POST MASTER DEGREE

Biorefinery: bioenergy, bioproducts & biomaterials

http://pagora.grenoble-inp.fr
Who should apply?

Students or professionals, French or foreign

→ Who already hold a master's degree (or equivalent) in engineering
→ Wishing to specialize in biorefinery, bioenergy, bioproduct and biomaterial areas

This expertise is of particular interest in the packaging, chemical, papermaking and energy industrial sectors.

Academic staff and Industrial Experts

→ Lectures are given by Professors at Grenoble INP-Pagora and industrial experts in the field
→ An associated laboratory practice programme inside Grenoble INP-Laboratories is offered
→ Conferences and site visits are organized

Grenoble INP-Pagora industrial partners

PLANT BIOMASS, TOWARD A GREEN FUTURE

Plant biomass is a source of energy, materials and chemical products whose vast and renewable potential is paving the way to an oil-free future.

In a biorefinery operation, components from biomass can be extracted, isolated and modified to produce gaseous or liquid fuels as well as specialty and commodity chemicals. The latter may in turn be converted into biomaterials.

Based on scientific expertise of Grenoble INP-Pagora coming from its innovative research in the conversion of plant biomass components and strong links with industry, the Post Master Degree covers the entire chain from biorefinery to the production of bioenergy, bioproducts and biomaterials. This whole chain is today considered as the most exciting and efficient move towards a sustainable society and a provider of new job opportunities.

One year Post Master degree Programme

→ 3 main areas: biorefinery for bioenergy and bioproducts, biomaterials
→ Academic semester (modules 1, 2, 3, 4)
  Classes (courses and laboratory practicals), conferences and site visits
→ Research semester (module 5)
  Project carried out in partner company or in Pagora’s laboratories

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Module 1 - 8 ECTS
**Biorefinery, general and basic aspects**
Oil, coal, gas and biomass, plant chemical components (cellulose, lignin, hemicelluloses, starch, sugars, oils, tannins and other extractives). Polymer chemistry, characterization, structure and properties, polymer industry.

Module 2 - 5 ECTS
**Biorefinery for energy**
Pretreatment and saccharification of biomass, fermentation, production of bioethanol.
Torrefaction, pyrolyse and gasification of lignocellulosics. Production of diester.
Worldwide activities and perspectives.

Module 3 - 8 ECTS
**Biorefinery for bioproducts**
Existing biorefinery and conversion processes.
Cellulose, starch, sugars and derivatives, resin acids, terpenes, rubber, lignin derivatives...
Diacids, levulinic acid, furan derivatives, xylitol, sorbitol, diols, diamines, phenols...

Module 4 - 9 ECTS
**Biomaterials**
**Biopolymers:** natural polymers, synthetic polymers from natural resources (PLA, PBS, polyamides, polyethylene, PHA...)
Structure and properties, future bio-sourced polymers, technical and scientific challenges.

**Composites:** natural fibers for composites, structure and properties, fibre-matrix compatibility and adhesion...

**New biomaterials:** complex and laminate bio-based materials, nanocellulose, bio-nanocomposites, active biomaterials, production and properties.

Module 5 - 30 ECTS
**Post master project**
- 5 month internship, carried out in a partner company or in Pagora’s laboratories.
- Professional project or scientific project.

For each module (1, 2, 3, 4) Assessment of sustainability, principles of life cycle analysis, end of life, environmental factors, energy consumption, toxicity, competition of raw materials, risk assessment... are discussed.
One of France’s leading engineering institutes

- 6 engineering schools delivering more than 1100 «diplômes d’ingénieurs» (Master equivalent) per year
- 300 PhD theses defended every year

Grenoble INP-Pagora

- One of the 6 engineering schools of Grenoble Institute of Technology, specialized in paper, print media and biomaterials sciences
- Project-based pedagogy
- Strong partnerships with related industrial sectors
- A world-class research laboratory with 35 PhD students active in wood and fiber chemistry, biomaterials, fiber properties and process engineering

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Admission Criteria

→ Completed Master of Engineering, Master of Science or equivalent
→ B2 level in English language (all courses are given in English)
→ Acceptance by the admission committee, based on academic record and motivation.

Application deadlines
→ Registration from March to end of June

Programme duration
→ from October to end of August

For more information
http://pagora.grenoble-inp.fr/postmasterbiorefinery/

Contact us
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