



Master of Agro- and Ecosystems Engineering (ACE)

Major Subjects

- Production
- Environment
- Economics
- Geo-information

Faculty of Bioscience Engineering

Agro- and Ecosystems Engineering

Agro- and Ecosystems Engineering is about ensuring the prosperity and wellbeing of current and future generations in both the global North and global South. Agro- and ecosystems provide a wide range of essential goods and services such as food, water, energy and biodiversity. Yet, the contemporary context of population growth, rapid urbanisation, economic globalisation, climate change, deforestation, soil pollution and degradation challenges the future provisioning of a sufficient quantity and quality of these goods and services.

New and creative solutions are needed to ensure the sustainable provisioning of goods and services by agro- and ecosystems. The “engineering”, i.e. the smart design and implementation, of these solutions needs an integrated approach, simultaneously considering biophysical and socio-economic components of sustainability. Therefore, information and knowledge from a wide range of scientific disciplines must be combined with new insights. Moreover, this integration requires the best possible use of state-of-the-art tools for data acquisition, processing and interpretation.

MSc in Agro- and eCosystems Engineering (ACE)

ACE is a multi-disciplinary master’s programme dedicated to training the next generation of experts in the sustainable management of agro-and ecosystems. *ACE*’s vision is that these experts should hold a broad perspective that allows an open dialogue between the biophysical and socio-economic dimensions of these systems.

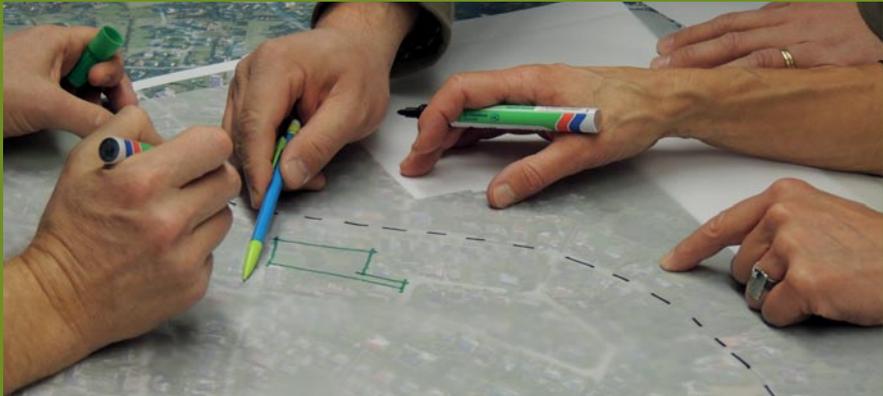
ACE offers students the opportunity to acquire in-depth scientific and application-oriented knowledge on natural and production-oriented systems. The broad perspective will build upon knowledge of the physical, chemical, ecological, agronomical, economic and informatics aspects of these systems. Both temperate and/or (sub)tropical settings can be studied.

The interdisciplinary core programme is complemented with **a specialisation in one of four major subjects**: (i) biological PRODUCTION, (ii) the abiotic and biotic ENVIRONMENT, (iii) bio-ECONOMICS and (iv) bioGEO-INFORMATION.

The **PRODUCTION major** focuses on agrosystems, with optional specialisation tracks in production forestry or aquaculture. Both specialisation tracks are completed by a semester at one of our partner institutes abroad.

The **ENVIRONMENT major** provides in-depth understanding of the biophysical functioning of both agro- and ecosystems with the aim of improving the management of their biodiversity, soil and water resources.

The **ECONOMICS major** focuses on the economic and policy aspects of natural resource use, biological production and food supply chains. This major offers specialisation tracks in agricultural, resource and development economics in the (sub)tropics.



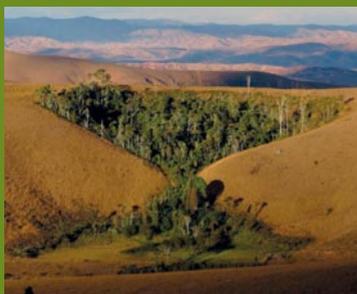
The **GEO-INFORMATION major** covers earth observation technology and geodata management. In-depth courses address both technological aspects and their applications in the field of terrestrial resources inventory, monitoring and management.

Throughout all major subjects, *ACE* devotes considerable attention to the acquisition of transferrable skills through participatory group projects and assignments.

