



MASTER

ENERGY

EFEMO

Energy, Fluids, Environment, Optical Metrology
Option Laser diagnostic and optical metrology



CONDITIONS D'ADMISSION

Entry to the 1st year of the EFEMO Master's Degree

BScs in Mechanics, GSI-ME, Physics or Physics & Chemistry.

Entry to the 2nd year of the EFEMO Master's Degree

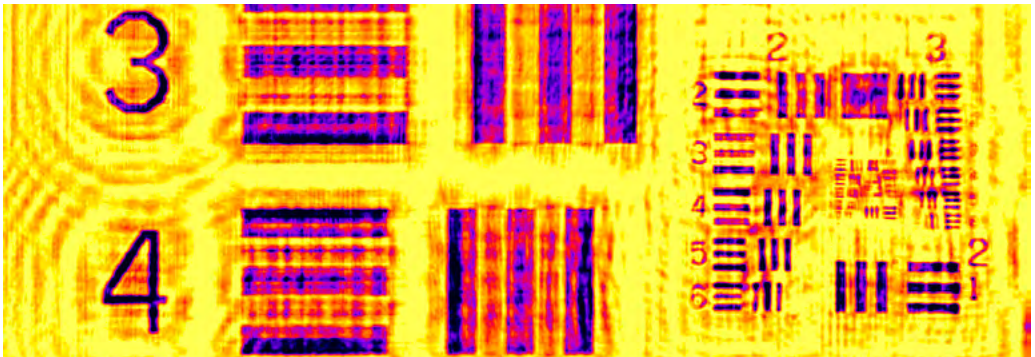
Initial training

Applications are open for students who will have completed their first year in a Master's Degree (obtained from the University / ESIGELEC / ESITECH / INSA). Candidates from other institutions will have their applications examined by a validation committee. Candidates who will have graduated from a Bachelor's Degree at the University of Rouen (Physics, GSI-ME, Physics & Chemistry) are advised to complete the first year in this Master's Degree in Energy, with the EFEMO specialisation and the LDOM option.

Whatever are the applicants' backgrounds, the syllabus will include basic teaching in optics, computer science or fluid mechanics during the first semester of the 2nd year of the EFEMO Master's Degree.

Continuing training

The Bachelor's Degree level will be required once the validation of prior professional experience will have been confirmed. Registration for the 2nd year of this Master's Degree is open to job seekers (with possible backing from the regional council of Normandy) as well as workers entitled to a career break. Students' registrations will depend on both the examination of their individual records and a personal interview. The validation of prior professional experience is likely to allow equivalent ratings for applicants, considering their professional backgrounds.



OBJECTIVES

The EFEMO Master 2 course, specialised in laser diagnostics and optical metrology, is aiming at training experts in the fields of optics and detectors, in order to help the students:

- quickly find work in the industrial sector,
- prepare a PhD within a research laboratory.

This course offers an opportunity to gain wider knowledge in the fields of optics, lasers and detectors. It benefits from the leading skills of the CORIA laboratory (collaborating with both the University of Rouen & the INSA Institute in Rouen), whose reputation has been established both nationwide and worldwide.

At the end of this course you will be able to:

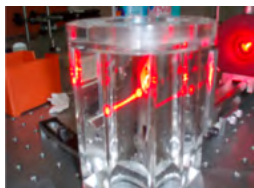
- Develop applications in optical metrology,
- Design optical devices for laboratories and for the industry,
- Apply electromagnetic theories for studying lasers,
- Master computer languages applied to image processing and numerical simulation,
- Collaborate with a team of engineers and/or researchers,
- Lead a scientific project in both French and English.

CURRICULUM

First Year

M1

- **Techniques et Méthods (4 CE)**
Numerical Simulation (36h)
- **Applications (6 CE)**
Fluid Mechanics (24h)
Thermal Transfers (24h)
- **English/Communication/Careers advice (8 CE)**
- **Fluid Mechanics (8CE) (94h)**
- **Thermal Transfers (8 CE)**
Thermal Transfers (70h)
Statistical Thermodynamics (24h)
- **Optics/Acoustics (4 CE)**
Optics (24h)
Acoustics (24h)
- **Image processing (1 CE) (14h)**
- **Optics, Lasers and Metrology (5 CE) (58h)**
- **Mathematics and numerical Analysis (11 CE)**
Mathematics (40h)
Advanced Numerical Simulation (84h)
- **Introductory Training Period to Laboratory Research (5 CE).**



Second Year

M2

Common-core Syllabus (Basic Training)

- **Fluid Mechanics, Turbulences, CFD (36h - 4 CE)**
- **Energy (36h - 4 CE)**
Combustion, cinétique, chimique, transferts et radiation
- **Human culture (36h - 3CE)**
English / Business Aspects / Careers Advice.

