# Annex A

## PHD PROGRAM IN ENGINEERING FOR ENERGY AND ENVIRONMENT

<table>
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<tr>
<th>Coordinator</th>
<th>Prof. Andrea Lugi Facci</th>
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<tr>
<td>Department</td>
<td>Department of Economics, Engineering, Society and Business Organization in collaboration with the Department of Agriculture and Forest Sciences</td>
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| Program duration | 3 years: 1st November 2022 – 31st October 2025  
Thesis Defence: within February 2026 |
| Program objectives | The PhD program in Engineering for Energy and Environment aims to provide a high level of training to a select number of young graduates to make them competitive on a national and international level in private companies with high technological contents, research centers and universities. The main objective of the program (which is structured in two curricula, Energy and engineering systems and Biosystems and environment) is to provide an interdisciplinary view of engineering problems in the energy and environment scientific areas, characterized by a high technological development. The research activities will be devoted to the study of new engineering solutions, novel processing techniques and innovative research methodologies, with a focus on their technology transfer. Students will be engaged in training activities and scientific research in the program subjects, with particular reference to technologies for thermonuclear fusion, energy conversion processes, energy storage, environmental issues, innovations in the fields of mechanical engineering, also in agriculture, and of sensors, biosystems and agricultural issues, with regard to primary production and environmental aspects. The work of the PhD students will be coordinated by the members of the board already active in national and international industrial collaborations and research projects, in innovative and relevant topics, such as hydrogen technologies, renewable energy, biomass, biosystems and thermonuclear fusion. |
| No. of positions | Total positions 27  
Positions with scholarships co-funded by University 8  
Positions with “PNRR PA” scholarship 1  
D.M. 351/2022 - M4C1 Inv. 4.1  
Positions with “PNRR DM 352” scholarship 11  
D.M. 352/2022- M4C2 Inv. 3.3  
Positions reserved for employees of companies which perform research and development activities 3  
Industrial PhD  
Position without scholarships 4 |
| Curricula | (In the application form the candidate must)  
Curriculum “Energy and engineering systems”  
n. 14 positions with scholarship, n. 1 industrial doctoral position  
n. 6 positions with scholarship, n. 2 industrial doctoral positions, n. 4 |
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<tr>
<th>Specify the curriculum of interest</th>
<th>Positions without scholarship</th>
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| **Position funded by external founders** | **Curriculum** “Biosystems and environment”  
  a) **Topic**: Climate change and risk management in agriculture towards the one health concept (INAIL). **Advisor**: Prof. Andrea Colantoni.  
  b) **Topic**: Tractor and self-mooving agriculture machines safety: digital solutions to reduce the risk of collision, overturning and crushing (INAIL). **Responsabile scientifico**: Prof. Massimo Cecchini. |

| Positions with scholarship co-funded by University | **Curriculum** “Energy and engineering systems”  
  a) **Topic**: Designing, developing, and prototyping a sustainable and flexible mobility platform based on Hybrid Electric Vehicles. **Advisor**: Prof. Andrea L. Facci.  
  b) **Topic**: Optimization of the energy and mass fluxes within multi energy systems using artificial intelligence. **Advisor**: Prof. Stefano Ubertini.  
  **Curriculum** “Biosystems and environment”  
  a) **Topic**: Study and development of digital systems for workers learning support in the field of job safety and health in forestry and agriculture environments. **Advisor**: Prof. Massimo Cecchini.  
  b) **Topic**: Digital transformation of the agricultural sector through the implementation of innovative methodologies for the detailed monitoring of the rural territory. **Advisor**: Prof. Fabio Recanatesi.  
  c) **Tematica**: Crowd sensing systems development for agricultural and forestry monitoring. **Advisor**: Prof. Fabio Recanatesi.  
  d) **Tematica**: Physical methodologies to detect environmental relevant analytes. **Advisor**: Prof. Ines Delfino. |

