

# MECHANICS AND ADVANCED ENGINEERING SCIENCES (DIMSAI)

Section "PhD positions and scholarships" integrated on 14/05/2018

Section "PhD positions and scholarships" integrated on 25/05/2018

Section "PhD positions and scholarships" integrated on 05/06/2018

Section "PhD positions and scholarships" integrated on 22/06/2018

Section "PhD positions and scholarships" integrated on 01/07/2018

<b>Coordinator</b>	Prof. Marco Carricato Department of Industrial Engineering Viale Risorgimento 2 - Bologna <a href="mailto:marco.carricato@unibo.it">marco.carricato@unibo.it</a>
<b>Starting date of the PhD Programme</b>	01/11/2018
<b>Duration</b>	3 calendar years
<b>Language of the PhD Programme</b>	Italian and English
<b>Mandatory stay abroad</b>	Yes (3 months)
<b>Curricula</b>	<b>Research topics</b>
<b>1. Aerospace Engineering, Machine Elements, Manufacturing Processes and Metallurgy:</b>	The curriculum pursues the education of researchers and high-qualified engineers, operating in the fields of Mechanical and Aerospace Engineering and able to address issues related to design and research activities in disciplines such as: <ul style="list-style-type: none"> <li>- Aerodynamics and fluid dynamics</li> <li>- Tribological behavior of metallic materials, with and without surface modifications</li> <li>- Mechanical and aerospace design and structures</li> <li>- Aerospace plants and systems</li> <li>- Microstructure and mechanical properties of advanced metals and metal matrix composites</li> <li>- Flight mechanics and control</li> <li>- Experimental stress analysis, characterization and development of constitutive models</li> <li>- Design methods and tools in industrial engineering</li> <li>- Mechanical and aerospace technologies and materials</li> </ul>
<b>2. Internal Combustion Engines, Fluid Machinery, Energy Conversion Systems, Mechanics of Machines and Industrial Mechanical Plants:</b>	The curriculum includes different subjects, ranging from internal combustion engines to industrial mechanical plants. For the cultural fields Internal Combustion Engines, Fluid Machinery, Energy Conversion Systems the curriculum studies fluid machinery and energy conversion systems, addressing thermodynamic, fluid dynamic, energetic, ecological and technological issues by means of modeling, control and testing. In particular, the main research areas are: <ul style="list-style-type: none"> <li>- Modeling, control and testing of internal combustion engines and hybrid vehicles</li> <li>- Fluid dynamics simulation of internal combustion engines and fluid machinery</li> <li>- Numerical and experimental analysis in the field of gas turbines, combined cycles, steam engines, prime movers, and integrated systems for the processing and storage of energy from renewable and non-renewable sources.</li> </ul> For the cultural fields Mechanics of Machines and Industrial Mechanical Plants the curriculum comprises scientific and operative issues concerning the analysis, design and management of devices, machines, processes and industrial plants, through the adoption of a systemic approach and of methodologies drawn from theoretical, applied and experimental mechanics, industrial plants and production. The main research areas are: <ul style="list-style-type: none"> <li>- Automation, robotics and mechatronics</li> <li>- Biomechanics</li> <li>- Vehicles, transport and lifting systems</li> <li>- Dynamics and machine vibrations</li> <li>- Monitoring, diagnostics and prognostics of mechanical systems</li> <li>- Industrial plants and production systems</li> <li>- Maintenance and industrial safety</li> <li>- Instrumentation</li> <li>- Logistics and operations</li> </ul>
<b>3. Thermal Physics, HVAC Systems, Acoustics, Nuclear Technologies and Industrial Applications of Plasmas:</b>	<ul style="list-style-type: none"> <li>- Heat transfer and convection theory.</li> <li>- Thermal analysis of porous media</li> <li>- Thermal and fluid-dynamic aspects of single-phase and two-phase flows in conventional devices and microdevices (microfluidics)</li> <li>- Applied thermal engineering and HVAC systems</li> <li>- Heat exchangers and heat recovery systems</li> <li>- Renewable energy for HVAC (heat pumps, solar plants)</li> </ul>

	<ul style="list-style-type: none"> <li>- Environmental acoustics, building acoustics, architectural acoustics, sound absorbing materials and systems, noise control techniques, digital processing of acoustic signals and lightning</li> <li>- Energy efficient buildings</li> <li>- Design of nuclear plants</li> <li>- Radioprotection</li> <li>- Risk analysis and safety</li> <li>- Modelling of neutron, charged particle and photon transport</li> <li>- Applications of nuclear technologies to medicine, industry and cultural Heritage</li> <li>- Direct Numerical Simulation (DNS) of two-phase flow</li> <li>- Development and validation of advanced computing platforms</li> <li>- Thermo-hydraulics of advanced nuclear reactors</li> <li>- Reliability and risk analysis at the system level</li> <li>- Calculation of thermodynamic and transport properties of plasmas</li> <li>- Physical modelling and design oriented simulation of plasma assisted processes</li> <li>- Diagnostics of plasma sources and processes</li> <li>- Biomedical applications of cold atmospheric plasmas and plasma medicine</li> </ul>
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**PhD positions and scholarships**

