



Freie Universität Bozen
Libera Università di Bolzano
Università Lìedia de Bulsan

Faculty of Science and Technology

PhD programme in SUSTAINABLE ENERGY AND TECHNOLOGIES

Website:

<https://www.unibz.it/en/faculties/sciencetechnology/phd-sustainable-energy-technologies/>

Duration: 3 years

Academic year: 2017/2018

Start date: 01/11/2017

Official programme language: English

Programme contents

This is a full-time programme. The final thesis must be completed in English with a complete abstract in both German and Italian. PhD students should benefit from the special multilingual opportunities that the University offers, which include various activities/events in Italian, German or other languages (seminars, optional courses, social events, etc). The PhD programme comprises lectures and research activities that can be completed both at the Free University of Bozen/Bolzano and at other universities, in Italy and abroad. As reported below, a period abroad is mandatory and can be spent at a foreign university and research centre with or without a specific agreement with unibz.

Dottorato Industriale – Industrial PhD (PhD Executive)

These are "co-tutored" positions with companies, thought to allow employees involved in research activities to enter high education programs, through a doctoral course. The Industrial PhD links the doctoral program to the vision of the companies and their dynamics and needs. This allows a research training focused both on the growth of the industrial PhD student and on the demands of the company, as well as an interaction and integration within the university research group where the student is operating, promoting the development of the collaboration between university and companies.

Phases of the PhD

The research activities are organized in five phases ending after 2, 6, 12, 24 and 36 months.

Phase 1, Presentation (first 2 months): the PhD Course Committee meets the students and defines a supervisor. Students meet the supervisor to agree on the research topic within the areas in this advertisement. Students start working on a study plan that has to be approved by the PhD Course Committee. In the meantime, students may start attending courses that are relevant to their individual study plan.

Phase 2, Introduction (2nd -6th month): students complete an exhaustive review of the literature concerning their subject area as well as the first steps in the research topic activity, and prepare

their research programme that has to be approved by the PhD Course Committee. Students will possibly complete and/or follow courses that are relevant to their individual study plan.

Phase 3, Development (6th -12th month): students continue their research in their topic and attend courses, summer schools, seminars or conferences. Students prepare their public seminar about the state-of-the-art of their research topic. They will also inform the PhD Course Committee about the research programme that they want to conduct abroad, and propose a co-supervisor at the foreign university or research centre. A report about the first-year activities for the PhD Course Committee concludes the phase.

Phase 4, Deepening and period abroad (12th -24th month): students continue their research and finish any courses that they may have been following. They can attend seminars, schools, or conferences. At this stage, it is recommended that sometime has been spent abroad. During this phase or in the next, students are also expected to take part in an international conference to present the results of the activities developed inner the PhD studies and they should begin to prepare the manuscript(s) for publication in peer-reviewed journal(s). A report to the PhD Course Committee about the second-year activities concludes the phase.

Phase 5, Conclusion (24th-36th month): students finish their research and any experiences abroad; they finish writing and submit the manuscript(s) that is (are) to be published and complete their (draft) thesis. A report to the PhD Course Committee about the third-year activities concludes the phase.

Each of the activities in the different phases are granted a number of credits as decided by the PhD Course Committee. At the end of each phase, students have to meet the PhD Course Committee to present and discuss their achievements. The PhD Course Committee evaluates the work and provides suggestions when necessary.

Correspondingly, the PhD program foresees the following milestones to be overcome to be admitted to the different years and to the final exam:

- **Within 6 months:** together with their supervisor or co-supervisors, students develop and organize their research plan in the first six months of the course. Students must defend their research plan in front of the PhD Course Committee.
- **Within 12 months:** students have to prepare a public seminar in which they present and discuss the state-of-the-art of their research topic and/or the early achievements of their own project;
- **Each year:** students prepare an activity report at the end of each year, to be approved by the PhD Course Committee, in order to be admitted to the following year or to the final exam. The report has to be presented to the PhD Course Committee at the end of the second and third year, while it is shortly presented at the end of the public seminar at the end of the first year.
- **Within three years:**
 - students have to take part in at least one international conference where they are expected to present a paper or a poster;
 - students must spend at least three months abroad conducting research;
 - students must attend, passing the related exam, specific courses among those suggested by the PhD Course Committee, e.g. to improve their English skills, to master techniques for the analysis of literature and scientific writing, and to deepen their knowledge of scientific methods, such as advanced statistics or modelling.
- **To be admitted to the final exam:** the students have to demonstrate to: (a) have acquired sufficient CFU as decided by the PhD council at the beginning of the cycle, (b) have at least one journal paper accepted where they figure as first author, and (c) have to

present to the PhD Course Committee a draft of their final thesis. Exceptions to the achievement of the above milestones, if adequately motivated, can be evaluated and approved by the PhD Course Committee, provided that equivalent milestones can be identified in the student's activity.

Research areas

The research projects of the PhD students will pertain to the areas of interest of the Faculty Research Macro-areas Energy Resources and Energy Efficiency and Industrial Engineering and Automation. Interactions with the other Macro-areas are possible but have to be approved by the PhD Course Committee.

