Coordinator: Prof. Valerio Cozzani  
Civil, Chemical, Environmental, and Materials Engineering – DICAM  
Via Terracini 28 - Bologna  
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Starting date of the PhD Programme: 01/11/2019
Duration: 3 calendar years
Language of the PhD Programme: English
Mandatory stay abroad: Yes (6 months)

Research topics:
The following learning, teaching and research areas have been identified:
- Physical models (analytical and numerical), system identification
- Structural mechanics
- Fluid mechanics, hydrology and soil mechanics
- Geomatics and autoID
- Process safety and loss prevention
- Remote sensing and earth observation systems
- Positioning systems
- Sensors and actuators, interoperability and dependability
- Communication and sensor networks, Internet of Things, Web of Things
- Energy harvesting and power management
- ICT techniques for energy efficiency in buildings and cities
- Nondestructive tests, methods and technologies
- Signal and image processing, computer vision
- HW/SW design of embedded systems
- Machine learning applied to structural and environmental monitoring
- Information management, big data, crowd sensing, data availability, data privacy and security
- Data modeling, data analysis/uncertainty, learning and cognitive analytics, prediction, decision support
- Domain specific platforms and services
- Modeling and simulation methodologies and tools for complex systems
- Safety, risk analysis and management
- Resilience and resilience engineering
- Logistics (in ordinary and extraordinary conditions)
- Optimization schemes/strategies
- Reliable systems design and project based learning
- Environmental multi-source pollution and control
- Emergency management and communication
- Circular economy and circular resource management

PhD positions and scholarships:

<table>
<thead>
<tr>
<th>Position n.</th>
<th>Financial support</th>
<th>Description</th>
<th>Positions linked to research subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PhD Scholarship</td>
<td>totally financed by the University of Bologna general budget</td>
<td></td>
</tr>
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<td>PhD Scholarship</td>
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<tr>
<td>4</td>
<td>PhD Scholarship</td>
<td>partly financed from the central budget and co-financed by the Department of Informatics - Science and Engineering</td>
<td>Structural and geotechnical engineering</td>
</tr>
<tr>
<td>5</td>
<td>PhD Scholarship</td>
<td>financed by MIUR under the &quot;Departments of Excellence&quot; initiative</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>PhD Scholarship</td>
<td>financed by MIUR under the &quot;Departments of Excellence&quot; initiative</td>
<td>Chemical and process engineering</td>
</tr>
<tr>
<td>No.</td>
<td>Type</td>
<td>Details</td>
<td>Funding and Duration</td>
</tr>
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<tr>
<td>7</td>
<td>PhD Scholarship</td>
<td>funded under the three-year High Competence Plan for research, technology transfer and entrepreneurship (POR FSE funds – Resolution n. 388 of 19/03/2018). The assignment of this scholarship is subject to the declaration of residence or domicile of the beneficiary in Emilia-Romagna.</td>
<td>MODIASC – Monitoring and advanced damage diagnostics of civil structures with technologies based on pervasive sensing and real-time analysis</td>
</tr>
<tr>
<td>8</td>
<td>PhD Scholarship</td>
<td>financed by ARCES - Advanced Research Center on Electronic System and co-financed by the Department of Informatics - Science and Engineering</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Research grant</td>
<td>provided by ARCES - Advanced Research Center on Electronic System under the Arrowhead Tools project &quot;European investment for Digitalisation and Automation Leadership&quot; (H2020-ECSEL, GA 826452) and with resources from STMicroelectronics, with a duration of 12 months renewable up to a maximum of 36 months and a gross perciptent amount of €19,367.</td>
<td>Machine-learning based anomaly detection techniques for structures and industrial plants</td>
</tr>
<tr>
<td>10</td>
<td>Research grant</td>
<td>provided by the Department of Electrical Energy and Information Engineering &quot;Guglielmo Marconi&quot; under the MAC4PRO project &quot;Smart maintenance of industrial plants and civil works&quot;, Call for applications INAIL BRIC - Edition 2018 – Principal investigator Prof. Luca De Marchi. The research grant will have a duration of 12 months renewable up to a maximum of 36 months and a gross perciptent amount of €19,948.73€.</td>
<td>Development and optimization of microcontroller-based sensor networks for Structural health monitoring</td>
</tr>
<tr>
<td>11</td>
<td>Industrial doctorate</td>
<td>position reserved to employees of FRAME S.r.L.</td>
<td>Structural behaviour of metal silos containing granular material, storage facilities and related handling systems</td>
</tr>
</tbody>
</table>

**Positions linked to specific research subjects:** during the oral test, applicants may express their interest in one or more positions linked to specific research subjects. Considering the expressions of interest above, the Admission Board shall express its view on the suitability of the interested applicants, taking into account their specific skills, experience and aptitude.