<p><b>Total number of the available PhD positions</b></p> <p>Please, note that for each Curricula a specific sub-ranking list will be drawn up.</p> <p>Positions with scholarship will be awarded on the basis of the Curriculum selected by applicants during the application stage and as indicated in the cover page of the research project proposal.</p> <p>Should available positions remain vacant, eligible applicants from the general ranking list may be contacted. The remaining available positions shall be awarded from the top of the ranking list downward.</p>	<p><b>20</b></p>
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<p><b>Positions with scholarship funded by the University of Bologna budget</b></p>	<ul style="list-style-type: none"> <li>- 3 totally funded by the University of Bologna general budget, reserved to Curriculum 1;</li> <li>- 3 totally funded by the University of Bologna general budget, reserved to Curriculum 2;</li> <li>- 1 funded through the “5 per mille fundraising campaign 2015”, reserved to Curriculum 3;</li> <li>- 1 funded by the University of Bologna general budget and co-financed by the Department of Industrial Engineering, reserved to Curriculum 3;</li> <li>- 1 funded by the Department of Industrial Engineering, reserved to Curriculum 3.</li> </ul>
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<p><b>Positions with scholarship linked to specific topics</b> (art. 9 of the Call for applications)</p> <p>During the oral examination, applicants will have the possibility to show their interest for one or more scholarships linked to specific topics. Taking into account the preferences expressed by the applicants and with due consideration of the applicants' skills and expertise, the Admission Board will establish if the applicants can be considered eligible for the allocation of the scholarships linked to specific topics</p>	<ul style="list-style-type: none"> <li>1 - financed by ENEA (Agenzia Nazionale per le Nuove Tecnologie, l'Energia e lo Sviluppo Economico Sostenibile), reserved to Curriculum 3 and focused on the research topic “Development and implementation of models for the study of severe accidents at nuclear plants using "best-estimate" type codes”</li> <li>1 - financed by the Department of Industrial Engineering, reserved to Curriculum 1 and focused on the research topic “Radio Science experiments with the BepiColombo mission”</li> <li>1 - financed by Regione Emilia-Romagna within the program “Alte Competenze per la ricerca, il trasferimento tecnologico e l'imprenditorialità” – Title of the research project: “Mechatronic solutions to innovate flexible and collaborative automation: robotized automatic machines”</li> <li>1 - financed by the National Research Council of Italy - CNR – STIIMA (Sistemi e Tecnologie Industriali intelligenti per il Manifatturiero Avanzato), reserved to Curriculum 2 and focused on the research topic “Electro-adhesive grippers, electrostatic actuators with variable capacitance, deformation/position and pressure/force sensors with variable capacitance or based on piezo-resistivity”.</li> <li>1 - financed by the Department of Industrial Engineering through funds from the EU H2020 Project EU H2020 FETOPEN - “MAGNIFY”, reserved to Curriculum 1 and focused on the research topic “Study of an electrospun multi-scale hierarchical structure for the construction of artificial muscles”</li> <li>1 - financed by the Department of Industrial Engineering, reserved to Curriculum 1 and focused on the research topic “Study of metal-composite hybrid junctions with high mechanical performances and self-sensing capacity”</li> </ul>
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<p><b>Position covered by research grants</b> During the oral examination, applicants will have the possibility to show their interest for one or more scholarships linked to specific topics. Taking into account the preferences expressed by the applicants and with due consideration of the applicants' skills and expertise, the Admission Board will establish if the applicants can be considered eligible for the allocation of these positions</p>	<p><b>1</b> – Financed by research grants issued by the Department of Industrial Engineering through funds from the EU H2020 Project <i>MyLeg</i>, (Principal investigator Prof. Andrea Zucchelli), reserved to Curriculum 1. Research grant shall have a duration of 36 months and shall amount to € 22.797,59 per year (gross amount including the taxes incurred by the receiver). Research grants shall be focused on the following topics: “<i>Study of elastic elements in composite materials for “My Leg” transfemoral prostheses</i>”</p>
<p><b>Reserved positions</b> (pursuant to art. 2, para 2, lett. e) of the M.D. n. 45/2013)</p>	<p><b>1</b> – reserved to the employees of ENEA</p>
<p><b>Positions without scholarship</b> (please, refer to art. 7 of the call for applications)</p>	<p><b>3</b></p>
<p><b>Admission requirements</b></p>	
<p>Please, see art. 2 of the Call for applications</p>	
<p><b>Mandatory documents to be attached to the application</b></p>	
<p>Please, see art. 3 of the Call for applications</p>	
<p><b>Further qualifications that may be attached to the application, if in possession of the applicant</b> (only qualifications attested by documents drawn up in Italian, English, French, German and Spanish shall be considered as valid and assessed by the Admission Board)</p>	
<ul style="list-style-type: none"> <li>- Abstract of the second cycle master's degree thesis. Undergraduate applicants may submit the draft of the thesis approved by their supervisor (please, note that abstracts cannot exceed 5.000 characters, including spaces and formula possibly used. The above figure does not include: the title of thesis, the outline, and images such as graphs, diagrams, tables etc. - where present)</li> <li>- Multi-annual research project, with special emphasis on the activities to be completed during the first-year course. The proposal must meet the following requirements: <ul style="list-style-type: none"> <li>o <b>It must indicate in the cover page the research topic of the PhD Programme covered by the research project proposal and for which the applicant is applying.</b></li> <li>o It cannot exceed 20.000 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);</li> <li>o It must include: the state of the art; description of the project; expected results; lead-time for implementation; (proposed) criteria to be used to assess the findings obtained; references.</li> </ul> <p>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.</p> </li> <li>- List of the publications (monographs, articles published on scientific journals).</li> <li>- List of the minor publications (conference papers, volume's chapters, etc.).</li> <li>- 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.</li> <li>- Foreign languages</li> <li>- Study periods completed by students outside their countries of origin (e.g. Erasmus programme or other similar mobility programmes).</li> <li>- Other qualifications attesting the suitability of the applicants (scholarships, prizes, etc).</li> </ul>	
<p><b>Admission exams</b> (art. 4 of the call for applications)</p>	
<p><b>Examination type</b></p>	<p><b>Schedule</b> (please, note that applicants shall not receive any communication concerning the exams schedule)</p> <p><b>Examination results publication</b> (please, note that applicants shall not receive any communication concerning the publication of results)</p>
<p><b>Qualifications and research project evaluation</b></p>	<p>Non-presential.</p> <p>The results of the qualifications and research project evaluation shall be available online starting from the <b>20/06/2018</b> at the page <a href="http://studenti.unibo.it">http://studenti.unibo.it</a> (please, select: (please, select “summary of the requests in progress” - “see detail” and open the pdf file “risultati valutazione titoli e progetto”)</p>