1. Sustainable energy and buildings

This research focus reflects the 'Energy Resources and Energy Efficiency' macroarea's research activities. In particular, it deals with the two main goals of (i) energy efficiency in energy generation, distribution and use, and of (ii) replacement of fossil fuels with renewable sources. Of special interest the aspects related to peculiar contexts such as the local mountain territory of South Tyrol. In this respect, activities focus particularly on energy efficiency in buildings and production systems, and on the management of renewable energy sources, including energy generation and supply technologies, as reported below:

a. Energy Efficiency and Sustainability (EES) in final uses, including Buildings and Production Processes, from the user to a regional scale

- Energy Efficiency and Indoor Environmental Quality in Buildings from design to control
- Energy Efficiency in Production Processes
- Management of Energy Use at a District Level

b. Renewable Energy Technologies (RET)

- Characterization of the exploitation of renewable energy sources (in particular biomass, hydroelectric and wind).
- Efficiency and performance of energy generation technology (electric and fluid machines)
- Optimization of district heating systems

2. Sustainability in Industrial Products and Processes

This research focus reflects the 'Industrial Engineering & Automation (IEA)' macroarea's research activities that deal with the topics of product development, manufacturing and assembly processes, design and management of production systems as well as mechanical and mechatronic design, automation and digitalization techniques, with a focus on sustainability and efficiency for small and medium manufacturing, construction and agricultural businesses.

In particular, the sustainability and efficiency concepts are researched in the following topics:

a. Mechanical Engineering Design (MED)

- Product Development and Innovation Management
- Functional and Structural Optimal Design of Machines
- Numerical Models for Materials Strength Prediction
- Advanced Finite Element Simulation

b. Automation and Manufacturing Technologies (AMT)

- High-performance Automation
- Advanced and Collaborative Robotic Systems
- Manufacturing Processing of Metal Alloys
- Metallurgy and Welding

c. Production and Supply Chain Management (PSCM)

- Industry 4.0
- Strategy and Business Models
- Lean and Reconfigurable Assembly Systems
- Planning, Control and Automation of Construction Processes

Admission requirements - Evaluation criteria for examinations/qualifications

Degrees from the old Italian system: all

Master (laurea specialistica/magistrale): all

Foreign degrees

Applicants who have a foreign degree must have a university level education of at least five years and hold the prerequisites listed below.

Other:

The requisites for admission to doctoral programmes are related to an appropriate educational, and/or cultural background, and/or have worked in the PhD program research fields. Qualifications in engineering and architecture are preferable.

Admission to the program is based on the assessment of applicants through:

- CV and academic qualifications;
- their cover letter;
- interview.

Their level of English will be assessed during the interview.

The candidates' profile will be evaluated based on the quality and the consistency with the research areas of the PhD program.

To apply for the PhD program, applicants must include the following:

- personal statement letter written in English (max. 1 page).
- Curriculum vitae (CV) (in English and possibly following the EU format that can be downloaded here <https://europass.cedefop.europa.eu/en/documents/curriculum-vitae>).
- Master degree certificate with indication of final mark /exam transcript

For admission, the (exams) average grade of master's degree (or equivalent) must be greater than or equal to 24/30. For foreign degrees, the mark will be converted to an equivalent one in thirtieths.

In case of Italian university degrees the certification must be substituted by a self-declaration or by the Diploma Supplement.

Dottorato Industriale – Industrial PhD (PhD Executive)

For those applying to the Dottorato Industriale (PhD Executive) positions, the following additional

documents are necessary:

- Copy of the contract of employment at the company or self-declaration.

Other documents to be included in the application if available:

- reference letters, written in Italian, German or English from a university lecturer or a researcher from a research institute,
- list of publications (published, being published or submitted for publication), with related links, if possible,
- any language certificates.

Only for those applicants fulfilling the admission requirement, an Evaluation Committee will first evaluate the CV, cover letter, and the applicant's qualifications - including publications (if any) - taking also into account the appropriateness of the candidates' profiles for the PhD program research areas, and will then draw up a list of applicants admitted to the next stage of the selection process. This will consist of an interview in which their knowledge of English will also be assessed. For the interview, video-conferencing, telephone and the like are admitted but not encouraged. Motivated requests have to be sent to the secretariat.

The Committee will select the best applicants on the basis of a comparative assessment.

The following scores will be awarded:

- up to 15 points for: the applicant's CV, cover letter and qualifications,
- up to 5 points for the appropriateness of the CV regarding the research areas of interest for the PhD program,
- up to 10 points for the interview.

The final score is the sum of the previous points, with a maximum of 30, and will be used to define the priority list and the access to the grants. The lowest score to be admitted in the rank-list is 15/30.

In case two or more applicants have the same score, a lot will be drawn to decide on the allocation of places. The ranks list will be published on the website of unibz (www.unibz.it) and at the notice boards of the Faculty of Science and Technology.

Examination dates

| Description | Date | Place |
|--------------------|---|---|
| Personal Interview | From 23 to 27 July 2018 (depending on the nr. Of applications) | Main building of the Free University of Bolzano, piazza Università 1, Bolzano |

Intake and grants

Total intake: 14

Intake with grants from the University: 11

| | | |
|-------------------------------------|---|----------------------------|
| Intake for "Dottorato Industriale": | 2 | Company: Fraunhofer Italia |
| Other types of intake: | 1 | |
| Intake with no grant: | 0 | |