TABLE 5 – PhD course INDUSTRIAL AND INFORMATION ENGINEERING

<table>
<thead>
<tr>
<th>The PhD course</th>
<th>University of Udine, Polytechnic Department of Engineering and Architecture (DPIA) - via delle Scienze 206, 33100 Udine, ITALY (tel. +39 0432 558253)</th>
</tr>
</thead>
</table>

**Administrative course location**

**Associated location**

Institut National Polytechnique de Grenoble (France)

**Location for training, teaching and research activity**

Teaching and other training activities will take place primarily at the administrative course location or in other structures of the University of Udine. The research program will be mainly developed, depending on the scholarship (see art. 12 of the notice) and/or on the supervisor assigned, at one of these locations: administrative location, associated location, financial supporter’s location.

**Coordinator**

Prof. David Esseni (david.essendi@uniud.it)

**Course duration**

3 years

**Curricula**

1. New management paradigms and fabrication technologies for competitive enterprises with low environmental impact;
2. Information and communication technology for the inclusive society;
3. Innovative electro-mechanical paradigms and systems for energy saving and renewable energy sources;
4. Mechanical technologies and electronic devices for domotics, medical diagnostic and safety.

**Research topics**

1. **Curriculum 1 - New management paradigms and fabrication technologies for competitive enterprises with low environmental impact**
   2. System and machinery efficiency for industrial production;
   3. Cognitive features of products development in view of CAD-PLM technologies;
   4. Characteristics and applicability of emerging prototyping methodologies (augmented reality, functional mock-up, interaction design, etc.);
   5. Smart logistics: computation models and algorithms;
   6. New technologies for the manufacturing of innovative materials;
   7. Systems for monitoring and control of machine tools;
   8. Methodologies for the design of energy and production efficient automatic systems Approaches to system and product innovation;
   9. Light and flexible robots with low energy consumption.

2. **Curriculum 2 - Information and communication technology for the inclusive society**
   1. Nano-electronic devices (MOSFETs, Steep Slope, etc.) for high efficiency and high performance electronics. Non volatile Memories for massive 3D integration (Flash, charge trap);
   2. Advanced electron devices based on innovative materials and architectures in the Beyond CMOS and More than Moore domains: graphene, 2D crystals, III-V compound semiconductor devices;
   3. Semi-classical (BTE) and quantum mechanical (NEGF) simulation of nanoelectronics devices;
   4. Integrated circuit design for energy efficient communications, energy conversion and management;
   5. Innovative communication paradigms and systems: systems with multiple antennae, distributed communication systems, HW and SW architectures for telecommunications;
   6. Multimedia signals processing and analysis: video and image encoding, video streaming based on peer-to-peer networks, joint source/channel encoding, compressive sensing;
   7. Test and development of metaheuristic algorithms for combinatorial problems;
   8. Pervasive computing, cloud computing, overlay networking, distributed computing in miscellaneous networks of computers;
   9. Artificial vision system, virtual sound, machine learning;
   10. Wireless communication systems and networks, signal processing for communication, physical substrate algorithms, transmission system algorithms.

3. **Curriculum 3 - Innovative electro-mechanical paradigms and systems for energy saving and renewable energy sources**
   1. Energy harvesting systems for self powered, smart, distributed sensors;
   2. Electro-mechanical devices for innovative production and storage energy systems;
   3. New paradigms, systems, technologies for surface and air transportation vehicles with low energy consumption;
   4. Integrated power electronics for industrial plants and machinery;
   5. Electric drivers and converters for distributed electric generation and co-generation systems (photovoltaic, wind, etc.);
   6. On board electronics: terrestrial and satellite localisation and navigation systems; communication networks and systems;
   7. Green mechatronics: mechatronics for energy saving;
   8. Design methodologies for materials handling systems characterised by low environmental impact;
   9. Holistic design of lightweight structures for low emissions and low energy consumption vehicles;
TABLE 5 – PhD course INDUSTRIAL AND INFORMATION ENGINEERING

<table>
<thead>
<tr>
<th>Research programs</th>
<th>Research programs are selected by the Teaching Board among the topics offered by the curricula.</th>
</tr>
</thead>
</table>
| Course website    | https://www.uniud.it/it/ateneo-uniud/ateneo-uniud-organizzazione/dipartimenti/dpie
|                   | http://phd.diegm.uniud.it/                                                                      |

ADMISSION REQUIREMENTS

Required degree
- Italian Laurea (before DM 509/99) or Italian Laurea Specialistica/Magistrale (ex DM 509/1999 and DM 270/04).
- Foreign degrees and titles: refer to art. 3 and 4 of the notice.

