Energy Master's Degree

Energy - Fluids - Environment - Metrology Optics

Specialisation in laser diagnostics and optical metrology

BEGINNING OF THE TRAINING at the University
September 2017

END OF THE TRAINING at the University
February 2018

APPLICATION DEADLINE
Before june, 30 2017

FINAL TRAINING PERIOD
5-month period in a research laboratory
or R&D department

COURSE LOCATION

- UFR des Sciences et des Techniques de Rouen
  Technopôle du Madrillet
  76801 Saint-Etienne du Rouvray

- UMR 6614 CORIA
  Technopôle du Madrillet - Avenue de l'Université
  BP 12 - 76801 Saint Etienne du Rouvray

CONTACTS

Initial training:
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UMR 6614 CORIA

Continuing training:
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Service de Formation Continue
76821- Mont-Saint-Aignan
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CORIA's website
http://www.coria.fr/
Section « formation »

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,

Conditions of Admission

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.

Teaching hours

EFEMO Master's Degree - 1st Year

- First semester: 412 Heures, 30 European Credits
- Second semester: 354 hours and initiation into research within a research team during, 30 EC.

EFEMO LDOM Master's Degree - 2nd Year

- Third semester : 282 Heures, 30 EC.
- Fourth semester : 45 Heures and 5-month period in a research laboratory or R&D department, 30 EC.

LABORATOIRES PARTENAIRES

UMR 6614 - CORIA,
CNRS, Université et INSA de Rouen.

UMR 6634 - GPM,
CNRS, Université et INSA de Rouen.

Laboratoire DC2N,
INSERM U982, Université de Rouen.

IRSEEM, ESIGELEC
Ecole supérieure d'ingénieurs en génie électrique, Rouen.

UMR 6252 CIMAP
CEA, CNRS, ENSICAEN et Université de Caen.

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,
- 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.

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 & Measrurement 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).

Curriculum

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.

EFEMO Master's Degree – First Year

Techniques and Methods I (4CE)

- Numerical Simulation (36h).

Applications (6CE)

- Fluid Mechanics (24h),
- Thermal Transfers (24h).

English / Communication / Careers Advice (8CE)

- English (40h)
- Communication (30h),
- Careers Advice (10h).

Thermal Transfers (8 CE)

- Thermal Transfers (70h),
- Statistical Thermodynamics (24h).

Optics / Acoustics (4 CE)

- Optics (24h),
- Acoustics (24h).

Mathematics and Numerical Analysis (11 CE)

- Mathematics (40h),
- Advanced Numerical Simulation (84h).

Fluid Mechanics (8 CE - 94h)

Image Processing (1 CE – 14h)

Optics, Lasers and Metrology (5 CE – 58h)

Introductory Training Period to Laboratory Research (5 CE)

EFEMO / LDOM Master's Degree – Second Year

Common-core Syllabus (Basic Training)

- Fluid Mechanics, Turbulences, CFD (36h - 4 CE) : Fluid Mechanics, Turbulences, CFD,
- Energy (36h - 4 CE) : combustion, kinetics, chemistry, transfers and radiation,
- Optics (36h -4 CE) : lasers and applications, optical signal processing, optical setups,
- Human culture (36h – 3CE) : English / Business Aspects / Careers Advice.

Specialisation in Laser Diagnostics & Optical Metrology

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.

Heads of Department
1st year of this Master's Degree
Marc Brunel

2nd year of this Master's Degree,
specialisation in Laser Diagnostics & Optical Metrology
Sébastien Coëtmellec
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