



# Vocational Bachelor year 3 (senior) in Plant production

Minor « Plant breeding and experimentation »

Spring semester / 30 ECTS

10th to 22nd Feb

24th February-  
15th April

15th April to June  
12th

June 15th to  
June 26th

Period #1  
Landing in Angers  
incl. Survival French  
2 weeks

Period #2  
CLASSES  
7 weeks

Period #3  
COMPANY  
PLACEMENT  
7 to 9 weeks

Period #4  
EXAMS  
2 weeks



- **Bases of Genetics = 12 hours**
  - This course sets the basics of Genetics from the Mendel laws to the use of markers. This class also contains practical work in lab. This is a requirement for genotyping module.
- **Crop pathology = 12 hours**
  - This course goes through the vegetal pathologies : resistance reactions in the plant and plant disease (cycle, symptoms). Crop protection methods are explained.
- **French expertise and innovation : 20 hours**
  - This module is a set of several conferences focusing on the French expertise. This module contains many visits in companies in the field of plants, focus on innovative technologies.

- **Plant breeding : 11 hours**
  - The target is to understand how to breed species, breeding schemes and technical solutions (nurseries, fields,...). Protection and registration of new varieties. Includes company visits.
- **Genotyping and Genomics: 30 hours**
  - Classes and practical work in lab on DNA extraction and PCR.
- **Experimental schemes : 8 hours**
  - Experimentation goals and objectives, design a field trial according to specific research request. Practical management: from the sowing of trial to data collection.
- **Data analysis : 5 hours**
  - After data collection in the field, the statistical analysis aims at producing ANOVA and PCA charts to make conclusions and build technical report. This module includes exercises on softwares.
- **Seed quality and technology : 8 hours**
  - The aim of this module is to understand how seed are produced and processed (cleaning, sorting). Overview of seed quality tests and certification. Includes company visits.

- **Where?** In a plant selection firm, experimental station or research lab in France or abroad.
- **Duration:** 7 to 9 weeks
- **How to find it?** If you do not have an internship, ESA will help you to find one nearby Angers.
- **Assessment:** Students have to write a report presenting the company, the different missions and acquired skills. An oral defense is to be done.

- **List of top-end companies visited :**
  - **Visit of a breeding program and a collection of ancient wheat varieties**
  - **National Seed Testing Station (SNES)**  
*The SNES is the National Reference Laboratory in France for seed quality analysis for seed import/export. The station contributes to the implementation of seed certification regulations and facilitates national and international seed trade.*
  - **Arvalis Phenofield**  
*A ultra-modern field platform with controlled environments and environmental sensors*
  - **Bejo : seed production firm (sorting, drying, etc)**
  - **GEVES (Variety and Seed Study and Control Group) :**  
*registration of new plant varieties in the official catalogue, legal protection of varieties (plant variety rights), seed certification based on international standards.*



*Also possible to visit special machinery for field research...(combines/seeder/lab machines)*

# Why coming to Angers?

Angers is a competitiveness cluster gathering firms, research and training centers in the plant field around some innovative projects to strengthen the firms' competitiveness.

## Innovation for the all sector :



- Where to apply? [OLAGE](#)
- When? Application deadline January 15th 2020
- [Contact person: M.godard@groupe-esa.com](mailto:M.godard@groupe-esa.com)