Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

Public Competition
for the admission to the PhD programmes

42nd cycle

Academic year 2026/27
Faculty of ENGINEERING
PhD Programme in
ADVANCED-SYSTEMS ENGINEERING

Website: PhD in Advanced-Systems Engineering / Free University of Bozen-Bolzano

Duration: 3 years

Academic year: 2026/27

Start date: November 1st, 2026

Official language: English

Art. 1 - POSITIONS

1. A total of 8 positions are available for the PhD programme in Advanced-Systems Engineering.

2. All information about the PhD programme in general, the schedule and its structure as well as the possible research projects listed below can be found at the following link: PhD in Advanced-Systems Engineering / Free University of Bozen-Bolzano/

3. **Positions with unibz scholarship: 2**

Positions without scholarship: 2

Positions tied to subject-related scholarship: 2

COVISION LAB SCARL/KgmbH: 1

Research Topic: Context-Aware Augmented Reality Systems for Human-Centered Guidance in Complex Environments

Fondazione Bruno Kessler: 1

Research Topic: Design and development of innovative sustainable, biodegradable membranes for flexible electronics and environmental sensing applications

4. By way of example, four research projects available for this call are listed below.

Project Title	**Supervisor**
End-to-End Vulnerability framework for Secure Software Systems	**Prof. Barbara Russo**
This research project in cybersecurity aims to develop an end-to-end framework for the identification, validation, and mitigation of software vulnerabilities. The work will integrate advanced static and dynamic code analysis techniques to systematically detect insecure coding patterns, memory safety violations, and injection flaws in complex software systems. Detected vulnerabilities will be experimentally validated within a controlled cyber range environment, where their real-world exploitability and impact on confidentiality, integrity, and availability will be rigorously assessed. By bridging automated vulnerability detection with practical exploitation and impact evaluation, the project seeks to advance methodological rigor in application security research. The ultimate goal is to contribute novel techniques and tools that enhance secure software engineering and vulnerability assessment practices.	
3D Curve Geometry and Minimum-Jerk Timing for Human-Like Motor Control and Planning in Biomechanical Systems	**Prof. Marco Frego**
Human arm and hand movements are remarkably smooth, a property often modelled using minimum-jerk principles, whereas engineered motion planners frequently rely on geometric path primitives that guarantee curvature continuity and feasibility. This PhD project aims to unify these perspectives by coupling 3D curves, defined by curvature and torsion, with optimal timing laws obtained by minimizing jerk under biomechanically meaningful boundary conditions. Methodologically, the work will derive and solve boundary-value and optimal-control formulations for time-parameterizing trajectories with prescribed endpoint speed and acceleration (including rest-to-rest reaches) and fixed movement duration. It will also address submovement segmentation and relate the resulting solutions to kinematics measured via motion capture. Prof. A. Peer's Human-Centered Technologies and Machine Intelligence Lab (HCT Lab) provide cutting-edge technologies for motion capture and the acquisition of physiological and muscular signals, as well as robotic arm manipulators. These resources enable the project to extend beyond purely kinematic modeling toward dynamics-informed analysis and validation. Expected outcomes include new curve-based motion primitives for human–robot interaction, quantitative links between curvature/torsion profiles and movement smoothness, and planning algorithms that improve safety, comfort, and energy efficiency in human-centered cyber-physical systems.	
Dynamics, optimization and control of robots with flexible modules	**Prof. Andrea Giusti**
The classical assumption of rigid bodies, ideal transmissions, and fixed kinematic structures in robotics forms the basis of most fundamental results in robot kinematics, dynamics, and control. However, modern robot design increasingly adopts lightweight structures, transmission elements with inherent flexibility, modular architectures, and soft components to improve adaptability, efficiency, and compliance. Novel modelling, optimization, and control methods for robots with flexible modules are becoming crucial to enable modern robotic systems to reach performance levels beyond those achievable with classical approaches.	
Human-Centric Adaptive Manufacturing Systems for the Inclusion of Vulnerable Workers	**Dr. Luca Gualtieri**
Despite strong societal efforts aimed at reducing physical, mental, intellectual, and sensory impairments, people with disabilities continue to experience daily discrimination and limited accessibility in both physical and digital environments. These barriers hinder their full participation in society. Within the Industry 5.0 context, this PhD project proposes the development of human-centric methodologies to enhance the inclusion of disabled and/or neurodivergent workers in industrial processes. The research includes the study of solutions based on lean, flexible, and reconfigurable production systems to support their effective integration and application in high-	

