# Annex A

## PHD PROGRAM IN “ENGINEERING FOR ENERGY AND ENVIRONMENT”

| Department | Dipartimento di Economia e Impresa (DEIM)  
In collaboration with Dipartimento di Scienze Agrarie e Forestali (DAFNE) |
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<tr>
<td>Partner Institutions</td>
<td>None</td>
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| Program duration | 3 years: 1st November 2021 – 31st October 2024  
Thesis Defence: within February 2025 |
| 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 places 21  
Places with scholarships 9  
Industrial Ph.D. 5 (2 Azienda Gajarda srl, 2 Gruppo Maurizi srl Roma, 1 CRS Laghi)  
Reserved for Research Center Employees (CREA-IT) 4  
Places without scholarships 3 |
| Curricula (In the application form the candidate must specify the curriculum of interest) | Curriculum “Energy and engineering systems”  
n.6 places with scholarship, n. 1 place without scholarship  
Curriculum “Biosystems and environment”  
n. 3 places with scholarship, n. 5 industrial doctoral positions, 4 reserved (CREA-IT) and n. 2 places without scholarship  
**Curriculum “Energy and engineering systems”**  
- n. 1 scholarship co-financed by ENEA funds (CINTEST, prof. Facci) and the University of Tuscia  
*Topic: Development of peer to peer energy communities for a high renewable energy penetration scenario*  
- n. 1 scholarship co-financed by CINTEST Funds (University Eff.Energetico + Horta, prof. Ubertini) and the University of Tuscia |
**Places with scholarship**

**Topic:** Lattice Boltzmann methods for multiscale and multiphase flows in engineering  
- n. 1 scholarship co-financed by CINTEST funds (Financed by US Viterbese 1908 srl, prof. Calabrò) and the University of Tuscia  
**Topic:** Studies of blockchain traceability systems of U.S. sports equipment Viterbese 1908 S.r.l  
- n. 1 scholarship co-financed by CINTEST funds (EUROFUSION funded by Prof. Fanelli) and the University of Tuscia  
**Topic:** Thermo-mechanical studies for divertor and first wall structure in divertor tokamak test facility  
- n. 1 scholarship co-financed by CINTEST funds (Funding Tokamak Energy Ltd, prof. Calabrò) and the University of Tuscia  
**Topic:** Electromagnetic forces analysis by MAXFEA code coupled to ANSYS APDL for ST40 and STF1 Tokamak Energy LTD experiments  
- n. 1 scholarship funded by DTT S.c.a.r.l.  
**Topic:** Integrated physics and engineering aspects of a divertor: the case study of the Divertor Tokamak Test (DTT)

**Curriculum** "Biosystems and environment"  
- n. 1 scholarship co-financed by DAFNE (SAFEMed project) and the University of Tuscia  
**Topic:** Energy efficiency in the horticultural sector  
- n. 1 scholarship funded by Facma srl  
**Topic:** Application of precision agriculture in shell fruit harvesting machines  
- n. 1 scholarship funded by the University of Tuscia  
**Topic:** Sustainable and low environmental impact mechanization models in the agroforestry sector  
- n. 2 industrial PhD scholarships reserved for the Company Gajarda srl:  
**Topics:**  
1. Study of optimization processes in the purification of water contaminated by As and other elements  
2. Analysis of automation processes for remote control in water purification plants  
- n. 2 industrial PhD scholarships reserved for the Maurizi srl Group:  
**Topics:**  
1. Innovative tools to support an alternative digital traceability to traditional systems  
2. Innovative methods for the creation of a new system for food traceability-  
- n. 1 industrial PhD scholarship reserved for CRS Laghi:  
**Topic:** Smart Information & Communication. Technologies for a Sustainable AgriFood Value Chain.  
- n. 4 places reserved for employees of research institutions (CREA-IT)  
**Topics:**  
1. Development of a decision support system, based on geoelectric and optical sensors, for the variable rate distribution of organic waste in a circular economy model for the recovery of nutrients and for safeguarding the levels of organic matter in the soil
| 2. | Technological implementation in cattle breeding to improve the quality, sustainability and environmental impact of the ration |
| 3. | Application of innovative sensors to automatic rationing systems for the subclinical identification of the onset of ketosis in ruminants and the assessment of milk quality |
| 4. | Precision mechanization: applications to the olive sector |

**Places without scholarships**

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<tr>
<th>Curriculum “Energy and engineering systems”</th>
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<td>- n. 1 places Topic:</td>
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<tr>
<td>Integrated scenario studies for a Divertor Tokamak Test</td>
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<tr>
<td>Curriculum &quot;Biosystems and environment&quot;</td>
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<tr>
<td>- n.2 places Topics:</td>
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<td>- Hardware and software systems for remote control and assistance of agricultural machinery</td>
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<td>- Innovative solutions for the improvement of the ergonomic characteristics of the cabins.</td>
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**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, 2021. 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 2021, 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 (eg 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 type of qualification (“vecchio ordinamento”, “Specialistica”/“magistrale”) and a copy of a valid identity document.

Candidates who do not meet the admission requirements at the time of submitting their application must indicate the date by which they expect to obtain the required qualification.
| Evaluation of candidates (Maximum score: **80 out of 80**) | Evaluation of academic qualification and oral examination  
**Assessment of the English Language Knowledge.**  
Language for the examination: Italian or English  
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 (www.unitus.it) at the section of *Didattica* > *Offerta post lauream* > *Dottorati di Ricerca*  
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. |
|---|---|
| Evaluation of academic qualification (Maximum score: **20 out of 80**) | Master’s thesis: max  
University career (exams taken with the relative grades and final grade): max  
Research and/or study activities in foreign institutions: max  
Professional experiences and other qualifications that each candidate considers useful: max  
Research project submitted by the candidate: max  
Before of the oral exam, the evaluation of academic qualification results will be published on the Tuscia web site www.unitus.it (section *Didattica* > *Offerta post lauream* > *Dottorati di Ricerca*). |
| Evaluation of the oral exam (Maximum score: **60 out of 80**) | Oral exam: maximum score 60 out of 80 points  
The minimum score for a positive oral exam will be at least 40 out of 80 points.  
The foreign language subject to verification will be English. |
| Topics of the oral examination | 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. |
| Exam dates and locations | The exams will be held between 9th – 24th September 2021. The timetable for the exams will be published in the section *Didattica* > *Offerta post lauream* > *Dottorati di Ricerca* of the University's website (www.unitus.it) within the deadline of the call for application |
| Contact to information | Contacts of the course:  
Prof. Danilo Monarca e-mail: monarca@unitus.it  
Prof. Giuseppe Calabrò e-mail: giuseppe.calabro@unitus.it |