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CM3 Computational Mechanical Design

LEARNING OBJECTIVES

The Computational Mechanical Design track is designed to equip mechanical engineers with the interdisciplinary and multidisciplinary skills needed to address the challenges posed by the increasing complexity of mechanical systems and the use of advanced materials, capable of performing safely under extreme conditions. This objective is achieved through a robust training program that enables students to consciously and critically utilize multiscale and multiphysics simulation tools and to take design decisions that lead to optimized, reliable, and sustainable solutions, both economically and environmentally. Students in this track will complete specialized courses in the mechanical behavior of materials and finite element simulations, computational fluid dynamics, and other related subjects, including topological optimization, structural monitoring, the application of machine learning in mechanical systems, and the development of digital twins. Additionally, students have access to a wide range of elective courses that allow them to deepen their expertise in areas such as the design of lightweight mechanical structures and components, bioinspired solutions, design for additive manufacturing, reliability, and robust design. They will also participate in a series of laboratory sessions aimed at developing practical solutions aligned with the course topics.

PRE-REQUISITES

No specific prerequisites are required for students choosing the Computational Mechanical Design track. However, a strong foundation in mathematics and physics, a solid understanding of materials, and knowledge of mechanical design principles are recommended. Additionally, students should possess the curiosity and problem-solving mindset needed to tackle complex, interdisciplinary, and multidisciplinary design challenges.

CM3 Computational Mechanical Design

LEARNING OUTCOMES

A mechanical engineer specializing in Computational Mechanical Design is a versatile professional with a broad and interdisciplinary cultural background. The in-depth study of complementary subjects enhances the engineer's expertise, enabling them to approach complex design challenges using advanced tools.

JOB OPPORTUNITIES

The interdisciplinary nature of the Computational Mechanical Design track enables students to pursue careers in companies that develop or produce systems and products focused on precise design aimed at optimized and sustainable solutions, both economically and environmentally. The skills acquired throughout this track make the mechanical engineer an ideal candidate to oversee and manage the entire product development process, from concept to production.

PARTNER UNIVERSITIES

There are numerous collaborations with some of the most prestigious international universities and companies. For example, in the past year, Computational Mechanical Design students have completed their theses at renowned institutions such as the Korea Advanced Institute of Science and Technology (KAIST, South Korea), Rheinisch-Westfälische Technische Hochschule Aachen (RWTH Aachen, Germany), Technische Universität München (TUM, Germany), Chalmers Tekniska Högskola (Chalmers, Sweden), École Polytechnique Fédérale de Lausanne (EPFL, Switzerland), Eidgenössische Technische Hochschule Zürich (ETH Zurich, Switzerland), and Technische Universiteit Delft (TU Delft, The Netherlands).

For further info and courses, please refer to the Educational Rules available on the School website: **https://www.ingindinf.polimi.it/formazione/regolamenti-didattici**