This Research Master entitled « Electronic and Mechanical Engineering - Mechanical Engineering program» (EME) is a one-year study aiming at bringing students, the theoretical background required to be an expert in the field. This research oriented program is intended to form highly qualified personnel to be active in Mechanical engineering industries (transport, aeronautics, automobile etc). This Research Master is managed by international high-level institutes, Polytech Tours, the Laboratory of Mechanics and Rheology and the research centers CEROC, CERMEL, CERTEMPlus.

Invited lectures will be organized with the participation of scientists from partner institutes in UK, Poland, Italy and India.

This Masters, taught entirely in English, aims to specialize students in the science and engineering of ceramics, metals, polymers/elastomers, and composites, with emphasis on a variety of subjects like materials for electronics, biomaterials, nanotechnologies, mechanics, design, numerical modeling, reliability, life cycle analysis, fracture analysis etc.

This program will cater to the needs of both engineering and science majors. Close contacts with the Industry will be provided through off-campus work assignments in industry.
(internships) or in academic lab. Our goal is to produce well qualified materials scientists and engineers who can function effectively in the technical arena as well as possess the skills to assume leadership roles in industry, academia, and government.

**The program objectives are to produce graduates who are:**

- able to apply the principles of materials science for undertaking advanced engineering and/or research projects.
- knowledgeable about a variety of engineering materials (including metals, semiconductors, ceramics, polymers, and composites), and the relationships among processing, structure, properties, and performance.
- able to define and solve problems, especially those involving materials selection and design, and are able to develop, implement and evaluate solutions via integration of their basic scientific skills and knowledge.
- able to communicate effectively and who demonstrate the ability to function in multi-disciplinary teams.
- skilled at using modern engineering tools for characterization, analysis and design of materials.
- able to understand their responsibility towards their profession and society in a global context.

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**Contact**

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**Content**

U.E.1: Mechanical Properties of advanced materials - ECTS 5
Functional steels, titanium alloys, shape memory alloys, intelligent materials. Software for materials selection

U.E.2: Acoustics and vibrations - ECTS 5
Propagation phenomena, Acoustic radiation. Introduction to non-linear acoustics and its applications.

Experimental vibrations.

**U.E. 3: Heat transfer - ECTS 5**
Fundamentals of heat transfer according to conduction, convection and radiation

**U.E.4: Piezoelectric Materials and their Applications - ECTS 5**
Fabrication process, properties and functional characterization.

**U.E.5 : French language and French culture, job training - ECTS 6**
Students attending the EME master program will have to succeed to an English Level Test and to French Level Test.

Each student has to choose between courses U.E.6b, U.E.6c

**U.E.6b: Behaviour of Polymers and Elastomers - ECTS 4**

**U.E.6c: Material Fatigue - ECTS 4**

Each student has to choose between courses U.E.7b, U.E.7c

**UE 7b: Numerical Modeling of Materials and components - ECTS 5**
Electronics course: Design of analogical and bipolar circuits.
Mechanical engineering course.

**U.E. 7c: DS (SP) : Surface Engineering - ECTS 5**

**U.E.8 : Research INTERNSHIP : 5 month ECTS 25**
Internship in a research laboratory or in an industrial environment. Literature survey, presentation of the project and realization of the project under a project tutor. A final project report will be presented before a jury. The project can be carried out in one of the European partners to this program

**Total ECTS Points: 60**

**Scientific partnership**

The academic and industrial partners for this program are:

- Indian Institute of technology, Madras, India
- Vellore Institure of Technology, India
- Universtity of Lodz, Poland
In particular, within strategic partnership actions, the EME Mechanical Engineering program hosted 3 invited professors:
- Professor Geetha Manivasagam,
- Professor Ben Beake,
- Professor Bielinski.