Master of Science in Mechanical Engineering

Bio-Inspired Engineering

CC4



Contacts







Prof. Gaetano Cascini

gaetano.cascini@polimi.it

Prof. Simone Cinquemani

simone.cinquemani@polimi.it

Track description

Nature has long been recognized as a source of efficient solutions and strategies adopted by living organisms for survival and biological evolution. Nature can inspire endless engineering applications, such as materials, structures, sensors, actuators, control strategies, adaptation and resilience principles as well as efficient use of resources. The *Bio-inspired Engineering* track offers interdisciplinary, advanced design competencies and critical thinking skills, exploiting the lessons learned from nature and showing how this knowledge can lead to more creative and sustainable engineering solutions.

Skills

Students will learn how to:

- address today's and tomorrow's technical and societal challenges with the creative potential of Nature, i.e. with a broader vision and a wealth of innovative tools and solutions
- design, develop and manage complex, sustainable and highperformance engineering solutions
- integrate the knowledge and skills of several disciplines (e.g., mechanical engineering, material chemistry, science, energy and control)
- collaboratively work in innovation team



CC4: Core Courses

Course Title

Energy Technologies for Efficient and Decarbonized Industry

Dynamics of Mechanical Systems

Advanced Machine Design

Advanced Manufacturing Processes B

Production Management

Advanced Materials for Mechanical Engineering

YEAR	SEM	ECTS	ECTS GROUP
1	1	10	10
1	1	5	5
1	2	10	10
1	1	5	5
1	2	5	5
1	1	5	5

CC4: Track Specific Courses

Course Title

Bio-inspired Design and Robotics

Instrumentation and Measurements for Bionic Systems

Soft Robotics

Biomimetic Structure Design

Additive Manufacturing B

Smart Materials

Elective courses

(Introduction to Green and Sustainable Chemistry, Metamaterials and Metastructures, Swarm Robotics, Topology Optimisation, Ef-Frugal Design and Innovation, Surface Treatment for Engineering Applications, ...)

Lab course

(Bioinspired Robotics, Prototyping of Bioinspired Solutions)

	YEAR	SEM	ECTS	ECTS GROUP
	1	2	10	10
	1	1	5	
	1	2	5	10
	1	1	5	
	1	1	5	
	1	2	5	
ficient and	2	1-2	5	30
	2	2	5	5

CC4: Master's Thesis

Mantainspired filtration of microplastics Classification and industrial applications of bio-inspired materials

Design of a bio-inspired robot for underwater explorations



Design of a growing robot inspired by roots