



# MSc Programmes Wageningen University

Brochure for international students | [www.wageningenuniversity.eu/master](http://www.wageningenuniversity.eu/master) | 2014-2015

# Get the most out of

	Page	Technology	Food	Health	Economics & Social Sciences	Nature & Agriculture	Earth & Environment
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MSc Biology	12	●	●	●	●	●	●
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MSc Management, Economics and Consumer Studies	29	●	●	●	●	●	●
MSc Molecular Life Sciences	30	●	●	●	●	●	●
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MSc Organic Agriculture	32	●	●	●	●	●	●
MSc Plant Biotechnology	33	●	●	●	●	●	●
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MSc Water Technology	36	●	●	●	●	●	●
Health & Society	37	●	●	●	●	●	●
Sensory Science	38	●	●	●	●	●	●

# Welcome

## 'To explore the potential of nature to improve the quality of life.'

That is the mission of Wageningen UR (University & Research centre). Within the domain of 'healthy food and living environment', Wageningen UR works around the globe conducting research for government agencies and the business community.

'To explore the potential of nature and improve the quality of life.' That is the mission of our scientists and students. Wageningen University is one of the world's leading research and education institutes when it comes to life sciences. We focus on complex issues in food production, the relation between food and health, environmental issues and bio-diversity. These issues are of great importance and subject to increasing worldwide concern.

At Wageningen, we take the broader picture into account before zooming in on the finer details. This enables us to both understand processes on a molecular level and their influence on and interaction with higher integration levels, such as ecosystems, crop characteristics or human health. We also interlink socio-economic approaches to problems with biological, chemical or physical approaches. In the complex dynamics of the modern world, it is no longer possible to solve complex issues through a simple mono-disciplinary result or approach.

This conviction is taught to our students and is the driving force behind our leading research groups. Our scientific and educational endeavours are internationally oriented and have an impact on society, policy and science. Students and scientists from around the world gather in Wageningen to form a large international community that bridges cultures in a natural way. This enriches the dynamic climate of our university and gives our Master study programmes an extra dimension.

I hope this brochure arouses your interest and that we may welcome you in the near future as a new member of Wageningen University's international academic community.

Prof. Dr. Martin J. Kropff  
Rector Magnificus



Prof. Dr. Martin J. Kropff  
Rector Magnificus

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# Studying in Wageningen



## International character

Wageningen University has a very international character with 25% of its international student body coming from 106 different countries. It is the first Dutch university to hold an international accreditation, given by the Dutch-Flemish Accreditation Organization (NVAO). Wageningen University is one of the best universities worldwide in the field of Life Sciences. Through partnerships with numerous national and international companies and governments, Wageningen University students experience no problems in finding internships, challenging work and career opportunities around the world.

## The University

Wageningen University is one of the leading international universities in the field of healthy food and living environment. Studying at Wageningen University guarantees you premium quality education and an international quality benchmark on your curriculum vitae. Here, you will focus on current and future global issues that are of increasing importance to both industry and government. Wageningen University is listed in the top 70 of all universities worldwide, according to the Times Higher Education Ranking. Within the domain Life Sciences, Wageningen University is listed in the top 40 in the Shanghai ranking and listed number 2 on the QS World University Rankings within the field of agriculture and forestry. Furthermore, it holds a top five position in the worldwide publication index in the field of food, agriculture, plants, animals and environment. You are ensured personal guidance throughout your student career with a teacher-student ratio of 1:7, which allows you to make the most of all the study options provided. The Code of Conduct with respect to international students in Dutch higher education has been revised as per 1 March 2013. This code sets a minimum standard for Dutch higher education institutions in their dealings with international students: [www.wageningenuniversity.eu/whywageningen](http://www.wageningenuniversity.eu/whywageningen)



## Campus & Facilities

Wageningen Campus is 11 soccer fields large at 70.000 m<sup>2</sup> and offers excellent student facilities. It is a place where students, teachers, researchers and staff from all over the world come together and exchange ideas. Wageningen University counts over 100 nationalities. Forum is Wageningen University's largest education building. The main library is located in Forum and is open 14 hours per day. Due to a steady increase of the student body, a new education building, Orion, has been constructed and officially opened in September 2013. There are several places on campus where you can relax and enjoy a drink with your fellow students like the 'Grand Cafe' at Forum, the Student Cafe in Orion, or you can have lunch at the 'Restaurant of the Future'. Nearby sports centre 'De Bongerd' offers over 60 different sports ranging from tennis, squash and indoor biking to football, rugby and athletics. There are multiple student associations and each study programme has its own study association that organises a wide range of activities and services for students.

### STUDENTS

**7,933** STUDENTS

**5,917** DUTCH STUDENTS (75%)

**2,016** INTERNATIONAL STUDENTS (25%)

**106** NATIONALITIES

**45%** MALE - **55%** FEMALE

### ALUMNI

**37,142** GRADUATES

**31,177** DUTCH

**5,965** INTERNATIONAL

### WAGENINGEN UR

**20** FULL-TIME BSC PROGRAMMES (3 years)

**29** FULL-TIME MSC PROGRAMMES (2 years)

**11** RESEARCH INSTITUTES

**87** CHAIRGROUPS

**6** PARTNERSHIPS

**7** TEST LOCATIONS/INNOVATION CENTRES

**> 15** LABORATORIES AND APPLICATIONS

**2** LIBRARIES

**1** AIRCRAFT

**1** SPORTS CENTRE

### LIVING IN WAGENINGEN

**€400** A MONTH IS THE AVERAGE COST FOR A STUDENT ROOM

**> 60** DIFFERENT SPORTS FOR ONLY €72,50

**20%** OF THE RESIDENTS IS STUDENT

**29** MINUTES BY TRAIN TO NIJMEGEN

**24** MINUTES BY TRAIN TO UTRECHT CS

**12** MINUTE BUS RIDE TO STATION

EDE-WAGENINGEN



## Annual Introduction Days

The Annual Introduction Days (AID) are held prior to the start of the Master programme and come highly recommended for all new students. During the introduction programme you can become acquainted with Wageningen, your fellow students and the university: [www.aidwageningen.nl](http://www.aidwageningen.nl)

## Wageningen town

Wageningen University is centrally located in the Netherlands. The cities Amsterdam, Rotterdam and The Hague are only one-hour travel by train from Ede-Wageningen's station. Utrecht only 25 minutes. From train station Ede-Wageningen to Wageningen Campus is a 12-minute bus ride. Wageningen is built on 'bicycle scale' meaning that all university facilities and the city centre are within cycling distance. There are historic and modern buildings, high-rise student flats, works of art and botanical gardens that all add to the diversity of Wageningen. Around 8.000 students study at Wageningen University and they, accounting for 20% of the population, turn Wageningen into a university town. The many international students, professors and researchers contribute to the international atmosphere. Wageningen has a thriving cultural and social life. Theatres, cinemas, student clubs, bars, nightlife and restaurants create the elegance of a city in a beautiful rural setting. The nearby flood plains of the Rhine River and National Park the Veluwe are ideal for those who enjoy nature, hiking, running or cycling.



## Housing

If you are a prospective international Master student intending to follow the complete study programme at Wageningen University then you have a bed guarantee. This means that Wageningen University guarantees you a place to stay upon arrival. This will be a single student room containing basic furniture and fast Internet connection. For more information about housing please visit [www.wageningenuniversity.eu/housing](http://www.wageningenuniversity.eu/housing).

\*Please note that at certain times of the year the demand for rooms is very high. It is therefore possible that you may be given temporary housing until a permanent room becomes vacant.

## Contact a representative

Wageningen University has representatives all over the world to answer your questions. They speak your language and know the university and the Netherlands well. Visit our tab Contact in Facebook, select your country and contact the representative now. Representatives of Wageningen University attend many education fairs and universities worldwide. If you want to meet us in your country or visit one of our Open Days in Wageningen, please visit [www.wageningenuniversity.eu/meetus](http://www.wageningenuniversity.eu/meetus).

## Meet us online

For more information about studying at Wageningen University, news and student activities you can follow us on social media.

[facebook.com/wageningenuniversity](https://facebook.com/wageningenuniversity)  
[twitter.com/uniwageningen](https://twitter.com/uniwageningen)  
[youtube.com/wageningenuniversity](https://youtube.com/wageningenuniversity)  
[pinterest.com/wageningununi](https://pinterest.com/wageningununi)



# MSc Animal Sciences



**PROJECT LEARNING FROM MOTHER.** Animal Sciences' education and research focuses on improving animal health and welfare. An example of a project done by our students and researchers is the project 'Learning from Mother.' Young animals often find the transition from mother milk to solid foods very difficult. It can lead to a low food intake and problems related to health and general well being. The project learning from mother, aims at easing this transition. In an experiment in which the sows received anise flavoured feed during pregnancy, the piglets showed a better food intake and less behavioural problems when given feed with the same flavouring, benefiting both pig and farmer.

