LMS Seminar

Bridging Biology and Engineering Through Computational Modeling

Jorge Grasa
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Date, time, and venue

November 19, 2026 (2 – 3 pm), Amphithéâtre Pole Mecanique

Abstract

Computational modeling has become a cornerstone of modern biomedical engineering, enabling the investigation of complex biological systems through predictive and quantitative approaches. By integrating mechanics, biology, advanced imaging, and numerical simulation, it provides powerful tools to understand physiological processes, support clinical decision-making, and advance therapeutic strategies. Examples from current research demonstrate how finite element modeling bridges biology and engineering across multiple scales, from ocular biomechanics to tissue regeneration. High-fidelity models of the human eye provide insight into corneal mechanics, intraocular pressure assessment, and the biomechanical response of ocular tissues, while recent studies on lens wobbling combine experimental observations and numerical simulations to explore the mechanisms governing crystalline lens motion and accommodation. Beyond ophthalmology, computational modeling and advanced imaging enable detailed investigations of structure-function relationships in musculoskeletal tissues and support the development of regenerative therapies. These approaches guide the design of biomimetic scaffolds for tendon regeneration, helping reproduce key structural and mechanical features of native tissues to promote functional tissue formation. Together, these examples highlight the role of computational modeling as a powerful link between biological understanding and engineering innovation, providing mechanistic insight and predictive capabilities for biomedical research and regenerative medicine.

About the speaker



Prof. Jorge Grasa is Full Professor of Mechanical Engineering at the University of Zaragoza (Spain) and a researcher at the Aragon Institute of Engineering Research (I3A). His research focuses on biomechanics, mechanobiology, tissue engineering, and computational modeling of biological tissues. He develops multiscale and multiphysics models to investigate cell-matrix interactions, tissue growth and remodeling, and the mechanical regulation of cellular processes. His work combines experimental and numerical approaches with applications in regenerative medicine, biomaterials, and engineered tissue constructs. He has authored numerous scientific publications and has led and participated in several national and international research projects.

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