potential contexts where such systems remain underutilized, such as social cooperatives and Work Integration Social Enterprises (WISEs). Furthermore, the integration and further development of adaptive cognitive and/or physical assistance systems will be investigated to improve inclusion, autonomy, satisfaction, and well-being among disabled and/or neurodivergent workers. The project aims to explore how manufacturing systems can be redesigned, implemented, and adapted to reduce performance gaps between workers with and without disabilities, thereby enhancing well-being, autonomy, and job satisfaction while simultaneously improving business performance, including the ability to manage complex orders, as well as quality and productivity. A key aspect of the research will involve analysing the specific requirements of social cooperatives and WISEs to support their effective and simplified future adoption of the proposed solutions.

Applicants may also consider other research projects, provided they are consistent with the educational objectives of the PhD program and with the research activities of the following program's faculty members:

Program's faculty members		
Prof.	Yuri	Borgianni
Prof.	Franco	Cacialli
Prof.	Franco	Concli
Prof.	Patrick	Dallasega
Prof.	Marco	Frego
Prof.	Andrea	Giusti
Dr.	Luca	Gualtieri
Dr.	Veit	Gufler
Prof.	Michael	Haller
Prof.	Giovanni	Modanese
Prof.	Niko	Münzenrieder
Prof.	Claus	Pahl
Prof.	Angelika	Peer
Prof.	Luisa	Petti
Prof.	Barbara	Russo
Prof.	Renato	Vidoni
Prof.	Karl Dietrich	von Ellenrieder

5. In the application for admission, applicants must specify their preferred type of scholarship (unibz or topic-specific) and up to a maximum of 3 research topics. The name of the relevant supervisor may be indicated, if known. The stated preference will serve only as an indication of the applicant's interests and will not be binding on the Admissions Committee.

6. Separate rankings will be compiled for positions tied to subject-related scholarship. Separate rankings will be compiled for each Curriculum. The positions tied to subject-related scholarships oblige the winners to carry out research activities relevant to the indicated subject. These will be assigned preferentially to applicants who make a specific request in their application.

7. Pursuant to the general part of the present call for applications, the number of positions may be increased as a result of funding provided by other universities, public research bodies or qualified private companies. Notice of such an increase will be given exclusively on the Unibz web page dedicated to PhD programmes. Applicants wishing to obtain eligibility for any additional subject-

related scholarships may make an explicit request to the selection committee during the interview, in order to allow it to assess the specific eligibility.

Art. 2 – ADMISSION REQUIREMENTS

1. Application to the present public competition for the admission at the PhD programme in Advanced-Systems Engineering may be presented pursuant to art. 4 of the general part of the present call for application, without limitations regarding gender, age or citizenship, by:

a) Applicants holding a postgraduate degree as per Ministerial Decree no. 509/1999, a postgraduate degree as per Ministerial Decree no. 270/2004, a degree of the former Italian university system of the following degree classes: all

b) Applicants holding an equivalent degree obtained abroad;

c) Applicants achieving one of the above-mentioned titles within the enrolment deadline. In the latter case, applicants will be conditionally admitted to the public competition and are **required to present the qualification by the enrolment deadline, under penalty of forfeiting admission to the programme.**

3. 3. An appropriate knowledge of English is required, which will be assessed during the interview.