## Specialisations

### ANIMAL BREEDING AND GENETICS

Understanding the function and sustainable utilisation of genetic differences in a wide range of species plays a central role in this specialisation. Students learn how breeding and genetics can contribute to safe and healthy food from animal origin and contributes to the health and welfare of animals.

### ANIMAL NUTRITION

Students focus on the interaction between animals and their nutrition. Students learn about the way animals digest and convert food by studying the nutrient flows and the physiology of the animals in relation to the composition of feeds. They also learn about the effect of feed in relation to health, welfare and behaviour of the animal.

### APPLIED ZOOLOGY

Understanding the relationship between structure and function of all systems within the body is the main focus of this specialisation. Students look at organ structures, hormones, bone structure or the immune system of animals and learn how these systems respond to external influences.

### ANIMAL HEALTH AND BEHAVIOUR

Knowledge of the adaptive capacity of animals is required to be able to determine how to keep an animal healthy and whether changes affect the animal. By looking at animal behaviour, stress parameters, energy metabolism, etc., students investigate, for example, which housing system or feed regime is best for the health and welfare of the animal.

### ANIMAL HEALTH MANAGEMENT

Students focus on quantifying the risk of transmission of infectious diseases within and between groups of animals. They investigate the influence of many factors on this process. Students learn to combine animal health management at population level with socioeconomic aspects by looking at aspects of veterinary epidemiology.

### ANIMAL PRODUCTION SYSTEMS

Students look at animal production systems in relation to the environment worldwide. Students learn about human and animal interaction and the influence of animal production on the environment, health and welfare of people and animals, and the economy.

### VARIANTS AND INTERNATIONAL PROGRAMMES

Besides these specialisations, it is possible to choose one of four variants which leads to a specific type of career. You can focus on Research, Education, Communication & Policy or Business & Management. There are also international programmes in which different universities provide education together. It is even possible to obtain a double degree. Students can follow an international Master in Animal Breeding and Genetics or in Sustainable Animal Nutrition and Feeding, in European Animal Management or in Animal Welfare Assessment.



## Programme summary

Humans interact with animals in many different ways, ranging from raising livestock for food to keeping pets for pleasure. Animal husbandry and livestock development are constrained not only by technical factors, such as feed supply, animal health, management and genetics, but also by infrastructural and socio-economic factors. Consequently, today's animal scientists need in-depth scientific training combined with a critical attitude towards all factors that limit the sustainable development of animal husbandry. Students focus on specific disciplines, such as nutrition, breeding, health or marketing with the aim of becoming experts in one of these fields. Our individually tailored programme trains animal scientists to obtain a broad view. They will be well-equipped to tackle the problems of sustainable livestock management and to provide proper care for companion animals, zoo animals and wildlife.

## Your future career

Our graduates work as nutritionists, policy makers, breeding specialists, advisors, managers, researchers or PhD students. They work for feed manufacturing companies, pharmaceutical companies or breeding organisations but also within regional and national governmental organisations, non-governmental organisations or research institutes and universities.

### ADMISSION REQUIREMENTS

see page 40 or look on the website.

## Related programmes

MSc Biology - MSc Forest and Nature Conservation - MSc Aquaculture and Marine Resource Management - MSc Biosystems Engineering - MSc Organic Agriculture.



# MSc Applied Communication Science



**ALUMNA SUSANNA TOL.** Wetlands can be found all over the world, from the polar regions to the tropics. These ecosystems are among the most threatened of our planet and are also deteriorating rapidly. Susanna Tol did her internship at Wetlands International and after finishing her degree stayed on to work there. By combining her knowledge of communication and environmental issues, she develops strategies for the organisation's communication and policy activities. Currently she is involved with issues related to creating awareness about the need to protect and restore wetlands to mitigate climate change.

## Specialisations

### STRATEGIC COMMUNICATION IN INNOVATION

Students learn to analyse and strategically apply communication to deal with current societal issues, problems and challenges in life science domains such as nature conservation, nutrition and health, water management, environment and food production. Our students are trained to adopt an integrative approach that involves social science and technical innovations, fulfilling an intermediary role to enhance multi-disciplinarity and interactive cooperation. Communication is a basic element of change. Complex processes of change involve different perspectives and perceptions of the various people involved. Societal processes, like climate change, poverty, disease or ecological degradation require appropriate solutions that integrate insights from all kinds of disciplines and stakeholders. Opportunities for enhancing mutual understanding and collaboration between science disciplines and society are explored. Special attention is paid to everyday life situations and how people actively deal with common issues related to the domains of the life sciences.

There are no pre-defined thesis tracks. Students compile their own thesis tracks by choosing, besides the compulsory communication science courses, a combination of closely linked courses, including a minor in a life sciences domain. An internship introduces students to professional practice. The major thesis allows them to become experts in a specific area within communication that is closely linked to their personal interests and future career.

In the thesis track of their choice students, for example, link Communication Science to Nature Conservation, Nutrition and Health, Animal Production Systems, Ecology and Environment, Forestry and Rural Development, Land Use Planning, Organic Agriculture, Product Design and Quality Management, Food Technology or Water Management.

### HEALTH AND SOCIETY

More information on this specialisation is available on page 36.



## Programme summary

In this programme students learn to analyse and critically reflect on the role of communication in complex dynamic processes and to design communication strategies and programmes which are relevant to societal problem solving and innovation.

## Your future career

Graduates are specialised in building bridges between various stakeholders, such as governments and citizens or laymen and experts. They work for communication consultancy organisations, government departments, hospitals, development agencies, commercial organisations and media and knowledge institutes. Career prospects are: communication consultant (advising organisations on how to improve their communication processes); policy maker (formulating policy in cooperation with groups in society); process facilitator (managing conflict, negotiation and change); communication manager (organising internal and external communication processes of an organisation); project manager (managing the communication and collaboration between parties throughout the entire project lifespan); journalist (making scientific knowledge accessible to a broader public); communication researcher (making a systematic analysis of a communication issue).

### ADMISSION REQUIREMENTS

see page 40 or look on the website.

## Related programmes

MSc International Development Studies -  
MSc Development and Rural Innovation -  
MSc Management, Economics and  
Consumer Studies

# MSc Aquaculture and Marine Resource Management



**ALUMNA PASCALLE JACOBS.** "Before I started the master Aquaculture and Marine Resource Management I already graduated as a terrestrial ecologist. After many wanderings I started the master Aquaculture and Marine Resource Management mainly because I saw a lot of potential in marine research. I did my thesis at IMARES and after my graduation they gave me the opportunity to work as a PhD on a research project. In my research I look at if and to what extent big amounts of young mussels attached to ropes or nets (mussel seed collectors) change the environment. These young mussels eat a lot so one of my research questions is if this grazing affects the amount of food available for other animals."

## Specialisations

### AQUACULTURE

This specialisation deals with the culture of hundreds of aquatic species (including finfish, shrimp, shellfish, ornamental fish, corals, sponges and algae) in a wide range of culture environments (including enclosures, semi-extensive ponds, cages, raceways and recirculation systems). Production methods should be sustainable, guarantee health and wellbeing of the culture organisms, be economically viable and socially accepted, and result in safe and healthy products. This can only be achieved through insights in aquatic production ecology based on knowledge of aquatic biology, physiology, physics and chemistry. Social and economic contexts are also considered.

### MARINE RESOURCES AND ECOLOGY

This specialisation focuses on the resilience of marine ecosystems to external pressures, including climate change, irresponsible fisheries, habitat destruction and pollution. Sustainable management of the living resources in the sea include models of population dynamics and fishing yield. It also requires insight into the ecological processes supporting the marine food chains, interaction between and within species and linkages between ecosystems.

### MARINE GOVERNANCE

In this specialisation, the focus lies on improving the sustainable governance of aquatic resources and marine ecosystems. This requires knowledge about the interests and strategies of commercial enterprises, non-governmental, governmental organizations and international institutions that are involved in protecting the marine environment against harmful activities and uses. The focus lies on analyzing and evaluating existing regulatory, economic and marketbased policy instruments and to develop ways to ensure effective use and protection of aquatic resources and marine ecosystems.

