



**emPLANT**  
master to suc**seed**

**COURSE**

**CATALOGUE**

**LAS SEMESTER 2**

**emPLANT COURSE CATALOGUE**  
**ERASMUS MUNDUS MASTER PROGRAMME IN PLANT BREEDING**

**Contents**

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<a href="#">Joint Courses</a> .....	3
<a href="#">Semester 2 LAS</a> .....	5

## Joint Courses

JOINT COURSES	Description, contents, learning outcomes	Prerequisites	Implementation:	ECTS
Pilot case	<p>Semester 1 and 2: UniLaSalle, SLU Semester 3: UH, UPV, EgeU</p> <p>The pilot case is a case study to apply the project management tools to a breeding program. First students by group have to choose a species to be ameliorated. Then, find a character or several ones as goal for the breeding strategy. The students need to check the market potential for this new variety and verify that farmers will want to cultivate it. Secondly, students will define the potential market for their product (seeds), but also the market for the new variety (consumers). Thirdly, they need to create a structure to breed the new variety, and define the role of each student of the group in this structure (company, association...).</p>	No prerequisites	<p>The introduction to the Pilot Case will take place during the Joint Integration Week where the groups will be formed based on the specialty chosen by the students for Y2. During the first year the students will work in groups with their tutors and via telephone/video conference/email if group members are not located at the same site (LAS/SLU). During S3 the Pilot Case will be finalized with the tutors at the host university and by telephone/video conference/email among the group members. Two juries will be organized. The first jury at the end of S1 will evaluate the content and the form of the work and especially the project management content. At the end of S2 a written report will be evaluated. At the end of S3 a jury composed of the local tutors, the Coordinators for Y1 and an expert in Project Management will judge the defense of the Pilot Case. The students of S1 and S3 will be able to attend their respective presentations. The juries of S1 and S3 will be carried out on the same day for logistic reasons.</p>	<p><b>S1: 3</b> <b>S2: 3</b> <b>S3: 2</b></p>
Intellectual Property & Plant Breeders' Rights	<p>The two systems (plant patent and plant breeders' right) and implication for breeder rights will be studied. Breeder's exemption and farmer privilege will be analysed. From practical examples, lecturers from institutions and companies will analyse each system. Infringement cases and violations will be analyzed. UPOV origin and historical steps are presented. DCU and VCU notions.</p> <p>The transgenic varieties, the mutant and somaclonal variants will allow to introduce the notion of Essentially Derived Variety (EDV). Current and potential application of molecular markers and next generation sequencing will be discussed.</p>	No prerequisites	<p>This course will be offered in form of a UPOV (<a href="http://www.upov.int">www.upov.int</a>) online course. During one month, the student can access and complete 25h of online courses at their own rhythm. The course will be validated by a written online examination. SLU and LAS will nominate tutors who will accompany the students. In addition UPOV will nominate a contact person to accompany the students.</p>	<b>S2: 2</b>

<p>Joint Summer Breeding Field Camp (at the end of Y1 (June))</p>	<p>The objective of this summer intensive program is to immerse students in two crops breeding chains. One week for a major crop such as corn or wheat and the second on a legume or fruit crop (green bean, apple). During each week students are going to visit the main actors related to breeding for the selected crop from farmers, to several breeders (diversity conservation, breeding, laboratory) or public research institutions involved in basic research , seed industry and seed multiplication farmers and even food industry to see the quality requirements for the specific transformation. To have a full panorama of the selected crop.</p> <p>The main learning objective is to have an integrated view of the food chain from the breeding till the final transformation of the product. Secondary objectives are to understand the different actions of breeding companies, how they integrate the requests of the consumer. To have a deeper knowledge on at least two crops which are managed differently, as are the cereals sand the vegetables. And understanding the importance of the seeds quality.</p>	<p>No prerequisites</p>	<p>All students will join the field camp after the first year.</p>	<p><b>S2: 2</b></p>
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## Semester 2 LAS

