POLITECNICO DI MILANO

PhD in BIOINGEGNERIA / BIOENGINEERING - 38th cycle

PARTENARIATO PNRR Research Field: DEVELOPMENT OF PATIENT-SPECIFIC COMPUTATIONAL MODELS FOR THE TREATMENT OF VASCULAR PATHOLOGIES

Monthly net income of PhDscholarship (max 36 months)
€ 1250.0 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	Globally cardiovascular disease remains the leading cause of death and disability, accounting for 1 in 4 of all deaths worldwide In the European Union alone. This accounts for 1.9 million deaths every year, with an annual cost to the economy of € 210 billion. Identification of patients at high risk and providing the optimised treatment to minimize consequence post-intervention is key to addressing this societal burden. The proposed research activity is part of the PNNR project MUSA (spoke 2) and aims to build predictive computational models for the treatment of vascular pathologies with the presence of stent-like devices (coronary stents, percutaneous valves, thrombectomy devices, flow diverters, stent-grafts, among others). This thesis will permit the development of a general framework applicable to the intervention optimization for patients with vascular pathologies.
Methods and techniques that will be developed and used to carry out the research	During the PhD program the student will learn about nonlinear numerical methods based in finite elements for structural and fluid dynamic analysis. These methods will be used by the student to autonomously create patient-specific, finite element models of diseased arteries, and to simulate the treatment of these pathologies with endovascular devices. The PhD thesis demands intensive collaboration with engineers, biologists and clinicians of national and international centers.

	international centers. This will require the candidate to acquire proficiency in the specialist engineering and clinical language to facilitate communication and knowledge delivery. These efforts will sum up in the development of a solid background in the biomechanics of diseased arteries and its treatment by the end of the PhD program.
Educational objectives	- Learn, apply and develop numerical tools to analyze the mechanisms of disease in arteries - Understand the interaction between the medical device and the underlying vascular tissue, and its relation with the evolution and treatment of the pathology - Team work in biomechanics research - International collaboration
Job opportunities	After the completion of the PhD, the candidate could pursue jobs either in the academy as Post-Doc researcher in biomechanics worldwide or at biomedical device companies or consultancy company in the field of medical devices.
Composition of the research group	3 Full Professors 1 Associated Professors 1 Assistant Professors 7 PhD Students
Name of the research directors	PROF. FRANCESCO MIGLIAVACCA - PROF. GIULIA LURAGHI

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

Scholarship Increase for a period abroad

Amount monthly	625.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
A shared desk and computer will be given to the PhD student for the time needed to carry out research. Short periods of teaching assistantship are encouraged during the program.