## Related programmes

MSc Animal Sciences - MSc Biology -  
MSc Environmental Sciences - MSc Forest  
and Nature Conservation.

## Programme summary

Oceans, seas, estuaries and lakes have been a major source of food since the origin of man. In many cases exploitation levels have bypassed the carrying capacity of these ecosystems, leading to devastating effects on biodiversity and ecosystem functioning. In the future, sustainable aquaculture can be one of the solutions to provide mankind with marine proteins and oils. Commercial fisheries itself should shift from a focus on 'exploitation' towards 'ecosystem based management'. Since society is requesting certified sustainable aquatic products, new and innovative governance and monitoring systems are needed. In addition, international agreements like the Marine Strategy Framework Directive in Europe require a more holistic and integrated approach to Marine Governance. Therefore, young professionals are needed with a holistic view on marine ecosystem management. Within this programme you will learn all about ecosystems, nature conservation, sustainable production of aquatic foods and socioeconomic processes. Graduates are skilled in techniques and methods for analysing and solving biological and environmental problems in aquatic systems by looking at the organisms and the communities including ecological, management and social aspects.

## Your future career

The MSc started in 2005 as Aquaculture and Fisheries. It has evolved from a focus on sustainable forms of fish production to the broader scope of the management and governance of sustainable aquaculture and marine ecosystems. The interest in sustainable management of the seas and coasts is booming, while few professionals are available with an integrated and specialised training in this field. Numerous types of specialists are needed, including technical specialists, researchers, consultants and project leaders, both in commercial, governmental and non-governmental organisations.

### ADMISSION REQUIREMENTS

see page 40 or look on the website.



# MSc Bioinformatics



**ALUMNUS TOM VAN DEN BERGH.** It is sometimes difficult for doctors to diagnose genetic diseases caused by a missense mutations. A missense mutation does not necessarily mean that you have the gene associated disease and become ill since not all missense mutations lead to appreciable protein changes. Tom van den Bergh MSc created a database for Fabry's disease for his final thesis. He wrote a computer programme that reads publications and stores all information about Fabry mutations in its database. Genetic researchers can, in turn, quickly access this database to determine if the mutation they found in a patient has already been addressed in literature and what the effects were. This is just one example of how Bioinformatics can address real world problems.

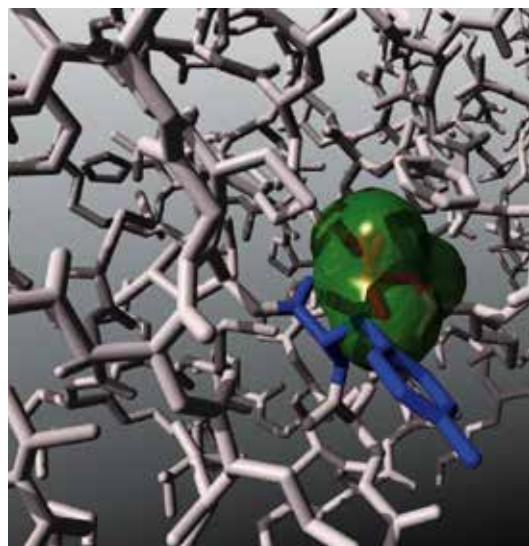
## Thesis tracks

### BIOINFORMATICS

The bioinformatics track focuses on the practical application of bioinformatics knowledge and skills in the molecular life sciences. It aims at creating and using bioinformatics resources to address specific research questions. The knowledge and skills gained can be applied in many life science disciplines such as molecular & cell biology, biotechnology, (human) genetics, health & medicine and environmental & biobased technology.

### SYSTEMS BIOLOGY

The systems biology track focuses on the study of the complex interactions in biological systems and on the emerging properties derived from these. Systems biology approaches to complex biological problems offers a wealth of possibilities to understand various levels of aggregation and enables control of biological systems of completely different scales, ranging from the molecular cellular level to marine, plant, or animal ecosystems to a desired state. The knowledge and skills gained can be applied in many life science disciplines, including molecular & cell biology, applied biotechnology, genetics, medicine and vaccine development, environmental and biobased technology.



## Programme summary

DNA contains information for life but how is this information used? Biological data such as DNA and RNA sequence information produced by next-generation sequencing techniques is accumulating at an unprecedented rate. Life scientists increasing use bioinformatics resources to address their specific research questions. Bioinformaticians bridge the gap between complex biological research questions and this complex data. Bioinformaticians use and develop computational tools to predict gene function(s) and to demonstrate and model relationships between genes, proteins and metabolites in biological systems. Bioinformatics is an interdisciplinary field that applies computational and statistical techniques to the classification, interpretation and integration of large-scale biological data sets. If different data types are joined complex interactions in biological systems can be studied. The use of systems biology methods to study complex biological interactions offers a wealth of possibilities to understand various levels of aggregation and enables control of biological systems of different scales. Systems biology approaches are therefore quickly gaining importance in many disciplines of life sciences such as in applied biotechnology where these methods are now used to develop strategies for improving production in fermentation, bioconversion and enzymatic synthesis and in the study of human metabolism and its alterations where systems biology methods are applied to understand a variety of complex human diseases, including metabolic syndromes and cancer. The Wageningen programme focuses on the practical application of bioinformatics and systems biology approaches in many areas of the Life Sciences. To ensure that students acquire a high level of understanding of modelling and computing principles the curriculum includes training in the fundamentals of database management, computer programming, structural and functional genomics, proteomics and systems biology methods. This training is completed with advanced elective courses in molecular biology and biostatistics.

## Your future career

Bioinformatics and Systems Biology are new fast growing biologybased interdisciplinary fields of research poorly served by the traditional curricula of Life Sciences. As demand has outpaced the supply of bioinformaticians, the first job after graduation is often a PhD project at a research institute or university. It is anticipated that five years after graduation, about one third will stay employed as a scientist at a university or research centre, while the others choose for a career at research-oriented pharmaceutical and biotechnological companies.

### ADMISSION REQUIREMENTS

see page 40 or look on the website.

## Related programmes

MSc Biotechnology - MSc Molecular Life Sciences - MSc Plant Biotechnology.



**ALUMNA MARTINE KOS.** "I work as a PhD-student at Wageningen University. Being a PhD-student means that you work on a large research project for four years. I work on the effects of plant resistance on biological control of pest insects. In other words, I test whether resistance compounds that plants produce to defend themselves against herbivorous insects (like caterpillars) can also negatively affect the predators (like lady bird beetles and parasitoid wasps) that plants attract to eat the herbivores. My research is a great combination of field work, performance studies of the insects in the greenhouse, chemical analyses in the lab, behavioural studies, and of course trying to write everything down as clear as possible in publications."

## Specialisations

### ANIMAL ADAPTATION AND BEHAVIOURAL BIOLOGY

This specialisation focuses mainly on subjects as adaptation, mechanisms involved in these adaptations and behaviour of animals.

### BIO-INTERACTIONS

In this specialisation you obtain knowledge about interactions between organisms. You learn to understand and interpret interactions on different levels, from molecular until ecosystem level.

### MOLECULAR ECOLOGY

In this specialisation you learn to use molecular techniques to solve ecological questions. You will use, for example, molecular techniques to study the interaction between a virus and a plant.

### CONSERVATION AND SYSTEMS ECOLOGY

This specialisation focuses initially on fundamental processes which play a key role in ecology. You learn to interpret different relations, for example the relation between chemical or physical processes and bioprocesses. Besides that you learn to analyse different ecosystems. This knowledge you can use to manage and conserve these ecological systems.

### EVOLUTION AND BIODIVERSITY

The systematics of biodiversity in an evolutionary perspective is the central focus of this specialisation. Subjects that will be addressed in this specialisation are: evolution, genetics, biosystematic research and taxonomic analysis.

### HEALTH AND DISEASE

The mechanisms that play a role in maintaining healthiness of humans, animals and other organisms are the main points in this specialisation.

### MARINE BIOLOGY

Choosing this specialisation means studying the complexity of the marine ecosystem. Moreover you learn about the impacts of for instance fishery and recreation on this ecosystem or the interaction between different species in this system.

### MOLECULAR DEVELOPMENT AND GENEREGULATION

This specialisation focuses on gene regulations and the different developmental mechanisms of organisms.

### PLANT ADAPTATION

This specialisation focuses on the adaptations that different plants gained in order to adjust to various conditions. You learn to understand the regulation processes in plants that underlie these adaptations.