SEMESTER 2 LAS	Description, contents, learning outcomes	Prerequisites	ECTS
French as a foreign language	<p>This language course aims at providing students with the necessary language tools to interact successfully in everyday life and in basic professional situations. After a 2 week intensive language course, students will continue to learn French at the rate of 3 hours per week. In addition to classroom instruction, students will realize interactive assignments, such as conducting surveys amongst their French peers. These assignments, are designed to familiarize students with cultural aspects in France and the French-speaking world.</p> <p>Introducing yourself and introducing someone else. Asking questions. Talking about your professional activities. Expressing preferences. Understanding an itinerary. Expressing an intention. Making appointments. Understanding a schedule.</p>	Course in S1	2
Spanish as a foreign language	<p>This language course is targeted at students who chose UPV as Y2 destination and who still need to bring their Spanish to a B2 level for everyday life and professional situations. Students will learn Spanish at the rate of 2 hours per week. In addition to classroom instruction, students will realize interactive assignments. This course is carried out in close collaboration with UPV so as to ensure that the students obtain the language level needed.</p>	Course in S1	2
Plant Microbe Interaction	<p>The course is to study the breeding to plant resistance. The course describes the differences between the qualitative and quantitative resistance, methods of breeding, and their advantages and disadvantages. It explains the new methods of breeding using effectors, elicitors, and the beneficial microorganisms. It introduces the epidemiology of plant diseases, their interactions with other factors as insects and the actually projects and strategies treat the plant resistance.</p> <p>The course describes the molecular methods to identify the plant resistance gene markers and gene expression analysis. It introduces examples of the major economical plant diseases and the role of plant breeding in the control of these diseases.</p>	Introduction to plant pathology	5
Phenotyping	<p>Student will be introduced in traditional and modern methods of phenotyping. Diversification of phenotypic data will be illustrated. A focus will be on how to collect, store data safely, mobilize a large number of data, using notebook, excel and classic database.</p> <p>Programme:</p> <p>Several visits and lectures will introduce classical and high throughput phenotyping tools and platforms as well as supporting technologies for aerial and root systems.</p> <p>Different database systems and their evolution (Excel, Access, MySQL) will be studied from practical examples.</p>	No prerequisites	4
Plant Genetics 2	<p>Basics for Quantitative genetics Definitions of qualitative and quantitative traits. Understanding major gene(s) vs polygenic control and inheritance. Analyse variance components of quantitative traits. Definition of heritability and estimates, genetic gain. Introduction to Molecular quantitative genetics and genomic selection.</p> <p>Programme :</p>	No prerequisites	5

	<ul style="list-style-type: none"> <li>- From Population genetics to quantitative genetics</li> <li>- The different types of action of genes</li> <li>- Variance components of quantitative traits</li> <li>- Factors affecting heritability and methods of estimation</li> <li>- Consequences for selection methods</li> <li>- Response to selection and breeder equation</li> <li>- General and specific combining abilities</li> <li>- Association of DNA polymorphisms with phenotype variations of quantitative traits</li> <li>- Linkage disequilibrium</li> <li>- Genetic mapping and QTL detection</li> <li>- Marker assisted selection</li> <li>- Genomic selection</li> <li>- Incidence of polyploidy</li> </ul>		
Seed and plant production and certification regulation guidelines	<p>Importance of quality in seed and plant development and production. Notion of seed and plant certification. Comparison of certification processes and practical achievement in different regions.</p> <p>Program :</p> <ul style="list-style-type: none"> <li>- From practical examples, lectures and visits of official institutes (SNES, GEVES) and private companies, students will learn importance of physiological quality, sanitary conditions and genetic conformity for seed and plant productions.</li> <li>- Internal and official inspections guarantee quality for customers and are required for international exchanges. We will review some processes and analyse current national and international regulations, and their limits.</li> </ul>	No prerequisites	<b>4</b>
INTERNSHIP + Minor Thesis	<p>The minor thesis internship takes place in a company or research institution. It will familiarize student with a seed company and breeder position.</p> <p>Student have to make a minor thesis report.</p>	Courses of Semester 1 and 2	<b>5</b>