| Positions with “PNRR PA” scholarship | M4C1- Inv. 4.1 “Research Doctorates for Public Administration”  
  no. 1 scholarship to undertake research on:  
  **Topic**: ProjEct peRFormance indiCators for sustainabiliTy. **Advisor**: Prof.ssa Ilaria Baffo. |

| Positions with “PNRR DM 352” scholarship | M4C2 – Inv. 3.3 “Innovative doctorates aimed at strengthening the demand of innovation of enterprises and promoting the employment of researchers by enterprises”  
  **Curriculum** “Energy and engineering systems”  
  no. 11 scholarship to undertake research on  
  a. **Topic**: Characterization of the energy consumption of a building during realization and management. **Company**: Ecosfera Servizi. **Advisor**: Prof. Andrea L. Facci  
  b. **Topic**: Monitoring of the energy consumption of a building during realization and management. **Company**: Ecosfera Servizi. **Advisor**: Prof. Andrea L. Facci  
  c. **Topic**: High-efficiency power supply systems for High Temperature Superconducting Magnets for nuclear fusion experimental |
| No. 3 places allocated to the Industrial PhD Programme | **Curriculum “Energy and engineering systems”**  
**Topic:** Digital Transformation and Sustainability in the Energy Transition Context: innovative frameworks to generate knowledge from industry 4.0 data flows while supporting corporate responsibility reporting and validation. *Industrial Doctorate* Nuovo Pignone Tegnologie srl. *Advisor:* Prof. Marco Marconi. |
| --- | --- |
|  | **Curriculum “Biosystems and environment”**  
**Topic:** Implementation of a methodology for chemical and commodity-related waste characterization towards recycling and circular economy. *Industrial Doctorate* Gruppo Maurizi. *Advisor:* Prof. Andrea Colantoni. |


g. **Topic:** Multiphysics and multicode approach for the evaluation of Vertical Displacement Events related loads to support the design of the DTT vacuum vessel and in-vessel components. *Company:* SAMIC. *Advisor:* Prof. Giuseppe Calabrò.


i. **Topic:** Fusion energy plants mechanics: weldings *Company:* Walter Tosto. *Tutor:* Prof. Pierluigi Fanelli.

l. **Topic:** Resistive Pedestal stability analysis and correlation with separatrix properties in view of DTT. *Company:* DTT. *Tutor:* Prof. Giuseppe Calabrò.

m. **Topic:** Valorization of the Stabilized Organic Fraction (FOS) produced by mechanical-biological treatment plants *Company:* Ecologia VT. *Advisor:* Dott. Marco Barbanera

Please note that the acceptance of a PNRR scholarship implies obligations additional to those of a regular scholarship: see art. 14 of this Call.
**Topic:** Valorization of organic compost for the implementation of innovative low-impact soil conditioners for agriculture. *Industrial Doctorate* Ecologia Viterbo. *Advisor:* Prof. Andrea Colantoni (subject to the favourable opinion from the ANVUR).

**Positions without scholarships**

**Curriculum** "Biosystems and environment"

**Topic:** Realization of innovative circular economy models to recycle organic wastes. *Advisor:* Prof. Andrea Colantoni.

**Topic:** Development of an application to improve the environmental sustainability and protection through big-data analysis. *Advisor:* Prof. Danilo Monarca.

**Topic:** Data driven and artificial intelligence drive approach for the agri-food supply chain: quality, traceability, and portability. *Advisor:* Dott. Paolo Menesatti.

**Topic:** Buildings energy efficiency through optimization and integration of indoor pollutants reduction. *Advisor:* Prof. Danilo Monarca.