## Programme summary

Biological issues are at the forefront of the technological progress of modern society. They are central to global concerns about how we effect and are affected by our environment. Understanding the complexity of biological systems, at scales ranging from single molecules to whole ecosystems, provides a unique intellectual challenge. During the MSc Biology students get a broad overview of the latest developments in Biology ranging from genes to ecosystems. They learn to critically discuss the newest scientific developments in the biological sciences. A systems biology approach provides a way to make a link between these organisation levels and teaches students to quantitatively analyse biological problems. Within their area of specialization students deepen their knowledge and skills in a certain subject. To prepare for a successful international career, we strongly encourage our students to complete part of their programme requirements abroad.

## Your future career

Many graduates from the Biology programme enter careers in fundamental and applied research or go on to become postgraduate students. Some find a position as communication officer, manager or decision-maker. Over 70% of our graduates find a job within six months upon graduation. Compared to other Dutch universities, many biology graduates from Wageningen University find a position abroad.

### ADMISSION REQUIREMENTS

see page 40 or look on the website.

## Related programmes

MSc Molecular Life Sciences - MSc Animal Sciences - MSc Plant Sciences - MSc Forest and Nature Conservation - MSc Biotechnology - MSc Plant Biotechnology - MSc Aquaculture and Marine Resource Management - MSc Organic Agriculture.

# MSc Biosystems Engineering



**ALUMNUS WOUTER BAC.** "I am doing a PhD at Wageningen University about the development of a pepper harvest robot. A number of harvest robots have been developed already, for example for cucumbers, strawberries and oranges, but they often appear to be slow and therefore do not pass the pilot phase. That is why I want to develop software algorithms that can 'learn', in order to pick faster and more accurately. In fact we want to implement the learning possibilities of humans in to a harvest robot!"

## Thesis tracks

### AGRICULTURAL ENGINEERING (FARM TECHNOLOGY)

This topic consists of four main themes: Automation for bioproduction, greenhouse technology, livestock technology and soil technology. All these topics have the shared goal of designing systems in which technology is applied to the demands of plants, animals, humans and the environment. Examples of such applications include precision agriculture, conservation tillage, fully automated greenhouses and environmentally friendly animal husbandry systems that also promote animal welfare.

### PROCESS DYNAMICS

Production processes and various kinds of machinery have to be optimised to run as efficiently as possible, and with the least amount of possible environmental impact. To achieve this, computer models and simulations are developed and improved. Examples include designing control systems for a solar-powered greenhouse to include a closed water cycle, and designing a tomato harvesting robot.

### INFORMATION TECHNOLOGY

Information and communication play a vital role in our society. To optimise production processes and quality in production chains, it is necessary to acquire, use and store data and information. This requires the design and management of business information systems, software engineering, designing databases and modelling and simulation.

### ENVIRONMENTAL TECHNOLOGY

Environmental technology revolves around closing cycles and reusing waste products and by-products. Processes have to be designed in such a way that they either reuse waste or separate it into distinct and reusable components. Examples include the production of compost, the generation of green energy or the design of environmentally friendly animal husbandry systems and greenhouses.

### AGROLOGISTICS

The goals of Agro logistics are to get the right product in the right quantity and quality at the right time and to the right place as efficiently as possible while fulfilling the requirements of the stakeholders (such as government legislation and regulations). This requires the design of effective, innovative logistic concepts in agrifood chains and networks. Examples are the design of greenhouses developed for optimal logistics or designing a dairy production process with minimal storage costs.



## Related programmes

MSc Animal Sciences - MSc Plant Sciences - MSc Geo-information Science - MSc Geographical Information Management and Applications - MSc Organic Agriculture.

## Programme summary

The Biosystems Engineering study programme educates students in finding innovative solutions to technology-related problems. They combine their knowledge of technology, living systems and the natural and social sciences with their experience in integrated thinking by taking a systems approach. These solutions can be applied to either the field of food or non-food agricultural production. Graduates of the Biosystems Engineering programme are capable of working as academically-trained professionals. During the programme they develop independence and creativity, while acquiring skills that enable them to analyse problems, and work as part of a team (both interdisciplinary and multicultural). Biosystems Engineering is a tailor-made, thesis-oriented programme. The individualised curriculum is based on the specific interests and competencies of the student. The most important part of the programme is the thesis.

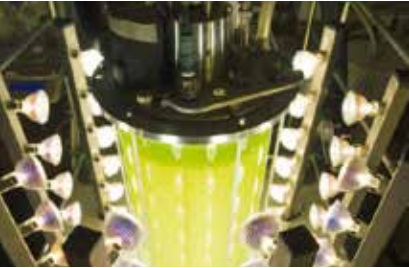
## Your future career

Most graduates are employed in the agro-food sector, in related sectors of industry and trade, or at local, regional or national government agencies. In industry and trade, graduates are employed as project leaders, product managers, technical experts, sales specialists or managers. Graduates work for many kinds of companies, including designers of agricultural buildings (animal husbandry systems, greenhouses) and bio-energy production systems. Others find jobs with IT companies (climate control computers, automated information systems) or firms in the agro-food chain that produce, store, process, distribute and market agricultural products. In the service sector, graduates enter careers as consultants or information officers. Graduates also work for the government as policy makers in the fields of technology and sustainable agricultural production, while others enter careers in research at institutes or universities.

### ADMISSION REQUIREMENTS

see page 40 or look on the website.

# MSc Biotechnology



**ALUMNUS SINA SALIM.** In America and Brazil, production of maize and sugar cane for bio ethanol takes up enormous swathes of arable land that could otherwise be used for food production. This leads to the well-known food versus fuel dilemma. An alternative method for producing bio diesel is the use of algae instead. Currently, too much energy is consumed during the growth and harvesting of algae but huge efforts are being made to reduce these energy requirements. Sina Salim is trying to develop a cheap and energy efficient harvesting method to ultimately produce bio diesel from algae, a competitor of fossil fuel.

## Specialisations

### CELLULAR AND MOLECULAR BIOTECHNOLOGY

This specialisation focuses on the practical application of cellular and molecular knowledge with the aim of enhancing or improving production in micro organisms or cell cultures. Possible majors: molecular biology, biochemistry, microbiology, virology, enzymology and cell biology. The knowledge and skills gained can be applied in food biotechnology, medicine and vaccine development, environmental and bio-based technology.

### PROCESS TECHNOLOGY

This specialisation focuses on engineering strategies for developing, enhancing or improving production in fermentation, bioconversion and enzymatic synthesis. Possible majors: bioprocess engineering, food or environmental engineering, applied biotechnology and system and control techniques. The knowledge and skills gained can be applied in food biotechnology, medicine and vaccine development, environmental and bio-based technology.

### MARINE BIOTECHNOLOGY

This specialisation focuses on the use of newly discovered organisms from the sea in industrial processes. Applications include production of new medicines, fine chemicals, bio-based products and renewable energy.

### MEDICAL BIOTECHNOLOGY

This specialisation focuses on the use of modern biotechnology in the development and production of new vaccines and medicines. Advanced molecular and cellular techniques are used to study diagnostic and production methods for vaccines and medicines. Possible majors: molecular biology, microbiology, virology and cell biology.

### FOOD BIOTECHNOLOGY

This specialisation focuses on the application from biotechnology to food processing. The approach includes microbial and biochemical aspects integrated with process engineering and chemistry. Possible majors: food microbiology, food chemistry and process engineering.

### ENVIRONMENTAL AND BIOBASED TECHNOLOGY

This specialisation focuses on the design and development of biotechnological processes for solving environmental problems by removing waste products or by producing renewable energy. Possible majors: environmental technology, bioprocess engineering, microbiology and system and control techniques.



## Related programmes

MSc Molecular Life Sciences - MSc Food Technology - MSc Bioinformatics - MSc Plant Biotechnology - MSc Environmental Sciences.

## Programme summary

Biotechnology is defined as the industrial exploitation of living organisms or components derived from these organisms. Its practical applications include age-old techniques such as brewing and fermentation, which are still important today. In recent decades, gene modification has revolutionised the biotechnology industry spawning countless new products and improving established processes. More and more types of fermentation are being used and most new medicines are products of biotechnology. In addition, biotechnological processes are beginning to replace traditional petrochemical products and newly discovered organisms from the sea are being used in marine biotechnology. Modern biotechnology has become an applied area of science with a multidiscipline approach embracing recombinant DNA technology, cellular biology, microbiology and biochemistry, as well as process design, engineering, modelling and control.

