

## Career Opportunities

Whether you have a Master's degree or a PhD from Green Factories Graduate Programme, your profile will be very interesting in either academia or industry to implement the multi-use of existing agricultural and emerging bioresources (such as microalgae, marine resources, insects, etc.), driving the development of a more sustainable and innovative industry, with strong concerns in environment and energy efficiency.

### Examples of employment

- Engineer/manager in research and development
- Exploitation or Production Engineer
- R&D or Consultant Engineer
- Researcher or research professor (PhD level)
- Scientific manager (PhD level)
- Chief project officer (PhD level)

### Accreditations and partnerships

- GEPEA laboratory (Nantes University, ONIRIS, IMT-Atlantique, CNRS)
- Polytech Nantes - Nantes University
- ONIRIS
- BIA Laboratory - INRAE Centre de Nantes
- AlgoSolis R&D facility

## Admission

### Academic requirement

Students must have completed a good knowledge in one of following fields : Chemical and bioprocess engineering; Biochemical Engineering; Mechanical Engineering

- **At master's level:** Bac +3, Bac +4 (180 ECTS validated).
- **At PhD level:** Master's degree is required (bachelor + 120 ECTS validated).

### Language requirement

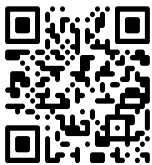
#### For Master Level:

Students must achieve ONE of the English conditions below:

- Minimum overall TOEIC score of 800 or equivalent.
- Graduated from a university in an English – speaking country.
- Direct English interview.

#### For PhD level:

Fluency in speaking, listening, reading and writing English.



## Contact

### Programme leader

Jérémy Pruvost

gp\_gf@univ-nantes.fr

Project supported by the French National Research Agency as part of the «Investissements d'Avenir» programme



ANR-20-SFRI-0014



univ-nantes.fr





# Green Factories

Process engineering for sustainable  
valorisation of bioresources

Graduate Programme

MASTER'S AND DOCTORAL DEGREES

The Graduate Programme “Green Factories” is integrated into Polytech Nantes (Nantes University) and the ONIRIS with contribution of INRAE Centre de Nantes. It is part of the Graduate School of Engineering Sciences and Systems.

This training research programme which goes from Master’s to Doctorate, aims to prepare the next generation of researchers and engineers to lead the industrial transition to a global circular bioeconomy through the development of innovative sustainable engineering approaches for the valorisation of agro- and bioresources. Through research training at the leading edge of (bio) process engineering, the programme offers a unique learning experience to unlock related scientific and technological obstacles for the development of a more sustainable and smart industry. The programme benefits from the internationally recognized expertise of GEPEA laboratory, which is deeply involved in research and industrial programs for the industrial transition in the food (nutrition and health), energy (biofuels, etc.) and environmental (green chemistry, industrial ecology, waste minimization, etc.) fields.

## Why us ?

- Fully taught in English by professors and researchers from top international laboratories
- Strong focus on cutting-edge research and industry application
- Access to innovative equipment and original experimental prototypes, from lab-scale to a semi-industrial platform, including the AlgoSolis R&D platform
- Hands-on experience, closely aligned with the demands of industry and current technological challenges, practice on a pre-industrial scale.
- Research-driven training with individual projects and global partnerships (Europe, Australia, USA, South America...)
- Personalized mentoring for career development in bioresource valorization.

### Skills

The programme provides skills in the following areas:

- Bioprocess Engineering
- Sustainability and Circular Economy
- Downstream processing of agro and bio-resources
- Microalgae culture and industrial valorisation
- Biotechnology and Food Process processing
- Chemical and Process Engineering

#### Master

- Develop high-level research skills in an international collaborative environment
- Advanced skills for the design, optimization and scaling of (bio)processes for production (i.e. bio and photobioreactors) and valorization of agro and bio-resources into valuable products (e.g. food, biofuels, ...).
- Modeling tools and control of (bio)processes, from single unit to complete exploitation scheme (i.e. culture and downstream processing)
- Knowledge of sustainable practices, resource efficiency, and circular economy principles to reduce the energy footprint of today’s industry.

#### Doctorate

- Develop a project within a research team.
- Develop project management skills, especially for handling interdisciplinary teams and managing large-scale bio-based resource projects from conception to implementation.
- Deepen the specialized knowledge.
- Acquire proficiency in using data analytics, modelling, advanced monitoring and control tools to optimize (bio) processes.
- Develop teaching and project management skills.
- Communicate in a synthetic and academic approach on the latest advances in the field.

## Our programme

The programme offers a multidisciplinary approach, combining plant (bio)chemistry, process engineering, and modeling to equip students with the skills needed for an industry increasingly focused on bio-based resources. Students can choose between two specializations: «Microalgae Valorisation» or «Innovative Food Factory.»

### First year of Master (M1)

#### First semester

- Basic Sciences
- Plant biomass resource and its utilisation
- Process modeling, simulation and Control (Part 1)
- Circular economy and LCA
- Research Discovery
- Engineering of Research I

#### Second semester

- Separation processes
- Process Modeling Simulation & Control (Part 2)
- Advanced research in plant resource processing and valorisation
- Elective course 1\*
- Engineering of Research II
- Summer School

### Second year of Master (M2)

- Biomass conversion technologies
- Elective course 2\*
- Engineering of Research III
- Master Thesis Building
- Conferences
- Supervised Research in Solo (Master Thesis)

#### \*Elective course (Related to host laboratories research activities):

- Microalgae valorisation: Microalgae biology, Microalgae culture and photobioreactor engineering, Harvesting and biorefinery of microalgae, Microalgae for circular economy
- Innovative Food Factory: Advanced food processing, Clean label and functional ingredients, Toxical risks and packaging
- Microalgae valorisation & Innovative Food Factory: Bioreaction Engineering, Technological innovations, Cell factory and Biochemical Analysis of bioproducts, Advanced monitoring of bioprocesses

The programme benefits from industrial and international partnerships across Europe, the USA, Australia, and South America. It is part of the ERASMUS exchange program (20+ countries) and collaborates with industry leaders like AlgoSource in microalgae.

### Doctorate

Research project	Transversal training (Communication, innovation, ethical)	Specialized training (advanced tools for modelling, optimisation, advances analytical technics...)
International mobility	Workshops	Supervising Master students

Financial support is available for international mobility, particularly within the framework of the international collaborations (Europe, Australia...). Other financial support from Nantes University, ANR, Europe, CNRS and the *Pays de la Loire* Region will be also available for internship and doctoral funding

## Graduate Programme

