Our planet is facing up the depletion of fossil resources while the overall demand of biomass for food and energy is continuously increasing. For one decade, biomass is considered as an alternative energy source contributing to reduce greenhouse effect. Biomass is also a renewable source of proteins, sugars, and fats, which lead to valuable green chemicals, pharmaceuticals, biosourced materials, i.e. to any bio-wares. Biorefinery engineering consists in designing biomass transformation processes to replace conventional chemical transformation.

PROFESSIONAL GOALS
Prepare master students to PhD study in the area of wood- and/or agro-resources transformation engineering or to R&D position in the biorefinery industry, or to scientific and technical consultant position in organisation related to bio-economy.

ACQUIRED SKILLS
At the end of the programme, students are able to select suitable biomass and design the most efficient process for sustainable production of chemicals, energy, pharmaceutical, and materials.

PARTNERSHIP
Research laboratories belonging to either the French National Centre for Scientific Research (CNRS) or to the French National Institute for Agricultural Research (INRA) are partners of the programme. Local biorefinery companies and start-ups participate to the programme.
PROGRAMME

The programme is divided into three steps:

- Focus on the wood and agro-resources economy and sustainability and the current technology for biorefinery:
  - Agro-based resources & wood: characterization & management (9 ECTS)
  - Biorefinery: new trends and technologies (4 ECTS)
- Presentation of the new trends and latest research knowledges and expertise in biorefinery using either
  - Advanced Chemical processes in biorefinery for chemical and energy production (11 ECTS)
  - Advanced Bioprocesses in biorefinery for chemical and energy production (11 ECTS)
- The last period is a 5-month master thesis in a research laboratory attached to CNRS or INRA (30 ECTS).

In both options, the program is built on multidisciplinary individual or group projects (3 ECTS).

The programme also includes core French course (3 ECTS) in order to allow the master students to become autonomous in the day-to-day life and enjoy French culture.

Pre-requisite: In order to make the most of this multidisciplinary programme, applicants should have basic knowledges in:

- Chemistry and biochemistry
- Process engineering: heat/mass transfer, fluid mechanics, reaction engineering, unit operations,
  - For the biotechnology orientation:
    Biology: microorganism, cells, yeast, fungi, enzymes...
  - For the chemical orientation:
    Chemical engineering including polymerisation engineering

HOW TO APPLY

Applications including CV, motivation letter and official academic results (with ranking) should be sent by mail to master-bioware-contact@univ-lorraine.fr.

Note that each campus (ENSAIA, ENSIC and ENSTIB) prioritizes applications received from partner universities.

Application deadline:
- Spontaneous applications: 30 March
- Nomination from partner universities: 30 April

Registration: Registration as full time student at Université de Lorraine.

Tuition fees
- Degree students
  - Non E.U. student: 3770 €
  - E.U. student: 243 €
- Exchange students:
  - 34 € (only for partner universities of ENSIC, ENSTIB or ENSAIA)
  - E.U. student: 243 € (only for partner universities of ENSIC, ENSTIB or ENSAIA)

CONTACT
master-bioware-contact@univ-lorraine.fr

www.ensaia.univ-lorraine.fr
www.ensic.univ-lorraine.fr
www.enstib.univ-lorraine.fr