## Your future career

Graduates in biotechnology have excellent career prospects and most receive job offers even before graduation. More than 60 percent begin their careers in research and development. Many of these MSc graduates go on to earn their PhD degrees and often achieve management positions within a few years. Approximately 30 percent of graduates start working immediately for biotechnology companies. Relatively few begin their careers outside the private sector or in a field not directly related to biotechnology. In the Netherlands, some graduates work for multinational companies such as Merck Schering Plough, DSM, Heineken, Unilever and Shell, while others find positions at smaller companies and various universities or research centres such as NKI and TNO.

### ADMISSION REQUIREMENTS

see page 40 or look on the website.

# MSc Climate Studies



**PROJECT SURVIVAL NL.** The Climate Conference in Copenhagen, Denmark, in December 2009 drew attention from people and governments worldwide. Dutch students set-up a project called Project Survival NL to enhance a fair climate agreement. The goal of the project was to attract attention to the under-representation of less-developed countries and to provide support for small delegations from Africa. A selection of “youth delegates” from local African organisations involved in sustainability issues and youth participation attended the conference. They participated in negotiations about the survival of their country with a focus on climate change. Activities included networking with politicians, NGOs, businesses, youth, media, and more. It was a busy time for the Project Survival NL group!

## Programme summary

Climate Studies: Earth, Life and Society focuses on better understanding and addressing climate change and its implications for nature and society.

It has become clear in the past decades that the climate is changing across the Earth. Research into the climate system and its dynamics is booming. It is leading to an improved understanding of the geophysical and biogeochemical processes involved although many fundamental questions remain unanswered. Forceful debates are conducted about the impact of climate change on nature and society, and about strategies for coping with the impact (adaptation) and for limiting climate change in the long term (mitigation). These issues are important the world over and fuel a range of new challenges to both natural and social sciences. This MSc programme aims to analyse and understand the climate system as well as the societal dynamics of climate change in order to enable society to make informed and future-oriented decisions about climate-change related issues.

Key questions addressed include: How will ecosystems be affected and how will these, in turn, impact climate systems? What will be the effect on the availability of water and food? How can agriculture adapt to changing climate conditions? How will climate change issues influence national and international political agendas, and how will citizens and companies respond? What will be the economic consequences of climate change and how will they be distributed globally? Will new social and economic opportunities emerge in the process of adaptation?

As these changes and challenges become ever more apparent, the demand for scientists who are able to understand and investigate them will increase. Wageningen University has a strong international reputation in this field due to the quality of its research in natural and social sciences, and its excellent track record in interdisciplinary research projects. It has bundled its expertise and resources in this MSc programme specifically aimed at students who wish to focus on the scientific insights in climate change and its implications for nature and society. As the largest environmental research and education institute in Europe with students from virtually all countries of the world, Wageningen offers a truly global platform for study in this field. Wageningen University is one of the academic core partners of the European Knowledge and Innovation Community addressing climate change mitigation and adaptation.

Climate Studies: Earth, Life and Society gives you a broad overview of climate-change related issues. You will become an expert in a topic of your choice during your thesis research. We offer the following thesis tracks:

- Meteorology and Air Quality
- Hydrology and Quantitative Water Management
- Crop and Weed Ecology or Nature Conservation and Plant Ecology
- Earth System Science or Integrated Water Management or Soil Quality
- Environmental System Analysis
- Environmental Economics
- Environmental Policy

The chair groups that offer these research projects all participate in the Wageningen Institute for Environment and Climate Research and/or the C.T. de Wit Graduate School for Production Ecology and Resource Conservation. According to recent international panel assessments, the quality and relevance of their research programmes range from very good to excellent.

## Your future career

Graduates from this programme are well equipped with the knowledge and skills to continue their academic training as a PhD student or to start a career as a scientific professional at universities, research institutes, and environmental and governmental organizations. Applied climate change researchers and experts are needed by banks, insurance companies, construction, power companies, and authorities.

### ADMISSION REQUIREMENTS

see page 40 or look on the website.



## Related programmes

MSc Environmental Sciences - MSc Earth and Environment - MSc Management, Economics and Consumer Studies

# MSc Development and Rural Innovation



**STUDENT SARA GROENENDIJK.** Did livelihoods in Nepal improve due to an increase of greenery and thus natural resources? This was one of the questions Sara Groenendijk tried to answer during her thesis research. She combined her knowledge of natural resource conservation and rural development in the countryside of Nepal. While conducting observations and interviews, she experienced rural living conditions that improved her understanding of people's social and cultural background and their limitations. During her stay, she learned much about herself, Nepali culture, development work in practice, and how (not) to do research.

## Thesis tracks

### COMMUNICATION AND INNOVATION STUDIES

Communication and Innovation Studies examines communication in individual and collective change processes. Special attention is paid to the role of communication in interactive design trajectories that are geared towards bringing about organisational, policy or technological change in societal domains such as sustainable agriculture, health, food, multi-functional land use, environment and international development.

### TECHNOLOGY AND AGRARIAN DEVELOPMENT

The goal of the Technology and Agrarian Development group is to understand how science and technology impact international development problems such as food security, health, adaptation to climate change and social justice. The approach involves analysis of how technology both mediates and is constituted through social relations and institutional arrangements between various actors, including farmers, scientists and policy makers. Every social problem that we face today involves science and technology, either as a cause or cure.

### RURAL DEVELOPMENT SOCIOLOGY

Rural Development Sociology focuses on rural development around the world, combining anthropological and social-political interests and practical issues. Field-based studies are the basis for critical reflection on theories of development and social change. Themes addressed include food security, livelihoods in the context of globalisation, poverty and environmental degradation, property rights, social impact of bio-fuels, and conflict, policy and politics.



## Programme summary

This programme aims to develop professionals who understand the role of knowledge in societal change processes, and are able to link human and technological dimensions of innovation. It is a social science programme tailored for students with a technical, life science or relevant management background with interest in international development problems. Innovations in the field of agriculture, food and natural resource management have a dual nature. They consist of new technological practices as well as new socio-organisational arrangements between different societal actors. Dealing with the links between technological developments and societies in which these are introduced and used, requires a fundamental understanding of socio-technical innovation and change processes. In other words, you will be challenged to combine your previously acquired technical competencies with new skills at an academic level of thinking in social sciences in order to make innovations work.

Offering a variety of disciplinary and problem-oriented courses, the programme is taught in an interactive style where learning from each other is emphasised. Working in small international groups contributes significantly to this mutual learning process. The programme is highly thesis-oriented. The subject matter and methodology courses serve primarily as preparation for an empirical research project. This entails writing a research proposal, conducting the research and completing a thesis, thereby offering you the opportunity to apply your newly acquired insights in a field situation. International students often apply this knowledge in their home country on a topic relevant to their professional interests and preferences. Others choose a relevant topic in their field of interest in various countries around the world, including the Netherlands.

## Your future career

The programme lays the foundations for a variety of career opportunities, usually oriented towards societal problem solving and innovation. You can become a researcher or a knowledge broker who ensures a good fit between client demands and research formulation. Or, you might take on the role of process facilitator or communication specialist in a nongovernmental organisation, the public sector or the private industry. A career as a policy maker or consultant in various (inter)national organisations is another realistic option.

### ADMISSION REQUIREMENTS

see page 40 or look on the website. If you have a social sciences background and an interest in development studies, refer to the MSc programme International Development Studies.

## Related programmes

MSc International Development Studies - MSc Applied Communication Science - MSc Management, Economics and Consumer Studies - MSc International Land and Water Management - MSc Environmental Sciences.



