



# PhD in INGEGNERIA DELL'INFORMAZIONE / INFORMATION TECHNOLOGY - 39th cycle

Research Area n. 1 - Computer Science and Engineering

**THEMATIC Research Field: DEVELOPING MACHINE-LEARNING-BASED ONCOLOGY  
SUPPORT DECISION SYSTEMS USING MEDICAL IMAGES**

**Monthly net income of PhDscholarship (max 36 months)**

**€ 1400.0**

In case of a change of the welfare rates during the three-year period, the amount could be modified.

## Context of the research activity

### Motivation and objectives of the research in this field

Lung cancer is among the leading cause of cancer-related deaths globally. Non-Small Cell Lung Cancer (NSCLC) accounts for approximately 85% of all lung cancers. Despite recent advances in treatment, such as the adoption of immunotherapy, the survival rate for NSCLC patients remains low, and identifying the most effective treatment for individual patients remains challenging. This PhD program aims at using the large amount of information provided by the images present in the clinical record of the patient to provide suggestions to the physician about the effectiveness of immunotherapy for NSCLC.

### Methods and techniques that will be developed and used to carry out the research

This research will develop novel algorithms to extract predictive models, based on deep and convolutional Neural Networks (NN), to specifically target medical data. In particular, general-purpose and pre-trained NNs have shown poor performance in the case of medical images. Moreover, in the medical field, the number of available training data is scarce since the numerosity corresponds to the number of patients treated with immunotherapy (usually of the order of hundreds per clinical center). Therefore the focus will be on the development techniques able to target images for the specific disease NSCLC that work even with a limited



	amount of training samples.
<b>Educational objectives</b>	The PhD program in Information Technology offers advanced scientific training that enhances the research and problem-solving skills of doctoral candidates. The program focuses on both theoretical and experimental skills to foster high-level scientific competence. Upon completion, graduates will possess the ability to independently develop and execute original research, either by leading a research group or working collaboratively within a team.
<b>Job opportunities</b>	Being a joint work in the intersection of computer science and the medical field, the PhD will outcome in career opportunities in academia or the medical field, as the research program involves interdisciplinary knowledge in AI and health. Potential job opportunities include positions as a data scientist, AI engineer, or medical researcher, collaborating with medical centers to apply and refine the techniques developed during the PhD. The candidate may also consider pursuing a postdoctoral fellowship to continue research in the field or start their own research program.
<b>Composition of the research group</b>	0 Full Professors 2 Associated Professors 16 Assistant Professors 20 PhD Students
<b>Name of the research directors</b>	Francesco Trovò

<b>Contacts</b>	
E-mail: francesco1.trovo@polimi.it Tel: 0223994101 <a href="https://trovo.faculty.polimi.it/index.html">https://trovo.faculty.polimi.it/index.html</a>	

<b>Additional support - Financial aid per PhD student per year (gross amount)</b>	
<b>Housing - Foreign Students</b>	--
<b>Housing - Out-of-town residents (more than 80Km out of Milano)</b>	--

<b>Scholarship Increase for a period abroad</b>
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<b>Amount monthly</b>	700.0 €
<b>By number of months</b>	6

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

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. The PhD is in the context of an HE project, I3Lung (<https://i3lung.eu/>), whose goal is the development of a platform able to provide support to physicians regarding the most suitable immunotherapeutic treatment for non-small cell lung cancer. The project already started collecting data from real-world patients, which will be made available for processing in the PhD. In the development of the PhD, prof. Giacomo Boracchi will be involved for his expertise in the development of algorithms using NN-based techniques.

EDUCATIONAL ACTIVITIES (purchase of study books and material, including computers, funding for participation in courses, summer schools, workshops and conferences): financial aid per PhD student

5.707,20 Euro per student

TEACHING ASSISTANTSHIP: availability of funding in recognition of supporting teaching activities by the PhD student 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.