BiWEM

Biomass and waste for energy and materials

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.

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 focuses on chemical engineering but also includes courses on economics, international regulations and on certain areas of the social sciences and humanities.

Competencies acquired

- 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

Career opportunities

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

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 test such as TOEFL IBT 80, IELTS 6.0, TOEIC 750, Cambridge CAE.

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

Calendar

One intake per year (mid-September).

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

Contact

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Syllabus

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 four teaching blocks, including an integrated team project over the three academic semesters under the supervision of expert practitioners.

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

This program is certified and promoted through the Toulouse Tech network.

Details of tuition fees
can be found on our website

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