# MSc Earth and Environment



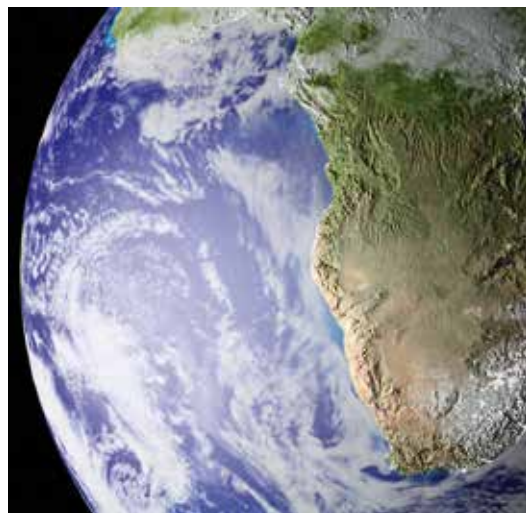
**ALUMNUS NICK GORSKI.** He came from Canada to Wageningen because of the excellent reputation the Netherlands has in the field of water. During his time here he conducted two thesis research projects. The first dealt with the fluxes of sediment-bound contaminants in a river basin in south-western Turkey. The second involved the development of a new modeling methodology for heterogeneous flow and solute transport in unsaturated soils. "I had the opportunity to do classes, field work, and research in other countries. It was an excellent way to put what you have learned into context." After graduating in Wageningen Nick went on to work for the KWR Watercycle Research Institute in Nieuwegein, Netherlands

## Thesis tracks

Students of the programme will specialise by selecting a major thesis subject and its preparatory courses, called the thesis track. The MSc Earth and Environment is a comprehensive programme offering its students a wide choice of thesis subjects. There are options focussing on the physical, chemical or biological aspects of soil, water and atmosphere. Other tracks are dealing more with the integrated or spatial approaches. We offer the following thesis tracks:

- Aquatic Ecology and Water Quality Management
- Atmospheric Chemistry and Air Quality
- Earth System Science
- Hydrology and Quantitative Water Management
- Meteorology
- Nature Conservation and Plant Ecology
- Soil Biology and Biological Soil Quality
- Soil Chemistry and Chemical Soil Quality
- Soil Geography and Landscape
- Soil Physics, Ecohydrology and Groundwater Management

The combination of profound disciplinary training with an Earth system's approach prepares graduates from the MSc Earth and Environment for dealing with the scientific and societal questions of the future. The programme further allows space for several elective courses and it has a special variant in preparation for a PhD study.



## Programme summary

Planet Earth is a fascinating and complex system supporting all life. It contains all priceless natural resources that are exploited by mankind for the supply of food, water, energy and other commodities. It is the foundation for mankind's prosperity and quality of life. Planet Earth, however, is under significant pressure and it is becoming increasingly difficult to sustain an ever growing human population and to secure a sustainable society for future generations. Scarcity of water, soil degradation, loss of biodiversity, vulnerability to severe weather and climate change are just a few examples of major issues that need to be addressed.

Geoscientists at Wageningen University study Planet Earth and its quality for life. Using tools from physics, chemistry, biology and mathematics, they build a quantitative understanding of the composition, structures and processes of the Earth and its atmosphere, as well as its resources and the influence of human activity. Thus, geoscientists have an important role to play in improving natural resource management and in removing obstacles to sustainable development. Study of the Earth system largely focuses on understanding of the interdependent physical, chemical and biological processes, and on developing models that describe these processes on relevant scales. This allows scenarios to be developed which describe expected local, regional and/or global changes, and the time scale on which they will occur. In Wageningen the focus is on the Earth's 'Critical Zone' -including the atmospheric boundary layer- where flows of energy and matter determine the conditions for sustaining life; hence the name Earth and Environment. Students of the programme will develop advanced modelling skills with due attention to methods for up and downscaling; they will learn to think in ranges of temporal and spatial scales.

## Your future career

Graduates from this programme are well equipped with the knowledge and skills to continue their academic training as a PhD student, or to start a career as a scientific professional at universities, research institutes, and consultancies. Depending on their specialisation, graduates may take up positions as meteorologist, hydrologist, water quality scientist or soil scientist in the public or private sector.

### ADMISSION REQUIREMENTS

see page 40 or look on the website.

## Related programmes

MSc Biology - MSc Climate Studies - MSc Environmental Sciences - MSc International Land and Water Management - MSc Plant Sciences.

# MSc Environmental Sciences



**ALUMNUS ALEXANDER VAN OUDENHOVEN.** After finishing his MSc Environmental Sciences, he started working as a research assistant with the Environmental Systems Analysis group of Wageningen University. There he helped to develop a hay fever prediction module: Allergy radar ([www.allergieradar.nl](http://www.allergieradar.nl)). Allergy radar predicts daily pollen release of six different plant species known to cause hay fever, based on temperature data, the weather forecast and plant-specific information. User feedback allows for constant refinement of the module's predictions. This is a good example of scientists and the general public working together to better understand and predict climate related health problems.

## Thesis tracks

The ten thesis tracks are clustered in 4 groups.

### **ENVIRONMENTAL QUALITY**

investigates the physical, chemical and biological processes that influence the quality of the environmental compartments Soil, Water and Air, and the effects of pollutants on humans and ecosystems. Students can choose the thesis tracks Aquatic Ecology and Water Quality Management, Meteorology and Air Quality, Soil Biology and Biological Soil Quality, Soil Chemistry and Chemical Soil Quality, or Environmental Toxicology.

### **ENVIRONMENTAL SYSTEMS ANALYSIS**

studies the natural and social processes involved in environmental issues. It aims to develop integrative tools and methodologies and to apply these in strategic research. Students can choose to develop such an integrated approach via the thesis track Environmental Systems Analysis.

### **ENVIRONMENTAL POLICY AND ECONOMICS**

covers the contribution of the social sciences to environmental research. The focus is on the social, political, legal and economic aspects of environmental issues and the goal is to provide students with the skills for studying, formulating and designing innovative forms of national and international environmental governance. You can choose a thesis track in the disciplines of Environmental Policy, Environmental Economics and Natural Resources, or Integrated Water Management.

### **ENVIRONMENTAL TECHNOLOGY**

concentrates on biological, chemical and physical processes for water reuse and the recovery of nutrients, minerals and energy. The aim is to fully understand these processes in order to design and optimise innovative technologies for renewable energy, closing nutrient cycles and solving environmental issues. You can choose any of these topics via the thesis track Environmental Technology.

## Related programmes

MSc Climate Studies - MSc Urban Environmental Management - MSc Earth and Environment - MSc Forest and Nature Conservation - MSc Aquaculture and Marine Resource Management.

## Programme summary

We are facing a future with an increased need of food, water, energy and other resources resulting from a growing world population and the demand for higher living standards. This will have an enormous impact on our already heavily burdened environment. Environmental challenges for the future include using our resources efficiently, minimising our impact on nature, and creating and changing people's awareness and behaviour towards their environment.

The MSc programme Environmental Sciences is designed for students who want to take up this challenge in finding innovative and sustainable approaches to secure and improve the state of the environment. This programme provides insight into the socioeconomic causes, the characteristics of pollution and degradation of the natural environment, and their effects on human beings and ecosystems. By taking an interdisciplinary approach, students learn to develop analytical tools and models, environmental technologies, socio-political arrangements and economic instruments to prevent and control environmental problems.

To allow you maximum flexibility in your individual course of study, there are no formal specialisations and compulsory elements are kept at a minimum. This enables the programme to be tailored to your individual requirements. The choice of the major thesis track determines which core courses have to be included. Major thesis research can be conducted in one of the ten thesis tracks (major) and each major can be combined with a minor in Environmental Communication or Education.

## Your future career

Graduates from this programme are well equipped to continue their scientific training in a PhD programme or to begin - or continue - a professional career requiring independent scientific performance. Students are taught the knowledge and skills needed to communicate with experts from different disciplines allowing them to play a key role in complex environmental and sustainability issues. Most graduates enter careers in environmental consultancy, research and management, while others are involved in policy development and higher education.

### **ADMISSION REQUIREMENTS**

see page 40 or look on the website.



# MSc Food Quality Management



**STUDENT TASIOUDIS DIMITRIOS.** "It was my need to combine my scientific background with management studies that I decided to do the master Food Quality Management. The master gives you a useful tool in understanding the meaning of every result in a real life situation and enables you to select the best solutions to tackle specific problems. Wageningen University is a great university where science flourishes and research is of utmost importance. It is the ideal environment to gain knowledge and to accomplish your goals."

## Specialisations

You will combine Food Quality Management courses with several courses based on your educational background and interest. These courses can be in fields such as food technology (e.g. product design, process design), food safety (e.g. food safety management, microbiology), management (e.g. case studies management, entrepreneurship) or logistics (e.g. food logistics management, supply chain management). The programme is thesis oriented and tailor-made. The thesis and internship in the second year of the programme are carried out in co-operation with a food industry.



## Programme summary

Food quality management assures the health and safety of food and other perishable products (e.g. flowers) and has become increasingly important in today's society. This is due to changing consumer requirements, increasing competition, environmental issues and governmental interests. This has resulted in a turbulent situation on the food market and in the agri-food production chain. The situation is further complicated by the complex characteristics of food and food ingredients, which include aspects such as variability, restricted shelf life and potential safety hazards as well as many chemical, biochemical, physical and microbiological processes. To face this challenge, continuous improvement in food quality management methods is required where knowledge of modern technologies and management methods plays a crucial role.

