








MSCA Postdoctoral Fellowships at Sorbonne University

Call for expression of interest 2024

ENGINEERING	
Code	Topics and supervisors / research units
ENG1	<p>Machine learning approaches to speed up the development of electrospun biomaterials Timothée Baudequin - Biomécanique et Bioingénierie (BMBI) - Compiègne</p> 
	<p><i>Electrospinning is a widely-used method of polymer fibres production, but setting up the process for a new polymer solution is complex and time-consuming (mostly trial-and-error approaches) due to the high number of involved parameters to achieve a stable process. The objective of the project would be to use machine learning to predict the optimal parameters for a given solution. Literature is scarce on this topic but such an algorithm would be extremely useful to hasten biomaterial development.</i></p>
ENG2	<p>Transport phenomena in the vascular system: Contribution of the corpuscular aspect of blood Badr Kaoui - Biomécanique et Bioingénierie (BMBI) - Compiègne</p> 
	<p><i>The corpuscular aspect of blood - that blood is a fluid made up of a suspension of cells, mainly red blood cells - has been discarded in studies of mass transport of drugs and biochemical signals. There is a lack of studies that shed light on the effects of the corpuscular aspect of blood on the transport and spatial distribution of moving solutes in the bloodstream. The project will character and highlight the interplay between mass transport and the dynamics and deformation of blood cells.</i></p>
ENG3	<p>HYbrid exPERimental and in-silico approach to optimize electrospinning process as a new route to develop multi-FUNctional nanos-structured systems: case of PVDF-Iron oxide nano-composites for energy harvesting systems: HYPERFUN Fahmi Bedoui – Laboratoire Roberval - Compiègne</p> 
	<p><i>Electrospinning (ES) is the most versatile method where nanodroplets made of a solution of polymer chains are expelled under a strong electrostatic attractive force. Optimizing the global experimental parameters to reach optimal fibers was the focus of a large body of literature. However, few and mostly phenomenological modeling studies can be found. We will propose a hybrid experimental and atomistic approach to simulate the ES and explain the underlying molecular mechanism of this process.</i></p>
ENG4	<p>Incorporating sustainability indicators in maintenance decision-making models Amélie Ponchet Durupt - Laboratoire Roberval - Compiègne</p> 
	<p><i>Maintenance decision-making models are mainly assessed and optimized based on economic criteria such as the average long run cost rate and its variations or on performance criteria such as the availability of the system. In the actual context where companies have to face several challenges to reach carbon-neutrality other indicators both social and environmental need to be integrated in maintenance models to ensure a sustainable approach.</i></p>

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ENG5	Investigation of the link between the microstructure of metallic materials and their macroscopic behaviour Julie Marteau - Laboratoire Roberval - Compiègne	
	<p><i>The use of recycled parts or new processes requires the investigation of the link between the microstructure characteristics and the corresponding macroscopic behavior. Coupling of experimental characterizations (SEM, EBSD, spectrometry, acoustic emission, nanoindentation...) will be used to identify the features governing the macroscopic behavior. This experimental approach could be supplemented by numerical modelling to help the understanding of the mesoscale behavior.</i></p>	
ENG6	Micro-robotic system based on diamagnetic levitation principle optically localized and controlled Laurent Petit - Laboratoire Roberval - Compiègne	
	<p><i>Researchers of Roberval laboratory work on the development of planar micro-actuators using diamagnetic levitation principle controlled using laser signal and micrometric optical localization sensors. The project aims at developing a micro-robotic system based on diamagnetic levitation principle coupled with a closed-loop control using the localization technique. The objective is to ensure high performances in terms of positioning, repeatability and stability for micro-manipulation applications.</i></p>	
ENG7	Dashboard for the resilient low-carbon city Gilles Morel - Laboratoire Avenues - Compiègne	
	<p><i>The post-doc will contribute to the development of a dashboard for the resilient and low-carbon city which is a software on-line platform that aims to provide to urban partakers an access to multi-domain spatial and temporal data and a set of hybrid models to support monitoring, diagnosis, concertation and decision for adapting the urban development to climate change (flood, heatwaves, air quality ...). This tool is mainly developed with the open-source eco-system Python.</i></p>	