Specialisation in Laser Diagnostics and Optical Metrology

- **Optics (36h - 4 CE)**
Lasers and applications or optical signal processing or optical setups
- **Optical Systems in Coherent Light(3 CE)**
Light Diffusion, Lorenz-Mie Theory (10h)
Interferometric Optics (10h)
Diagnostic System Design in Coherent Light (10h)
- **Optical Systems in Incoherent Light (4 CE)**
Cardinal Points, Imaging (10h)
Optical Aberrations, Fields, System Design (10h)
Infrared Optics and Detectors (10h)
- **Applied laser systems and rapid imaging (4 CE)**
Ultra-fast lasers & non-linear optics (20h)
Spectroscopy (8h)
Ultra-fast imaging (8h)
- **Advanced image acquisition and processing (4 CE)**
Advanced filtering (14h)
Acquisition chain (10h)
Morphological analysis & segmentation (12h)
- **Applications (7 CE)**
Introductory training period in research (40h in laboratory),
Applied English (5h)
Laser diagnostic applications (25h),
Fluid and combustion applications (25h)
- **Final training period (23 CE)**
5-month period in a research laboratory or R&D department.

CONTACT CFCA

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Earning this Master's Degree after completing a Second year entitles students to obtain 60 European Credits. Training through this course combines a common-core syllabus as well as an optional specialisation in laser diagnostics and optical metrology (LDOM). This specialised unit is supported by the CORIA laboratory's core competencies (<http://www.coria.fr/>) and by its 'Optics & Lasers' Department. Teaching involves lectures, seminars and tutorials.

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UMR 6614

CAREER OPENINGS

Career prospects for the graduate

Depending on the nature of the work placement at the end of this degree, this course will help the students either find work or start a research in order to become a Doctor. Students graduating from the EFEMO Master's Degree with a specialisation in laser diagnostics and optical metrology will earn a diploma with international opportunities. In addition they will be able to supply not only SMEs with new ideas for innovation but also contribute to larger businesses in their R&D departments. Furthermore they will have been given the fundamentals to apply for a PhD thesis.

The Master's Degree Graduates ... in the Industry

- Staff Engineer
- R&D Engineer
- Metrological Engineer
- Sales Engineer

Prospects for the Students awarded with a Doctorate

The highest degree in an academic course on both national and international levels, the Doctorate is an indispensable diploma for students wishing to be hired at an international level. Thanks to it the Doctors are in charge of a wider range of professional aspects such as:

- The industry: Research and Development Engineers, Heads of Testing & Measurement

- Quality Control Engineer
- Consulting Engineer ... Working for the
- Automotive, Aerospace, Petrochemical, Optical, Energy Production, Biomedical sectors
- Testing Laboratories for Public or Private Institutions, Research Laboratories, Environmental Organisations

The Master's Degree Graduates ... on a Research Project Thesis

At the end of their training period in research, thanks to the EFEMO Master's Degree with a specialisation in laser diagnostics and optical metrology, students will have the opportunity to apply for a Research Project topic offered by the PSIME Graduate School (its initials standing for Physics, Engineering Sciences, Materials & Energy) within the University of Normandy or for another topic suggested by another laboratory in another university.

Laboratories, Executives responsible for R&D Operations (Project Management, Technological Watch, Consulting, etc.),

- Public and Private Research Organisations (CNRS, CEA, ONERA, DGA, Airbus Group, EDF, SAFRAN, ZODIAC AEROSPACE): Research Engineers, Researchers
- Teacher and Researcher in Higher Education (Universities, Private and Public Engineering Schools).

HEADS OF DEPARTMENT

1st year

Arnaud Bultel

2nd year

Ammar Hideur

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76801 Saint-Étienne-du-Rouvray CEDEX

The application form required prior to registration can be downloaded from the CORIA's website

Contacts Initial Training

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Continuing Training

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