

MASTER BIOSURF

BIOMIMICRY AND SURFACE ENGINEERING



From Lotus effect to climate change

- Master in Materials Science and Engineering
- 4 semesters taught in English at École Centrale de Lyon
- Including 1 research project and 8 months of Internship
- A theoretical learning based on numerous practical activities and internationally renowned laboratories

OBJECTIVES

- To train scientists in materials science and surface engineering through a new transverse approach to biomimicry and ecological transition
- Cross-disciplinary approach to biomimicry: biomimicry and ecological transition, manufacturing and functionalization of surfaces, digital science

SCIENTIFIC FIELDS

Biomimicry

Surface Engineering

Tribology

Bio-inspiration

Surface manufacturing

Eco-conception

Materials Science

Physics

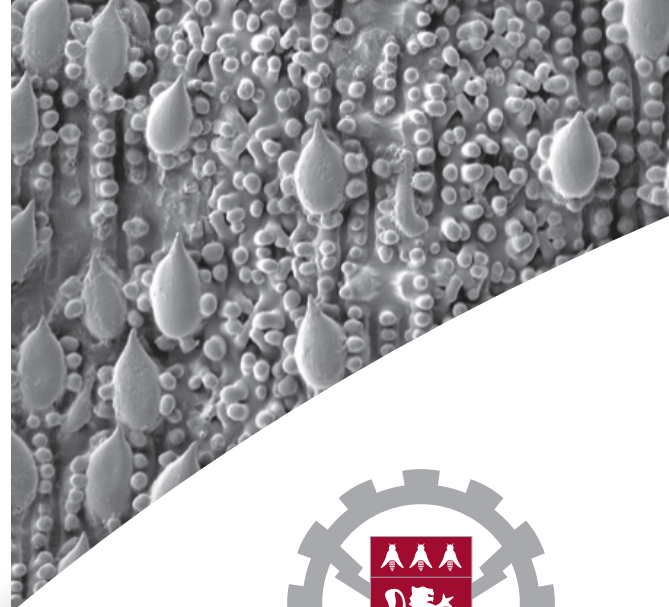
Climate change

Numerical computing

PREREQUISITES

Bachelor of Science

Preferably in Physics, Chemistry, Mechanics, Engineering Science, Materials Science



TRAINING CONTENT

■ Biomimicry courses

■ Numerical science and mathematics courses

■ Surface & Materials Engineering courses

S1	S2	S3	S4
Mathematics	Intercultural studies	Tactile Perception Engineering	Internship + Thesis
Biology / Living systems	Polymers and eco-conception	Climate Change	
Probability and statistics	Tribology and Bio-inspired surface engineering	Numerical Methods I: Macroscale (FEM)	
Computing for Engineers	Surface Manufacturing I: High temperature processes	Numerical Methods II: Nano / microscale	
Materials & Mechanical Engineering	Surface Characterization I: Optics & photonics for engineers	Surface Manufacturing II: 3D additive processes	
Physical Measurements	Language (French for foreign students or English for French students)	Surface Characterization III: Tribology	
Biomimicry: theory and interdisciplinarity	Surface Characterization II: Physics and chemistry of surfaces and interfaces	Biomimetics and SURFAB Project	
Language (French for foreign students or English for French students)	2-months internship	Numerical Methods II: Mesoscale	
		Surface Manufacturing III: Surface Engineering - Mechanical and ultrashort laser processes	
		Surface Characterization IV: Characterization of surfaces and nanostructures	
		Numerical Methods IV: Advanced numerical methods	

WIDE-RANGE OF SKILLS TO BE ACQUIRED

- Working effectively in the field of Surface Engineering with a bio-inspired approach
- Project management: in academic or in industrial research teams
- A grasp of complex problems with multi-disciplinary aspects
- Innovation: ability to solve problems and to manage risk, ability to think creatively and critically, use of research techniques
- Training a new generation of scientists taking into account ecological transition, climate change and biodiversity within high-level scientific projects



More info

MAIN OPPORTUNITIES

INDUSTRY Energy, Health, Transports, Materials, Surface Engineering, Tools and processes, Numerical simulation, Ecological transition, Biomedical, Bio-inspiration, Biodiversity, Numerical computing

PHDS AND SCIENTIFIC CAREERS BIOSURF prepares students for further studies at the doctoral level

CONTACT

- **Pr. Stéphane VALETTE**
Program manager
stephane.valette@ec-lyon.fr