reference letters can be sent by e-mail directly from the referees to [phd.engineering@unibz.it](mailto:phd.engineering@unibz.it) (please indicate in the subject line of the e-mail: "Reference for "NAME and SURNAME" of candidate").

## SELECTION PROCEDURES

Selection is based on:

- the assessment of each candidate's profile based on the curriculum vitae, academic qualifications, cover letter and research project proposal.
- the congruence with the research themes defined by the faculty for the present call;
- an evaluation of the letters of reference and publications; and
- an interview.

The following points are awarded:



Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



Freie Universität Bozen  
Libera Università di Bolzano  
Università Ljedia de Butsan

- Up to a maximum of 45 points for the CV, qualifications and publications, distributed as follows:
  - Qualifications, other qualifications, and work experience (up to 30 points);
  - Experience abroad, participation in summer schools and conferences, contributions to research projects, scholarships (up to 9 points);
  - Publications (up to 6 points)
- Up to a maximum of 6 points for reference letters;
- Up to a maximum of 14 points for the cover letter and research proposal on the basis of congruence with the research topics proposed in the call.

The Selection Board will select the best candidates based on a comparative evaluation. Candidates who obtain a score of at **least 45 points** in the evaluation of the admission documentation will be admitted to the next stage of the selection, which will consist of an oral interview in which knowledge of the English language will also be assessed. Remote interviews must take place via video call (MS Teams). A maximum of **35 points** can be obtained for the oral interview.

The *final score* is the sum of the score obtained in the evaluation of the documentation and the score obtained in the oral interview. The maximum score obtainable is 100.

Candidates who obtain a **minimum score of 70/100** in the assessment will be considered eligible. The ranking of successful candidates for admission to the PhD programme is defined by the final score calculated as above. The best eligible candidates are admitted to the course according to the number of places available with and without a scholarship, in the order of their ranking. The remaining eligible candidates will be placed on a waiting list. Candidates on the waiting list will only be admitted to the course if an already admitted candidate withdraws from the course.