Knowledge of the following foreign language
- English

DOCUMENTS AND QUALIFICATIONS TO BE ATTACHED TO THE APPLICATION FOR ADMISSION

<table>
<thead>
<tr>
<th>Compulsory documents (art. 5 of the notice)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Certification or self-certification (refer to art. 5 paragraph 5 of the notice) of the academic title needed for admission to the PhD course and list of the exams (with grades) passed during the Italian first level (bachelor) and the Laurea Specialistica/Magistrale courses, or during the Italian courses before D.M. 509/99 or during the foreign academic courses;</td>
</tr>
<tr>
<td>2. Curriculum vitae et studiorum, dated and signed;</td>
</tr>
<tr>
<td>3. Copy of a valid identity document (citizens of countries not belonging to the European Union should preferably include a copy of a valid passport, comprehensive of the pages containing the holder’s photo, personal details, passport number, date and place of issue, date of expiry);</td>
</tr>
<tr>
<td>4. Research project, dated and signed, developed under the research topics listed in this table (approximate limit 10.000 characters; English language);</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Optional documents (art. 5 of the notice)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Master thesis (“Tesi di Laurea”) associated to the degree/title providing access to the PhD course. Applicants who are not graduated on the expiration date of this call can submit an extended abstract in place of the complete thesis, in Italian or English language, signed by themselves and by their thesis Supervisor (approximate limit: 25,000 characters, including spaces);</td>
</tr>
<tr>
<td>2. Motivational letter by which the applicant explains the reasons for admission to the PhD course, dated and signed (approximate limit: 2,500 characters, including spaces);</td>
</tr>
<tr>
<td>3. Publications (max 2);</td>
</tr>
<tr>
<td>4. Letters of reference (max 2), from university professors, scientific researchers or other experts in the field (art. 6 of the notice);</td>
</tr>
<tr>
<td>5. Request for oral exam via Skype conference (see art. 9 paragraph 4 of the notice).</td>
</tr>
</tbody>
</table>

SELECTION COMMITTEE

Appointed members
- Stefano Filippi – Full Professor – University of Udine
- Roberto Petrella – Associate Professor – University of Udine
- Stefano Boscillo – Associate Professor – University of Udine
- Paolo Gardonio – Full Professor – Università di Udine
- Michele Simonato – External Expert – Electrolux professional

Substitute members
- Marina Colbal – Full Professor – University of Udine
- Roberto Rinaldo – Full Professor – University of Udine
- David Esseni – Full Professor – University of Udine

ADMISSION

GENERAL COMPETITION (art. 9 of the notice)

Positions available: 9
### TABLE 5 – PhD course INDUSTRIAL AND INFORMATION ENGINEERING

<table>
<thead>
<tr>
<th>Detailed description</th>
<th>N.</th>
<th>Funding</th>
<th>Annual gross amount</th>
<th>Period abroad</th>
<th>Research program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positions WITH SCHOLARSHIP: 8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 External Institution: European Social Fund, Region Friuli Venezia Giulia [Specific Programme 89/2019 – Operational Programme 2014/2020 Axis 3] - art. 16 of the notice *</td>
<td>1</td>
<td></td>
<td>€ 15.343,28</td>
<td>max 6 months optional</td>
<td>The research must be in line with the topics of the course and with the objectives as paragraph 1 of art. 16 of the notice of competition.</td>
</tr>
<tr>
<td>1 External Institution: Progetto PRIN 2017 (MIUR) prof. GARDONIO Paolo 2017ZX9X4K (DEVISU) *</td>
<td>1</td>
<td></td>
<td>€ 15.343,28</td>
<td>max 6 months optional</td>
<td>Modular Units for Vibroacoustic Control</td>
</tr>
<tr>
<td>1 External Institution: Electrolux Professional</td>
<td>1</td>
<td></td>
<td>€ 18,100,00</td>
<td>max 6 months optional</td>
<td>Program: “Design for linear and non-linear vibration management in professional appliances for laundry systems”</td>
</tr>
<tr>
<td>1 External Institution: Multi-company *</td>
<td>1</td>
<td></td>
<td>€ 15.343,28</td>
<td>max 6 mesi facoltativo</td>
<td>Industry 4.0 e Cybersecurity</td>
</tr>
<tr>
<td>Positions WITHOUT SCHOLARSHIP: 1</td>
<td></td>
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<tr>
<td>1</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>Research program in line with topics</td>
</tr>
</tbody>
</table>

* Scholarships funded by External Institutions and by associated locations can be assigned on condition of the approval of the agreement that governs the funding or the issuing of the decree granting the funds (art. 15 paragraph 7 and art. 16 paragraph 1).

**Competition procedure and test schedule**

**Evaluation of titles and oral exam.**
For the evaluation of applicants’ attitude for scientific research and their basic skills to tackle the course program, the Selection Committee can attribute up to 100 points to each applicant: max 30 points to the titles and max 70 points to the oral exam. The applicant is admitted to the oral exam if his/her titles receive at least 21 points. The oral exam is passed with at least 49 points. The applicant is admitted to the course if he/she passes the oral exam. **DATE FOR THE PUBLICATION OF QUALIFICATIONS EVALUATION RESULTS AND LIST OF ADMITTED APPLICANTS: within August 28, 2019**

**DATE FOR THE PUBLICATION OF THE FINAL RANKING LIST: within September 19, 2019**

<table>
<thead>
<tr>
<th>Foreign language that can be used for exam</th>
<th>Italian or English</th>
</tr>
</thead>
</table>

**Evaluation Criteria of qualifications**

- Curriculum vitae et studiorum: 12
- Research project: 10
- Scientific publications: 2
- Thesis/Abstract: 2
- Letters of reference: 2
- Motivational letter for admission to the PhD course: 2

**Oral exam**
The oral examination consists of an individual interview of about 15 minutes aiming to assess the applicant flair to undertake a research doctorate and to carry out the research tasks in the areas of interest for the doctorate. The interview will be assessed considering the following criteria:

a) technical and scientific competence in the topics of the doctorate
b) knowledge of the state of the art for the doctorate curricula
c) mastery of English language

**Calendar of the oral exam**

| Date | September 10, 2019 |
| Time | 09:30 am |
| Place | Polytechnic Department of Engineering and Architecture (DPIA) - Yellow Room - via delle Scienze 206, 33100 Udine |

Based on the number of applicants, the oral exam may take place in more than one day. Applicants must exhibit a valid ID for admission to the oral exam.