Art. 3 – APPLICATION FOR ADMISSION

1. In addition to the documentation listed in the general part of the present call for applications, the following documents must be uploaded to the application portal:

a) Motivational letter in English (maximum 2 pages), in which up to three research projects should be indicated, including the name of the supervisor if known. If applicable, applicants should also state their preference for topic-specific scholarships, briefly explaining the reasons for their choice. Finally, they may mention why they consider UNIBZ and this doctoral program suitable for their academic background and research activities;

b) Updated curriculum vitae in English pursuant to the European format (downloadable at the following link: https://europass.cedefop.europa.eu/en/documents/curriculum-vitae) eventually including a list of publication indicating the Digital Object Identifier (DOI);

c) up to a maximum of 2 letters of reference, in English and in digital format, written by university professors or researchers of research institutes, indicating names and institutional contacts.

Art. 4 – SELECTION PROCEDURE

1. The selection procedure consists of three phases:

a) applications will be examined ex officio for completeness and fulfilment of the formal requirements; applicants excluded due to incomplete applications or lack of requirements will be notified on the dedicated unibz web page. The publication will have the nature of a notification to all effects. No individual communication will be made.

b) The selection committee will assess the complete applications in accordance with Article 5, considering the qualifications and attached documentation referred to in Article 3. Applicants who reach the minimum score referred to in Article 5 will be admitted to the interview. Admission to the interview, as well as the relevant dates and times, will be communicated on the unibz dedicated web page. Individual communications will be sent in due time to the e-mail address indicated in the application form to applicants admitted to the interview.

c) Interviews may be held in person or by videoconference, at the applicant's request to the selection committee and will be evaluated in accordance with the criteria set out in article 5. Applicants must ensure the use of a webcam to enable them to identify themselves to the selection committee by

showing a valid identity document or passport, under penalty of exclusion from the public competition.

2. Absence from the tests and/or interviews, non-connection, unavailability of the applicant on the appointed day and/or time or non-exhibition of a valid identity document or passport are a cause for exclusion from the public competition.

3. If technical problems occur during the interviews by videoconference, if the problem concerns one or more members of the selection committee, the interview is deferred to another date ex officio; if the problem concerns the applicant, the committee may, subject to the principles of non-discrimination and equal treatment of applicants, postpone the test to another date for justified reasons.

4. Once the examinations have been completed, the relevant selection committees draw up rankings based on the scores obtained by the applicants in the individual tests.

Art. 5 – EVALUATION CRITERIA

1. The selection committee carries out a comparative assessment of the applicants. For applicants who have expressed a preference for positions tied to subject-related scholarships, the committee also ascertains their suitability for the specific subject.

2. The following scores will be awarded during the evaluation of the documents submitted with the application under Article 3:

a) up to a maximum of 10 points for: the curriculum vitae, the letter of motivation and qualifications;

b) up to a maximum of 10 points for: the congruence of the curriculum with the research areas of interest for the Ph.D and the ability to develop the proposed research projects.

3. Applicants who reach the threshold of 10/20 points will be admitted to the interview. Admission to the interview and the relevant dates and times will be communicated on the unibz dedicated web page. Individual communications will be sent in due time to the e-mail address indicated in the application form to applicants admitted to the interview.

4. During the interview, the following elements will be assessed: basic technical knowledge and skills related to the topics of the call, research aptitude, the ability to argue theoretical and methodological hypotheses, including those related to the call's themes, and proficiency in the English language. Up to a maximum of 20 points will be awarded. The interview is considered passed with a minimum score of 10 out of 20 points.

5. The final score is made up of the sum of the scores obtained in the assessment of the documentation and interview. Applicants and candidates who have obtained at least 20/40 points will be eligible. In the event of a tied score, the applicant with the youngest age will have priority.

Art. 6 – RANKING

1. Applicants and candidates will be admitted to the programme in order of their ranking until the number of positions available is reached. In the event of equal merit, the applicant who is younger in age shall prevail. In the event of successful placement in more than one ranking list, the winner must exercise the option for only one position. Separate rankings will be drawn up for each position tied to a subject-related scholarship.

2. The final rankings will be published on the unibz website on the page dedicated to PhDs. Such publication has the value of official communication. No individual communication will be made.