**Admission requirements**

Please, see art. 2 of the Call for applications

**Mandatory documents to be attached to the application**

Please, see art. 3 of the Call for applications

**Further qualifications that may be attached to the application, if in possession of the applicant** (only qualifications attested by documents drawn up in Italian or English, shall be considered as valid and assessed by the Admission Board)

- Multi-annual research proposal, with special emphasis on the activities to be completed during the first-year course. The proposal must meet the following requirements:
  - It must indicate in the cover page the research topics (up to 3) of the PhD Programme covered by the research project proposal and for which the applicant is applying;
  - It cannot exceed 10.000 characters, including spaces and formula possibly used. This figure does not include: the title of project, the outline, references and images (such as graphs, diagrams, tables etc - where present);
- The research projects that successful applicants shall carry out during their doctoral career may possibly differ from the project proposed at the application stage. This shall be defined together with the supervisor and approved by the Academic Board.
- Motivational letter. This must include the reasons prompting the applicant to attend the PhD Programme and those relevant experiences and research interests, that make the applicant suitable for the specific PhD Programme (2000 characters maximum, including spaces).
- Publications in extenso (monographs, articles published on scientific journals, volume’s chapters)
- Minor publications in extenso (national and international conference papers, etc.)
- Abstracts and posters presented during national and international conferences, etc. (max 3)
- Professional Master courses completed in Italy (1st or 2nd level) relevant to the PhD Programme
- Postgraduate vocational training programmes/specialisation programmes relevant to the PhD Programme
- Research activity of any kind - whether basic, applied, translational, etc. - carried out in any capacity, including when covered by research grants, and as a staff member of research projects
- Work activity
- Vocational internships
- Curricular and non-curricular training and guidance internships
- Documents attesting the knowledge of foreign languages
- Study periods completed by students outside their countries of origin (e.g. Erasmus programme or other similar mobility programmes)
- Other qualifications attesting the suitability of the applicants (scholarships, prizes, etc)
### Admission exams (art. 4 of the call for applications)

<table>
<thead>
<tr>
<th>Examination type</th>
<th>Schedule (please, note that applicants shall not receive any communication concerning the exams schedule)</th>
<th>Examination results publication (please, note that applicants shall not receive any communication concerning the publication of results)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualifications and research project evaluation</td>
<td>Non-presential.</td>
<td>The results of the qualifications and research project evaluation shall be available online starting from the 14/06/2019 at the page <a href="http://studenti.unibo.it">http://studenti.unibo.it</a> (please, select: “summary of the requests in progress” - “see detail” and open the pdf file “risultati valutazione titoli e progetto”)</td>
</tr>
</tbody>
</table>
| Oral examination | **Date** 01/07/2019  
In case that the oral examination cannot be completed in one day due to the large number of applicants, the oral exam schedule shall be made available at the webpage http://studenti.unibo.it together with the results of the qualifications and research project evaluation | The results of the oral examination shall be available on the webpage http://studenti.unibo.it starting from 05/07/2019 (please, select “summary of the requests in progress” - “see detail” and open the pdf file “risultati prova orale”) |
|                  | **Place** Bologna- ARCES  
Viale Carlo Pepoli, 3/2 |                                                                                                                                   |
|                  | **Time** 09:00                                                                                     |                                                                                                                                   |

Applicants can ask to take the exam remotely using Skype. For further details please refer to the relevant provision laid down in art. 4 of the Call for applications.

### Evaluation criteria

Points will be allocated to applications out of a total of 100 on the basis of the following weighting:

1. **Qualifications and research project**
   - Minimum for admission to the oral exam: 30 points
   - Maximum: 50 points
   Only qualifications relating to the last 5 calendar years prior to the calendar year of publication of the Call for applications shall be taken into consideration, with the exception of the University Degree (Diploma di laurea). Please, note that qualifications must be consistent with the PhD Programme.
   Points relating to qualifications shall be allocated on the basis of the following criteria:
   - Graduation final mark. Undergraduates shall be evaluated on the basis of the Weighted Average Mark (WAM): max 20 points
   - Publications: max 3 points
   - other qualifications: max 2 points
   Points relating to the research project shall be allocated on the basis of the following criteria:
   - Scientific value and ground-breaking nature of the proposal: max 12 points
   - description and structure of the proposal: max 8 points
   - proposal feasibility: max 5 points

2. **Oral examination**
   - Minimum for inclusion in the final ranking list: 30 points
   - Maximum: 50 points
   Oral examination includes the presentation of the research project and is intended to assess the suitability of the applicant to pursue scientific research as well as the general knowledge of issues connected to the PhD course. During the oral examination, knowledge of English language shall be assessed.
   The oral examination is carried out in Italian or in English.
   Points relating to the oral examination shall be allocated on the basis of the following criteria:
   - knowledge of the English language: max 5 points
   - research project presentation: max 25 points
   - general knowledge of issues connected to the PhD course: max 20 points
   Possible evaluation sub-criteria will be available on the Unibo website, selecting the relevant PhD Programme → “PhD programme information” at the bottom of the page in the section “Notices”.

### Final ranking list and enrolment (arts.6 and 7 of the call for applications)

After the publication of the results of the oral exam, the final ranking list will be available on the Unibo website, selecting the relevant PhD Programme → “PhD programme information” at the bottom of the page in the section “Notices”.

Following the publication of the final ranking list, successful applicants must enrol on http://studenti.unibo.it by the deadline indicated on the Unibo website, selecting the relevant PhD Programme → “PhD programme information”.

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*Admission exams (art. 4 of the call for applications)*

**Examination type**

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**Oral examination**

| Date | 01/07/2019  
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| Place | Bologna- ARCES  
Viale Carlo Pepoli, 3/2 |                                                                                                                                   |
| Time | 09:00                                                                                     |                                                                                                                                   |