POST MASTER DEGREE

Biorefinery: bioenergy, bioproducts & biomaterials

THE INTERNATIONAL SCHOOL
OF PAPER , PRINT MEDIA AND BIOMATERIALS
GRENOBLE INSTITUTE OF TECHNOLOGY

http://pagora.grenoble-inp.fr

PLANT BIOMASS, TOWARD A GREEN FUTURE

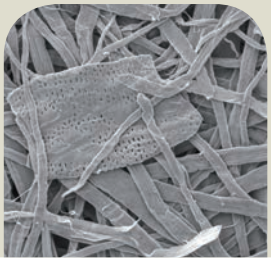
Plant biomass is a source of energy, materials and chemical products whose vast and renewable potential is paving the way to an oil-free future.

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



Module 1 - 6 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 - 6 ECTS

Biorefinery for energy

Pretreatment and saccharification of biomass, fermentation, production of bioethanol.
Torrefaction, pyrolyse and gaseification of lignocellulosics.
Production of diester.
Worldwide activities and perspectives.

Module 3 - 9 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.

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.

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.

GRENOBLE INSTITUTE OF TECHNOLOGY

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

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 or science
- → Wishing to specialize in biorefinery, bioenergy, bioproduct and biomaterial areas

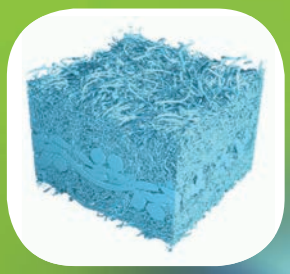
This expertise is of particular interest in the packaging, chemical, papermaking and energy industrial sectors.

Exchange master students

30 ECTS academic courses can be taken for free as part of a full master programme on the basis of exchange students with partner universities.

Academic staff and Industrial Experts

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



Grenoble INP-Pagora industrial partners

Novamont, SPhere, Dow Corning, Roquette, Cargill, JRS Rettenmaier, Smurfit Kappa, Solvay, Lafarge, Tembec, Arjowiggings, L'Oréal, Ahlstrom, Tetra Pak, Arkema, Schneider Electric, Seppic, Wedeco, Degrémont, Condat Lubrifiant, Air Liquide, Kic InnoEnergy, CEA...

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 January to end of June
- French students ultimate dealine mid-september

Programme duration

- from October to end of August

For more information

http://pagora.grenoble-inp.fr/postmasterbiorefinery/

Join us on Facebook

Contact

Prof. Dominique Lachenal
Programme Director
dominique.lachenal@grenoble-inp.fr

Prof. Gérard Mortha
Faculty Adviser of International Relations
gerard.mortha@grenoble-inp.fr

THE INTERNATIONAL SCHOOL OF PAPER, PRINT MEDIA AND BIOMATERIALS

461 rue de la Papeterie
CS 10065 - 38402 Saint-Martin-d'Hères Cedex
France
Phone +33 (0) 4 76 82 69 00 - Fax +33 (0) 4 76 82 69 33

http://pagora.grenoble-inp.fr

Grenoble INP pagora