Research on Agro- and Ecosystems

KU Leuven has a long tradition of research in the domains covered by this MSc programme. Coursework within *ACE* is informed by and embedded in cutting-edge research and students have the opportunity to participate in this research.

- In the field of **biological production systems**, ongoing research focuses on the conservation, characterisation and management of plant genetic resources, integrated soil fertility management, irrigation management, and the sustainable management of crop, forest and aquaculture systems;
- Current research themes regarding **environmental management and ecology**, include soil conservation, functions, conservation and management of biodiversity, the sources and fate of contaminants in the environment and the development of remediation systems, the cycling and fluxes of chemical elements throughout the terrestrial-aquatic environment;
- Current research within **agricultural and natural resource economics** focuses on environmental valuation, measuring sustainability aspects of the food chain, technology and innovation adoption, and evaluating policy impact;
- **Biogeo-information research** explores innovative techniques for extracting information from combined, remotely-sensed and in-situ observations. These tools are applied in a variety of domains, including the monitoring of land cover and land use, regional climate studies, precision farming and forestry, and environmental impact assessments.



Discover KU Leuven

Situated in Belgium, in the heart of Western Europe, KU Leuven has been a centre of learning for nearly six centuries. Today, it is Belgium's largest and highest-ranked university and, founded in 1425, one of the oldest and most renowned universities in Europe. As a leading European research university and co-founder of the League of European Research Universities (LERU), KU Leuven offers a wide variety of international master's programmes, all supported by high-quality, innovative, interdisciplinary research.

Since its founding, KU Leuven has been based in the city that shares its name. Leuven is a pleasant, safe and bustling student town, where centuries-rich history meets cutting-edge science. The university also offers degree programmes at campuses in 11 Belgian cities, including Brussels, Ghent and Antwerp.

Admission requirements

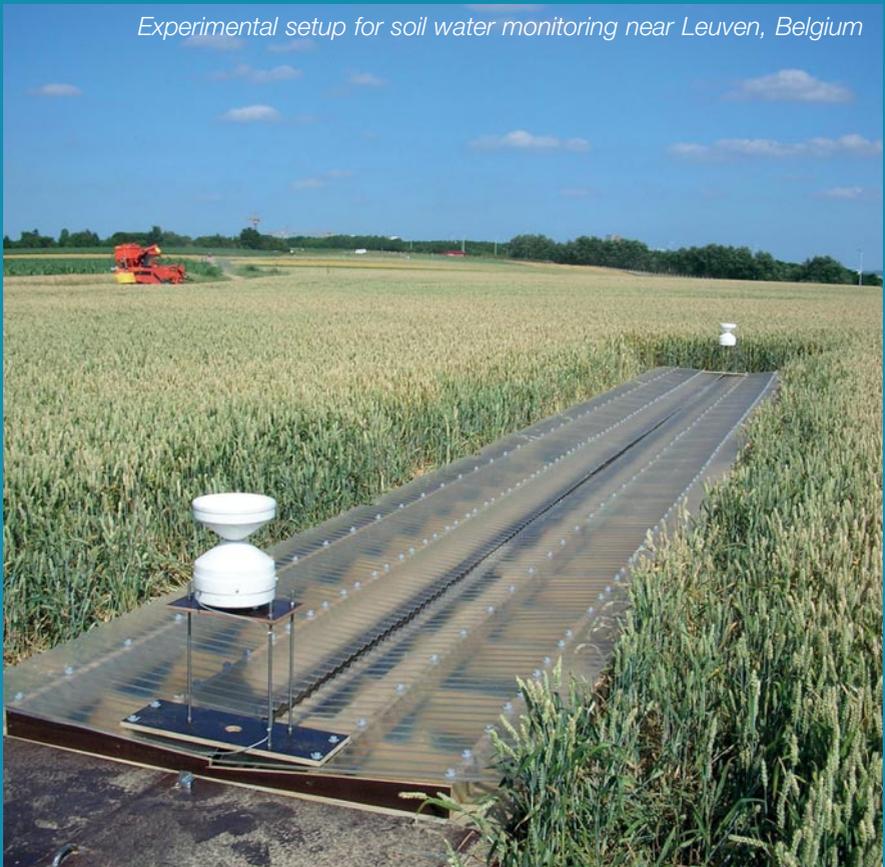
ACE is designed for highly motivated students with a solid background in exact sciences and a keen interest in the functioning and sustainable management, design and engineering of agro- and ecosystems.