**Admission requirements**

Application to the public competition is open to all, regardless of age and citizenship, who, by the date this call expires, possess one of the qualifications listed below:

- an Italian “laurea specialistica” degree, obtained according to the Ministerial Decree n. 509/1999;
- an Italian “laurea magistrale” degree, obtained according to the Ministerial Decree n. 270/2004;
- an Italian equivalent university degree obtained under the Italian regulations previously in force, the time-span of which being no less than 5 years;
- a foreign university degree equivalent to those mentioned above. Admission is also open to university students who will finish their MS degree by October, 31th, 2022. In such cases admission will be “conditional”. Failure to obtain the degree by that date will result in forfeiture of admission to the doctoral course. If the candidate is the winner, he will be admitted and enrolled “with reserve” and must submit, by 31 October 2022, via e-mail (dottorati@unitus.it), the following documentation:
  - if the degree is obtained in Italy, a self-certification relating to the achievement of the degree;
  - if the qualification is obtained abroad,
    - if an Italian citizen: a self-certification relating to the achievement of the degree, the model of which will be available on the web page reserved for PhDs, with a copy of a valid identity document attached;
    - if EU citizen or non-EU citizen: a certificate or equivalent document for the achievement of the qualification, in English (e.g. Diploma supplement).

For graduating applicants, the score reserved for the graduation evaluation will be replaced by the evaluation of the average of the exams.

Self-certification (or certification in case of Non-EU students) should state the name of the awarding University, award date, grade and
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<th>Evaluation of candidates (Maximum score: 80 out of 80)</th>
<th>Evaluation of academic qualification and oral examination</th>
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<td><strong>Assessment of the English Language Knowledge.</strong></td>
<td><strong>Language for the examination: Italian or English</strong></td>
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<td>The evaluation of qualifications is preliminary to the oral exam. The score obtained by candidates after the evaluation of their qualifications will be added to the score of the oral examination. The results will be published on the Tuscia University web site (<a href="http://www.unitus.it">www.unitus.it</a>) at the section of “Didattica”-&gt;“Dottorati di Ricerca”</td>
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<td>Together with the application form, candidates should submit a research project, within the themes of Ph.D., up to a maximum of 5 pages, which must be written in Italian or English. The research project will be discussed during the oral exam.</td>
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<tr>
<td><strong>Evaluation of academic qualification (Maximum score: 20 out of 80)</strong></td>
<td><strong>Evaluation of the oral exam (Maximum score: 60 out of 80)</strong></td>
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<td>Master’s thesis: max 5 points</td>
<td>Oral exam: maximum score 60 out of 80 points</td>
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<td>University career (exams taken with the relative grades and final grade): max 4 points</td>
<td>The minimum score for a positive oral exam will be at least 40 out of 80 points.</td>
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<td>Research and/or study activities in foreign institutions: max 2 points</td>
<td>The foreign language subject to verification will be English.</td>
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<td>Professional experiences and other qualifications that each candidate considers useful: max 4 points</td>
<td>Topics of the oral examination</td>
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<tr>
<td>Research project submitted by the candidate: max 5 points</td>
<td>The oral test, aimed at ascertaining the candidate aptitude for scientific research, will focus on the discussion of issues related to the PhD program topics and the research project presented by the candidate. The oral exam will include a verification of the English language knowledge based on reading and translation of sections of a scientific text.</td>
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<th>Exam dates and location</th>
<th>Contact to information</th>
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<td>The exams will be held between 5th –20th September 2022. The date(s) of the interview will be published on the University website at the site: <a href="http://www.unitus.it">www.unitus.it</a> &gt;Didattica&gt;Offerta post lauream&gt; Dottorati di Ricerca by the deadline of the application call.</td>
<td>Contacts of the course:</td>
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<tr>
<td></td>
<td>Prof. Andrea Luigi Facci: <a href="mailto:andrea.facci@unitus.it">andrea.facci@unitus.it</a></td>
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<td></td>
<td>Prof. Massimo Cecchini e-mail: <a href="mailto:cecchini@unitus.it">cecchini@unitus.it</a></td>
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<td>Prof. Giuseppe Calabrò e-mail: <a href="mailto:giuseppe.calabro@unitus.it">giuseppe.calabro@unitus.it</a></td>
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