

BIOMASS AND WASTE FOR ENERGY AND MATERIALS

MASTER OF SCIENCE

ACCREDITATION

Master submitted to the French Ministry of Higher Education and Research for accreditation. Expected opening in September 2016.

KEY WORDS

Renewable feedstocks, eco-technology, processing, design, assessment, environmental burdens, green business, social responsibility

SCHOOL PROPOSING THE MASTER

Mines Albi, in co-accreditation with Institut Mines-Télécom, Paris, France

LANGUAGE OF TEACHING

English.

INCENTIVE

Given the current context of natural resource depletion, environmental and public health crises related to air and water pollution, pressures on energy supplies, we are facing a paradigm shift. The linear model “take, make, consume and dispose” is progressively being replaced by a 4R approach “repair, refurbish, reuse and recycle”. The circular economy is becoming day after day a new development strategy for nations. Better eco-design, waste prevention and reuse bring significant net savings for businesses, while also reducing environmental harm and bringing new job opportunities. Turning biomass and waste into a valuable resource is at the heart of this strategy. Generating new materials, processes and markets requires global high-level training, including science, technology, regulatory knowledge, management and economics. All these innovative systems will emerge at the crossroads of process engineering, chemistry, fluid mechanics, thermal science, environmental sciences and economics as well as social sciences and humanities. BiWEM was created to satisfy the growing needs of this dynamic sector.

COURSE AIMS

The objectives of BiWEM are to provide students with a sound theoretical and practical specialised knowledge in the field of biomass and waste processing. Students in the program will acquire the ability to design economically viable biological or thermochemical processes for the conversion of biomass and waste into new materials or energy carriers, within a sustainable development frame. Consequently, BiWEM focus on chemical engineering but also includes courses on economics, international regulations and on certain areas of the social sciences and humanities.

PROGRAM

This is a full-time program of 2 years divided into four semesters: lectures, tutorials and practical work over the 3 academic semesters followed by an internship of one semester in a company or in a public research lab. The program is composed of five teaching blocks, including an integrated team project over the three academic semesters under the supervision of expert practitioners. During the 6-month MSc thesis, students have the opportunity to consolidate and improve the knowledge and the skills being taught. Students are supervised by a tutor from the host organization and by a senior lecturer from Mines Albi. Thesis is concluded by the preparation of a final report and an oral dissertation in front of a jury.

1. Environmental and social economic issues (26 ECTS)

- > Ethics, management and economics of the environment
- > Corporate social responsibility
- > Ecotechnologies and innovation
- > Global environmental business

2. Fundamental science and generic engineering tools (20 ECTS)

- > Fundamentals of transport phenomena, applied chemistry, biochemistry, metabolic pathways
- > Generic numerical and experimental methods for process optimization and engineering
- > Process modeling, integration and assessment

3. Fundamentals for renewable resource conversion (22 ECTS)

- > Resource availability, collection and sustainability
- > Biomass and waste pre-processing
- > Fundamentals of biological and thermochemical reactor design
- > Gas and solid coproducts post processing

4. Putting theoretical concepts into practice (22 ECTS)

- > Industrial visits
- > Industrially-relevant project work, sponsored by industrial partners: Environmental-friendly design of an economically viable processing route for turning waste or biomass into energy, chemical or useful material.

5. MSc Thesis (30 ECTS)

- > 6-month MSc thesis in industry or in a public research lab, in France or abroad.

LOCATION

The 3 academic semesters will be held on the Mines Albi campus. Albi is located 70 km from Toulouse, the capital city of the French southwestern Midi Pyrénées Languedoc Roussillon Region, which is ranked among the 12 most dynamic European Regions. The city of Albi is part of the UNESCO's World Heritage.

ADMISSION REQUIREMENTS

Participants must hold a Bachelor of Science or Engineering degree, in the field of chemical engineering, clean technology, mechanical engineering, energy. Participants with some industrial experience are also welcome.

LANGUAGE REQUIREMENTS

English

- > Mother tongue or
- > Bachelor degree taught in English or
- > English language qualification such as
 - TOEFL IBT 80,
 - IELTS 6.0,
 - TOEIC 750,
 - Cambridge CAE.

French

No prerequisite in French, but TEF II or equivalent may be required to obtain a visa.

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APPLYING

All applications should be made on-line:

www.mines-albi.fr/biwem

Applications are open from January to June each year.

HIGHLIGHTS

- > Program boosted by the research department RAPSODEE CNRS UMR 5302 having an outstanding international recognition. This centre has been granted by the French government as a research centre of excellence in Science for Energy Conversion (under Labex and Equipex funding schemes). This label is given to only 10% of the research labs in France. RAPSODEE has also developed and hosts the Springer peer-reviewed journal "Waste and Biomass Valorization" and the WasteEng Conferences Series.
- > Strong interaction with industry through conferences, practices and visits. RAPSODEE works closely with more than 50 companies, including world leaders in the field of Energy and Environment.
- > Good grounding in a core set of engineering competencies.
- > In-depth knowledge of the key crosscutting methods associated with process design and integration.
- > Access to impressive and up-to-date onsite pilot-scale facilities.
- > Opportunity to undertake an industrially- relevant project, sponsored by companies, and to develop a sense of decision-making.
- > 6-month MSc thesis in industry or in a public research lab.
- > A quality charter to welcome international students to the Mines Albi international campus.
- > Courses taught entirely in English and in small groups.
- > Free French language courses.

SKILLS ACQUIRED

- > Ability to use state of the art, sciences, technology, business model and regulatory aspects to conceive and develop processing routes for waste and biomass valorization.
- > Ability to use experimental and numerical methods for process conceptual and detailed design, optimisation and assessment.
- > Ability to think green, preferably with a circular economy mind-set.
- > Ability to understand, analyse and manage complex systems.
- > Ability to recommend strategies to meet business and ecological goals.
- > Ability to undertake socially responsible innovative industrial projects.
- > Ability to work well with others, across culture and disciplines.
- > Ability to present convincingly and argue a case in front of an audience, write reports, publications and short communications.

TYPICAL JOBS

- > R&D Engineer
- > Junior Project Engineer
- > Process Engineer
- > Design Engineer
- > Exploitation engineer
- > Environmental consultant

COST

18,000 € for the complete MSc. program (4 semesters, 120 ECTS)

SCHOLARSHIP

Scholarships are available depending on academic results and countries of origin (companies, governments, embassies...). Internships are paid and cover living expenses during the last semester.

LODGING

Individual furnished studio apartments are available for international students during their stay. The residences are on the school campus or in downtown Albi and offer comfort and facilities to the students. Living expenses are quite low in Albi compared to other locations in France. Accommodation at the students' Residence costs about € 330 per month. The total living expenses should not exceed € 6,000 per year (on campus food and accommodation).

CALENDAR

One intake per year (mid-September).

- > **Year 1:** Two academic semesters at Mines Albi.
- > **Year 2:** One academic semester at Mines Albi + a 6-month MSc thesis, in France or abroad.

CONTACT

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