<b>Oral examination</b>	<b>Date</b>	<b>02/07/2018</b> 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 <a href="http://studenti.unibo.it">http://studenti.unibo.it</a> together with the results of the qualifications and research project evaluation	The results of the oral examination shall be available on the webpage <a href="http://studenti.unibo.it">http://studenti.unibo.it</a> starting from <b>05/07/2018</b> (please, select “summary of the requests in progress” - “see detail” and open the pdf file “risultati prova orale”)
	<b>Place</b>	Bologna - Viale Risorgimento 2 Scuola di Ingegneria e Architettura Sala del Consiglio Edificio principale, II piano	
	<b>Time</b>	9 a.m.	
	<b>Pursuant to art. 4 of the call for applications, applicants residing regularly abroad can ask to take the exam remotely using videoconferencing tools (e.g. Skype). Please, for further details refer to the relevant provision laid down in the Call for applications.</b>		

**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 years 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 course.

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 and other qualifications: max 5 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 15 points
  - description and structure of the proposal: max 5 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 in respect of the pursuing of scientific research as well as the general knowledge of issues connected to the PhD course.

During the oral examination, knowledge of the following foreign language shall be assessed: English.

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 foreign language (English): max 5 points
  - applicant' suitability for academic research and knowledge of the issues connected to research project: max 30 points
  - general knowledge of issues connected to the Master's degree dissertation: max 15 points

Possible evaluation sub-criteria shall be made public on <http://studenti.unibo.it> (select: “summary of the requests in progress” - “see detail” and open the pdf file named “sub-criteri di valutazione”).

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

Only after the publication of the results relating to the oral exam, the final ranking list shall be available at the page <http://studenti.unibo.it>. In the section “Summary of requests in progress”, the status of the application submitted shall be “Final ranking List available”. A click on “See detail”, will open the webpage where the pdf file “Graduatoria” can be downloaded (at the bottom of the page).

Please, note that written communication about the final results and the deadlines for the enrolment shall not be sent to the applicants.

The enrolment of successful applicants must be completed by the deadline laid down at the bottom of the final ranking list.