



# PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 38th cycle

**Research Area n. 1 - Advanced Materials and Smart Structures**

**THEMATIC Research Field: INNOVATIVE MATERIALS AND ADVANCED PROCESSES**

<b>Monthly net income of PhDscholarship (max 36 months)</b>
<b>€ 1325.0</b>
In case of a change of the welfare rates during the three-year period, the amount could be modified.

<b>Context of the research activity</b>	
<b>Motivation and objectives of the research in this field</b>	<p>The demand arising from technological innovations driven by the uptake of new manufacturing processes and improved product performance, is strongly motivating the development of innovative structural and functional materials with advanced and new properties. Future materials need to be designed/optimized according to their specific processing route (e.g. materials for additive manufacturing), need to possess specific thermal and physical properties to fulfill special functions (e.g. phase change materials for thermal storage) could preferably show variation of their properties within the volume of a single components (e.g. multi-materials, gradient 3D lattices, metal-ceramic composites). Even more, they could act as "smart materials" adding a further dimension to materials science, being able to react to external stimuli by providing a change in their behaviour or properties. In addition, metalworking processes also require extensive innovation to allow the control of both traditional and new materials according to reliable, cost-effective and sustainable criteria. Several research projects are available within this frame. Details about the specific topics will be supplied on request.</p>
<b>Methods and techniques that will be developed and used to carry out the research</b>	<p>The Material research group has expertise on microstructural and mechanical characterization of advanced metallic alloys. The methods to be used will</p>



	involve Thermodynamic modelling of alloy microstructure, tools for experimental analyses on phase and microstructure analyses (optical and electron microscopy, EBSD, XRD, DSC...) and mechanical characterization among others by tensile testing, fracture toughness, fatigue testing, creep. For more details about infrastructures, see: <a href="https://www.mecc.polimi.it/us/research/departmental-laboratories/">https://www.mecc.polimi.it/us/research/departmental-laboratories/</a> .
<b>Educational objectives</b>	At the end of the PhD cycle the candidate will be able to define, design and carry out original research programs by working in a team or leading a research group in the field of smart materials. Opportunities will be offered for spending visiting periods hosted by project partners for scientific cooperation.
<b>Job opportunities</b>	Job opportunities are foreseen at national and international academic institutions, high-tech companies and SMEs involved in innovation and technical development sharing research with the Materials groups at PoliMi. Our last survey on MeccPhD Doctorates highlighted a 100% employment rate within the first year and a 35% higher salary, compared to Master of Science holders in the same field.
<b>Composition of the research group</b>	4 Full Professors 6 Associated Professors 2 Assistant Professors 10 PhD Students
<b>Name of the research directors</b>	Prof. Maurizio Vedani

#### Contacts

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#### Additional support - Financial aid per PhD student per year (gross amount)

<b>Housing - Foreign Students</b>	--
<b>Housing - Out-of-town residents (more than 80Km out of Milano)</b>	--



Scholarship Increase for a period abroad	
Amount monthly	662.5 €
By number of months	6

**Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information**

Financial aid is available for all PhD candidates (purchase of study books and materials, funding for participation in courses, summer schools, workshops and conferences): 5.401,42 euro.

Our candidates are strongly encouraged to spend a research period abroad, joining high-level research groups in the specific PhD research topic, selected in agreement with the Supervisor. An increase in the scholarship will be applied for periods up to 6 months (approx. 660 euro/month - net amount).

Teaching assistantship: availability of funding in recognition of supporting teaching activities by the PhD candidate. There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.