Quality issues in food and other perishable products are generally tackled using either a technological or a management approach. In Wageningen, a concept has been developed that combines both aspects. This 'techno-managerial' approach forms the basis of the Food Quality Management programme. It provides a comprehensive and structured overview of quality management for predicting food systems behaviour and generating adequate improvements in these systems from a chain perspective.

The programme prepares graduates to be able to deal with, and understand, the different players in the food industry (management, R&D), in order to ensure high quality products.

## Your future career

Graduates of this programme will be experts in the field of food quality management and can enter careers in agribusiness, research and public administration:

- Typical positions include quality assurance manager (responsible for the quality of the ingredients for a specific product).
- Designer/specialist (working on the quality aspects of fresh products in the development process), advisor/consultant (advising companies on certification).
- Researcher (studying the improvement of existing quality assurance systems in the food industry).

### ADMISSION REQUIREMENTS

see page 40 or look on the website.

## Related programmes

MSc Management, Economics and Consumer Studies - MSc Food Technology - MSc Food Safety.

# MSc Food Safety



**STUDENT MOATH ALMAYMAN.** "The courses of the master Food Safety consist of technical, managerial and legal aspects of food safety and are directly linked to real life situations. This in combination with the ability to perform an extensive research and an internship at an international company to enhance my working experience were reasons for me to choose this master. Even with a small population, Wageningen is a great cosmopolitan town. So many students from different backgrounds makes it a very interesting place."

## Specialisations

The programme offers two specialisations. Both specialisations have the courses on Food Safety Management and Food Law in common.

### APPLIED FOOD SAFETY

This specialisation deals with the more technical (microbiology, toxicology, risk assessment) part of food safety. Food Safety Economics is also part of the programme. Thesis topics are also in these fields and graduates generally work in industry and universities.

### FOOD SAFETY LAW

This specialisation is open for students with a technical or legal background. Courses focus on (international) food law, intellectual property rights and management. These are in Food law. Graduates generally work as regulatory affairs specialists in industry.



## Related programmes

MSc Food Quality Management - MSc Food Technology - MSc Nutrition and Health.

## Programme summary

Wageningen University is one of the few universities in Europe able to offer education and research in all fields of food safety. This includes not only technical disciplines such as microbiology and toxicology but also the legal, economic and communication aspects. The Food Safety programme at Wageningen University is one of the most modern and innovative in the world. Started in 2000 as the first of its kind, it is still the only two-year, full-time MSc food safety programme offered in Europe and the only programme offering Food Safety Law. The programme prepares graduates for careers in the food industry, government or consumer organisations; the three key players in international food safety management.

The food industry is increasingly confronted with farm-to-table food safety measures, regulations, legislation and guidelines aimed at controlling food hazards.

As a result, there is an increasing demand for managers with expertise in food safety evaluation who are able to survey and monitor the chemical, microbiological and physical parameters of product composition and product safety. Food safety experts are able to understand and analyse the variation in quality and safety of products. They are also able to assess the potential risks involved in the adoption of new production methods and processing techniques. Food safety evaluation concerns food constituents, agro-chemicals, environmental contaminants and natural toxins.

Food regulations are getting more and more complex, creating the need for regulatory affairs specialists in industry or in lobbying organisations. The programme is the only programme offering Food Safety Law for students with either a technical or a legal degree, fulfilling the need in society for such positions.

## Your future career

The market for those who complete this programme is promising and all our recent graduates have found jobs with relative ease. The demand for university-trained professionals in this field is currently higher than the number of available graduates. Most recent graduates found jobs in the private sector, at universities or at food safety research institutes. Many graduates enter careers in government and go on to managerial positions. Due to the increased efforts of the EU in the development of national food safety organisations, there will be many more job opportunities in various European countries, both for technical as well as regulatory specialists

### ADMISSION REQUIREMENTS

see page 40 or look on the website.

# MSc Food Technology



**STUDENT HARMKE KLUNDER.** "It is rich in proteins, unsaturated fats, vitamins and is available in large quantities all over the world. You may conclude, 'The ideal food ingredient.' However, would you still think so if it turns out to be about insects? 'With three other students, we added insects to a third world food product, thereby winning an international competition by the IFT (Institute of Food Technologists). Malnutrition in Africa could be fought by enriching their daily porridge, sorghumpap, with protein enhanced termites.' As food ingredients technologist it is possible to look beyond the products found on the shelves of the local supermarkets."

## Specialisations

### INGREDIENT FUNCTIONALITY

This specialisation focuses on the composition of food, especially on the role of various components, ingredients or structures in the quality and functionality of the final product. It deals with sensory, nutritive and textural aspects of foods in relation to their components. You major in Food Chemistry or Food Physics.

### PRODUCT DESIGN

While many new products are launched every year, not all succeed. This specialisation deals with the design and development of new or improved products. The focus is on the various processes used in Food Technology and on the design of new products from a consumer perspective. Particular attention is paid to modelling new product concepts/processes as well as predictive quality control. You major in Food Process Engineering or Product Design.

### FOOD INNOVATION AND MANAGEMENT

This specialisation combines courses in Food Technology with courses in Management and Innovation Studies. It is intended for students who wish to work on product development in small businesses or plan to start their own business. You major in Management Studies but there is also significant participation in one of the Food Technology groups.

### FOOD BIOTECHNOLOGY AND BIOREFINING

This specialisation focuses on using micro organisms or enzymes in food production. Microbial and biochemical aspects are integrated with process engineering and chemistry. The focus is on biotechnological food production. You major in Food Microbiology, Food Chemistry, Process Engineering or Microbiology.

### DAIRY SCIENCE AND TECHNOLOGY

This specialisation focuses on the dairy production chain. Its core programme consists of dairy-related courses and several additional courses, such as Food Components and Health, Advance Fermentation Science and Predicting Food Quality. During the second year, you complete a dairy-related thesis research project and internship.

### SUSTAINABLE FOOD PROCESS ENGINEERING

This specialisation focuses on Food Processing with special emphasis on sustainability. It is mainly aimed at students who would like to work in the food industry. The thesis can be carried out under the supervision of one of the following groups: Food Process Engineering or Operations Research and Logistics.

### EUROPEAN MASTERS DEGREE IN FOOD STUDIES

This international specialisation is developed in cooperation with the universities of Cork (Ireland), Lund (Sweden) and Agro-Paris Tech (Paris, France) as well as with ten large industrial partners. For more information see [www.eurmscfood.nl](http://www.eurmscfood.nl).

### GASTRONOMY

This specialisation focuses on the combination of Food Technology with cultural aspects of Foods as well as Molecular Gastronomy. It is mainly aimed at students who would like to work in the food services, in restaurants, retail and catering industries. During the second year, the thesis and internship can be carried out under supervision of the following groups: Food Chemistry, Food Physics or Rural Sociology.

### SENSORY SCIENCE

For more information see page 37.

## Programme summary

The Food Technology programme at Wageningen University has been in place for more than 50 years and is considered one of the best and most innovative programmes in its field in Europe. Wageningen University offers high-level courses and research in all areas of food science, ranging from advanced technical fields, such as Process Engineering or Chemistry, to fields with a more economic or sociological focus, such as Marketing and Gastronomy.

The Wageningen Food Science faculty is larger than that of any other European university. It includes professors and lecturers from a wide range of departments: Food Chemistry, Food Physics, Food Microbiology, Product Design and Quality Management, and Food Process Engineering. Food Technology covers nearly all aspects of food science and technology. As a result of being a very broad field, students are required to choose one of the following specialisations.

## Your future career

The demand for employees in this field is currently higher than the number of graduates from the programme, thereby, making job market prospects very interesting. Graduates find jobs with relative ease, especially, in the Netherlands and Western Europe. Recent graduates found positions in the private sector (from small and mid-sized companies to large multinationals), at Wageningen University or other universities as PhD students, or at research institutes domestically and abroad. Graduates also work in the field of process technology at innovation centres, innovative food companies or government agencies. Most achieve management positions.

### ADMISSION REQUIREMENTS

see page 40 or look on the website.

## Related programmes

MSc Biotechnology - MSc Nutrition and Health - MSc Food Quality Management - MSc Food Safety.