ACE is open to any applicant holding an academic bachelor's degree in engineering (bioscience engineering, agricultural engineering, environmental engineering or any equivalent engineering degree). The programme is also open to applicants holding other bachelor's or master's degrees encompassing thorough coursework in at least two of the following three domains: (i) mathematics and statistics, (ii) earth and environmental sciences, and (iii) biology and ecology. Students may be required to take strengthening elective courses to fill any gaps in educational background. Approval of the individual application and a proposal of a strengthening package is given on a case-by-case basis by the programme's steering committee. Applicants must have a good command of both spoken and written English. Applicants from foreign countries where English is not the language of instruction must provide a TOEFL score of at least 550 or an equivalent proof of English proficiency. Additional information is available at www.kuleuven.be/admissions/language.

Programme

ACE is a four-semester, 120-ECTS programme. It consists of a common core of 30 ECTS ("truncus communis") which gives students a broad interdisciplinary view of the main fields covered. Students select one of four major subjects (Production, Environment, Economics, or Geo-information). Each major consists of a fixed course package of 20 ECTS, to be complemented with a selection of relevant courses of 10 ECTS. A master's thesis of 30 ECTS is an integral part of each major. 20 ECTS are allocated to a minor package, which can be chosen to either strengthen the chosen major domain or to broaden expertise with topics from a different domain. Finally, students allocate 10 ECTS to elective courses to broaden their academic education, or may use these credits to take strengthening elective courses to fill any gaps in educational background. This programme structure allows for a high degree of personalisation which, in turn, ensures the best possible match for student's interests or future career ambitions.

Experimental setup for soil water monitoring near Leuven, Belgium





MASTER IN AGRO- AND ECOSYSTEMS ENGINEERING 120 ECTS

Truncus Communis: Agro- & EcoSystems 30 ECTS

Production
~ 20 ECTS

Environment
~ 20 ECTS

Economics
~ 20 ECTS

Information
~ 20 ECTS

Production
variable~10 ECTS

Environment
variable~10 ECTS

Economics
variable~10 ECTS

Information
variable~10 ECTS

Master's thesis research project and two supporting courses 30 ECTS

Minor 20 ECTS

Courses to be selected from own major, or from one of the three other majors, or from another master's programme of the Faculty of Bioscience Engineering.

Elective courses, possibly for strengthening 10 ECTS

For detailed descriptions of this programme's courses and for the course timetable, please consult www.kuleuven.be/ma/ace

Studying abroad

All students are given the opportunity to conduct part of their master's thesis research at various partner institutions abroad, in line with the wide geographical scope of research activities within this domain at KU Leuven. For those students with a keen interest in the specific aspects of tropical agro- and ecosystems, a field course in the tropics is offered as an optional component of the integrated project scheduled in the truncus communis. These students can also opt for a thematic minor package on Tropical Agro- and Ecosystems Engineering. In addition, European residents can undertake their master's thesis research at a European or other partner university within the framework of the Erasmus+ programme.

Furthermore, two optional specialisation packages within the Production major are offered. Each entail a one-semester stay at a partner institution. The Production Forestry package is organised at the Universidad de la Frontera (Temuco, Chile), while the specialisation in Aquaculture takes you to the University of Stellenbosch (South Africa). Both packages are available in the Production major. The Production Forestry package is also available in the Environment major.

 www.biw.kuleuven.be/internationalisering

Career prospects

The interdisciplinary nature of this MSc programme ensures that graduates are prepared to enter any of the various professional fields related to biological production systems and ecosystem management, with particular emphasis on plant production, natural resource economics and policy, sustainable environmental management, and earth observation and geomatics. Employment opportunities abound in national and international public sector organisations, NGOs and private companies. You will be qualified to fill technical-, research- and/or policy/management-oriented positions. Finally, this MSc programme provides excellent preparation for undertaking PhD research.



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Learn more

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This brochure provides the most complete and accurate information available concerning this master's programme offered at KU Leuven. However, amendments to the composition of this programme may be approved at any time. Consequently, KU Leuven is in no way legally bound by the information provided in this brochure. The most recent information on all our academic programmes can be consulted at www.kuleuven.be/coursecatalogue

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