



**CENTRALE
LYON**

Master 2 Mechanics

Degree level: Master

Training time: 1 year

Language: French

Status: Student

Campus: Lyon-Ecully Campus, Saint-Etienne Campus

Objectives

The **Master 2 Mechanics** at Centrale Lyon aims to train experts in the design, analysis, and optimization of complex mechanical systems through **5 specialization tracks**:

- Biomechanics
- Dynamics of Structures and Systems
- Surface Engineering of Interfaces and Structures
- Fluid Mechanics and Energetics
- Digital Solid Mechanics

Program

Biomechanics Structures and Systems Dynamics

Surfaces, Interfaces and Structures Engineering

Fluid Mechanics and Energy Computational Solid Mechanics

This pathway provides a deeper scientific grounding in the analysis and modeling of living tissues.

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Courses

- Finite element method in mechanics
- Modeling in mechanics of materials
- Tribology of living organisms
- Bioengineering
- Bio-materials
- Anatomy and Surgery
- Additive manufacturing
- English for professional communication level 2
- Corporate socio-economics

Internship

Students must complete a 5-6 month internship in a laboratory or within a company.

[Discover the syllabus](#)

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Courses

- Physical mechanics
- Mechanics and thermodynamics of continuous media
- Functional anatomy and surgery
- Tribology: principles and applications
- Materials behavior
- Tissue engineering and biomaterials

Internship

Students must complete a 5-6 month internship in a laboratory or within a company.

This course specializes in mechanics and vibration. It provides a mastery of modeling and numerical simulation tools and an understanding of physical phenomena in mechanics.

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Courses

- Physical mechanics and thermodynamics of continuous media
- Deepening, applications (DSM)
- Structural dynamics and machines
- Structural control and optimization
- Advanced modeling of systems & structures

Students can also choose from free UEs and complementary modules according to their training project.

Internship

Students must complete a 3-6 month internship in a laboratory or company.

[Discover the syllabus](#)

This pathway provides knowledge in materials science, process physics, surface and interface physics, to master the integrity of surfaces and structures of manufactured mechanical parts.

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Courses

- Physical mechanics
- Mechanics and thermodynamics of continuous media
- Tribology: principles and applications
- Soft matter: nanosystems and biological interfaces
- Sustainability of materials and nanostructures
- Characterization of surfaces and nanostructures
- Ultra-thin layers and functionalized Surfaces
- English
- Socio-economics

Internship

Students are required to complete a 3- to 6-month internship in a laboratory or within a company.

[Discover the syllabus](#)

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Courses

- Finite element method in mechanics
- Modeling in mechanics of materials
- Surface engineering
- Coating development methods
- General tribology
- Integrity of surfaces and structures
- Additive manufacturing
- Multi-physics for processes
- Tool-material-environment interaction
- Physical measurements applied to manufacturing processes
- English for professional communication level 2
- Corporate socio-economics

Internship

Students must complete a 3 to 6-month internship in a laboratory or within a company.

The Fluid Mechanics and Energy (MFE) course is designed to train students for careers in research and development in fields requiring in-depth knowledge of fluid mechanics. The program offers both fundamental courses and more specific courses geared towards energy and environmental issues.

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Courses

- Physical mechanics
- Mechanics and thermodynamics of continuous media

- Numerical simulation of flows
- Turbulence in flows
- Flow in the environment
- Aerodynamics, Propulsion
- Fluid Interfaces, Transfers, Mixing
- Fundamental Fluid Mechanics
- English

Students can choose additional courses as part of the free UE.

Internship

Students must complete a 3-6 month internship in a laboratory or company.

[Discover the syllabus](#)

The Computational Solid Mechanics pathway trains experts in the development of innovative simulations in the context of virtual engineering, which is increasingly present in industry.

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Learning

- Finite element method in mechanics
- Modeling in mechanics of materials
- Big data, model reduction and numerical twins
- Multi-physics couplings for processes
- Advanced numerical methods
- Intensive calculations
- Numerical methods for simulating mechanical models in dynamics
- English
- Corporate socio-economics

Internship

Students are required to complete a 3-6 month internship in a laboratory or within a company.

Diploma and certification

This course awards a national master's degree - controlled by the State.



Career opportunities

- Design, research and development manager
- Mechanical design engineer
- Production/industrialization engineer
- Calculation engineer
- Engineering or innovation consultant

Focus

A master's degree in co-accreditation with Université Claude Bernard Lyon 1 (UCBL) and Ecole des Mines Saint Etienne.

As part of this partnership, some courses will take place on their campuses.

- Université Claude Bernard Lyon 1 43, boulevard du 11 novembre 1918, 69100 Villeurbanne
- Mines Saint-Étienne, 158 Cour Fauriel, 42100 Saint-Étienne

Admission requirements and application

Pre-requisites

- Students holding a Master 1 or equivalent at Bac+4 (240 ECTS) obtained in civil engineering.
- Centrale Lyon engineering students as part of a double degree.

Application

Application based on portfolio. Details and dates to follow.

[FIND OUT HOW TO APPLY](#)

Tuition fees

Acknowledging and anticipating your expenses is essential before committing to a training course with confidence.

[FIND OUT ABOUT MASTER'S COURSE FEES](#) [DISCOVER THE AVERAGE STUDY BUDGET AT CENTRALE LYON](#)

Administrative contact

Education department - French-speaking Masters

Information and registration

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