Welcome at
MINES Saint-Étienne !

MINES
Saint-Étienne
1816
2016

Process Engineering & Industrial Energy Efficiency

Master of Science

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INSPIRING
INNOVATION
SINCE 1816

A Master of Science (National Masters' Degree)
Accredited by the French Ministry of Higher Education and Research
at the ***École Nationale Supérieure des Mines de Saint-Étienne****, France*

Taught in English

A new opportunity for international students

- Taught in English
- A one year program
- Provide the diploma of Master of science
- A key step for PhD studies

Applications for Eco-efficient Industrial processes: to produce and use cleaner, safer, and efficient energy

This Master of Chemical Engineering is also partly focused on the study of industrial processes in relation with solid reactions (particles, powders, granular and porous media): studies ranging from micro to macro scale "From particles to processes"

Course structure

Process simulation & Advanced thermodynamics (6 ECTS)
- Focus on fluid thermodynamics
- Focus on water thermodynamics

Heat Generation : fission and nuclear reactor, combustion (4 ECTS)

Applied fluid mechanics for industry (6 ECTS)

Classical systems for massive energy generation (4 ECTS)

Systems for mass production of energy based on renewable energies (5 ECTS)

Energy processes biomass and solar (5 ECTS)

One of the following courses:
- Reactivity heterogeneous systems and modeling for the design of reactors (6 ECTS)
- Transfers, Reactors and Unit operations (6 ECTS)

Internships 6 months in laboratories at EMSE or in R&D industrial centers / 30 ECTS

Internships Opportunities

- Particle design: synthesis, reactivity and transport of dispersed and porous materials
- Modeling of powder chemical transformations under controlled atmosphere at a multiscale approach
- Crystallization of gas hydrates for flow assurance, CO_2 capture, gas production, CO_2 sequestration and air-conditionning

Job Opportunities

Associate professor, Research Engineer in Industrial R&D centers, Engineering for Energy processes
Various profiles in the field of chemical processes related to the energy chain:
- Free carbon energy production : nuclear, fossils and bio-sourced
- Efficient plants : materials, energy and water management

PhD Opportunities

Thermodynamics and kinetics study of gas hydrates crystallization (joint PhD with a petroleum company)
- Development of a NOx sensor for automotive exhaust applications (joint PhD with an automotive supplier)
- Study of oxalates mixtures decomposition (joint PhD with a nuclear fuel company)

Requirements for applicants

- Prior successful completion of a first year of a Master's Degree in theoretical and / or applied science, or equivalent diploma (at the home university or Ecole des Mines) /or 240 ECTS validated
- Level B1 (CEFRL-Common European Framework of Reference for Languages) in French language is required for students joining graduate engineering programs and Masters of Science taught in French.
- A good command of English is mandatory for all programs specifically the Masters taught in English.

With the collaboration of the research department SPIN

Chemical Engineering and Natural Processes

which gathers:

23 faculty members

28 PhD Students

Laboratories:

- PRESSIC: Processes with solid reactivity and solid-gas interactions
- ProPICE: Powders Processing, Interfaces, Crystallization and Flow
- GSE: GeoSciences and Environment

Expertise, competences and skills:

- Heterogeneous and granular dynamic systems,
- Multi-physics and multi-scales models, from nm3 to km3
- In line, in-situ and off-line physico-chemical characterizations
- Technology: from sensor to process designing, sizing and prototyping

4 analytical platforms, 1 technology platform, 1 Nuclear room, 1 Nano room

- PC2 : Powder and Physico-Chemical characterizations, / ESMAT : Solids Thermal Micro-Analyses,
- SAC : Spectro and Chemical caracterizations, / OSP : 2D and 3D Models in GeoSciences
- HALLE-T2E2: Hall for Energy and Water technologies prototyping

Industrial partners :
Areva, Total, Solvay, Rio Tinto, Arcelor, Lafarge, St-Gobain, Kerneos, Eramet

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