# MSc Forest and Nature Conservation



**ALUMNUS KOEN DE RIJCK.** He works as an expert for WWF on High Nature Value farmland in Bulgaria and Romania. "Influencing policy at a ministerial level, making studies and sharing experience alternates with capacity building activities for stakeholders in the countryside. Very challenging in a fast developing country where biodiversity is becoming a more important issue! Many people left the countryside, leaving behind closed schools and abandoned agricultural fields. An uphill fight, but the potential impact for biodiversity is huge."

## Specialisations

### POLICY AND SOCIETY

The central study object is the dynamics between people, organisations and institutions within policy making and policy innovation processes, referred to as 'governance', relative to forest and nature conservation issues, including spatio-temporal aspects. Issues in the field of economics, public administration, communication and strategic planning are addressed in order to conserve and manage forests and natural areas, in a sustainable way. Examples are: recreation, communities and natural resources, deforestation, forest governance, sustainable forestry and certification schemes.

### MANAGEMENT

This specialisation aims to design and assess realistic and feasible management options for forests and natural areas. The approach is based on specific knowledge and understanding of wildlife management, management of forests and other terrestrial vegetation. Special attention is given to the following subjects: What, for instance, is the best option for wildlife conservation? Do populations need to be managed or not? How does one determine an optimal population level? How should the effects of various management activities, at different spatial and temporal scales, be evaluated? How should the perceptions of different people be dealt with? What are the best options in forest management for a specific area? How to manage nature? How to deal with abiotic, biotic and social bottlenecks in restoration ecology? What is the role of N and P pollution? How to restore shallow lakes? How to restore tropical forests? It is also possible to focus on specific aspects of natural resource management.

### ECOLOGY

The emphasis is on understanding the ecological processes that form the basis for the structure, composition and functioning of forests and natural areas. You can specialise in tropical forestry, landscape ecology, animal ecology, forest resource management, plant ecology, biodiversity conservation or tropical nature conservation.



## Related programmes

MSc Animal Sciences - MSc Biology - MSc Development and Rural Innovation - MSc Landscape Architecture and Planning - MSc Geoinformation Science - MSc International Development Studies.

## Programme summary

This programme focuses on policy, sustainable management and conservation of forest and nature, i.e. understanding and predicting the effect of phenomena such as global climate change, deforestation, biodiversity loss, ecotourism, timber production, hunting and animal reintroduction. Insights into all aspects of forest and nature conservation are required to address these issues with emphasis on both ecological and social aspects. The MSc Forest and Nature Conservation study programme represents an integrated approach to natural resource management that can be applied at different scales, to diverse ecosystems and in varying political and social contexts. A tailor-made structure, an outstanding research environment and three comprehensive specialisations contribute to making the programme challenging for undergraduates from both the natural and social sciences.

## Your future career

The programme provides an excellent preparation for Dutch as well as European and non-European jobs. Career possibilities include positions at research institutes and universities, government ministries and local authorities. Many positions are also available at state and private forestry and nature conservation services, and environmental assessment agencies. Examples include the European Forest Institute, Birdlife International, and landscape and animal protection organisations such as RAVON or WWF. In the private sector, graduates can find jobs at engineering and consultancy bodies, such as Royal Haskoning, the National Fund for Rural Areas or forestry companies. Graduates often begin their career by carrying out research, computer analysis and modelling of ecological systems, working in knowledge transfer or preparing policy documents. Eventually, their careers usually shift towards advisory work, consultancies, research coordination and project management.

### ADMISSION REQUIREMENTS

see page 40 or look on the website.

# MSc Geographical Information Management and Applications



**ALUMNA GINEKE SNOEREN.** She is currently employed as a business consultant at ESRI Nederland. "GIS offers many opportunities and will become more important in the future. That is why I decided to enrol in this programme. The course has two advantages. First, it does not focus solely on GIS techniques, but also looks at management. Second, the blended learning system is great: it combines contact teaching with distance learning. Distance learning means the possibility to study in your own time: less contact hours, but still contact with teachers and students at set times. A variety of people take the course: not only Dutch and foreign students but also people who are already employed in the field of GIS. You learn a lot from each other".

## Specialisations

There are no formal specialisations within the MSc Geographical Information Management and Applications. Specialisation takes place via the free options within the different modules and via the thesis and internship topics.



## Related programmes

MSc Geo-information Science.

## Programme summary

The MSc Geographical Information Management and Applications (GIMA) offers a challenging programme in the domain of Geographical Information Sciences (GIS). It will help you to develop your knowledge and skills in the field of geo-information management and geo-information applications. As a future geo-information specialist, you have to address a wide number of fundamental issues in today's society such as: How can we make governments' and other organisations' spatial plans accessible and understandable to citizens and businesses, in order to ensure its compliance with their construction projects? What information do businesses need when looking for suitable locations for sales outlets in order to reach potential customers? How to combine observation data and pre-existing knowledge to assess the current situation of a crime scene? How can organizations legally manage their geo-information so employees in different departments understand which data files are available and accessible for their project? What measures need to be taken, where and on which scale, to deal with natural hazards and humanitarian disasters?

The programme teaches, among others, how to apply and manage geo-information in organisations and projects by critically understanding and using state-of-the-art geo-information theories and technology.

## Particularities of the programme

This MSc programme is offered by four renowned universities in the Netherlands: Utrecht University, Delft University of Technology, University Twente and Wageningen University. It is organised for both part-time and full-time students. The structure of the programme is mixed and consists of distance learning (85%) with contact weeks on location at the four universities (15%) each year. The duration is two years full-time and four years half-time. Exemptions are possible for students who have relevant working experience after their BSc, making it possible to complete a half-time programme in approximately three years.

## Your future career

Graduates have excellent career prospects. The demand for managers and application specialists in geo-information in the professional market is constantly increasing. Our alumni are employed in both the private and public sector (by companies, consultancies, government organizations and research institutes) as managers, specialists and researchers.

### ADMISSION REQUIREMENTS

see page 40 or look on the website. This programme is registered in CROHO as MSc Geographical Sciences at Utrecht University, code 60732.

# MSc Geo-information Science



**ALUMNUS DAVID MARCELIS.** He obtained a BSc Forest and Nature Conservation and a MSc Geo-information Science degree. He works as a Radar and Remote Sensing specialist for eLEAF, a value adding company and advisory firm that operates worldwide in the transition area of remote sensing science and operational applications. As an employee at eLEAF, David takes part in projects involving radar remote sensing and works on his PhD on radar applications in crop growth monitoring. David is very positive about the connection between his study and his current job: 'The MGI programme provided me with a good basis of remote sensing and GIS knowledge and the necessary research skills to start my professional and scientific career.'

## Specialisations

There are no formal specialisations within the Geo-information Science programme. Students may specialize by selecting advanced courses in GIS and/or remote sensing, and by selecting courses in diverse application fields or (geo-)information technology. Students will also profile themselves by completing a major research thesis in one of the following research fields: spatial data infrastructures, quantitative remote sensing, imaging spectroscopy, LIDAR, geo-sensor networks, integrated land monitoring, spatial analysis, agent based modelling, visualization or communication. In addition students may choose from a range of interesting internship locations.



## Programme summary

Geo-information (GI) is derived from spatial data and it is indispensable for domains like spatial planning, water management, nature conservation, environmental management, agriculture, energy supply, disaster management, traffic and safety.

Geo-information has become increasingly important to society. The MSc programme Geo-information Science at Wageningen University offers a unique blend of geo-information science methods, technologies and applications. Especially the combined use of earth observation techniques (Remote Sensing) and Geographic Information Systems (GIS) for problem solving within the environmental and social disciplines is an asset of the Wageningen Approach. Wageningen UR, including Alterra, has the largest group of GI-scientists in the Netherlands. Students with various backgrounds in environmental sciences, social sciences and ICT follow this programme.

The Geo-information Science programme contains courses on the acquisition, storage, analysis and visualisation of spatial data. Students are taught methods and techniques regarding GIS, remote sensing and geo-information processes such as data capture, data analysis and data presentation. They are trained to recognise, describe and analyse problems in relevant environmental application fields; this includes training in the development of prototypes. They also learn about the technical and organisational role of geo-information in institutes and companies, how to communicate adequately and keep abreast of scientific and technical developments in geo-information, and how to apply these developments in specific fields. Depending on background, research topics and previous education, students may also select relevant courses in application domains or ICT.

## Your future career

Graduates in Geo-information Science have excellent career prospects. Most of them receive job offers before graduation. Most of our recent graduates have started as researchers (in PhD programmes or research institutes), or as technical specialists, consultants or project leaders in companies all over the world such as Royal Haskoning, Arcadis or Grontmij. Others are employed in local or central government agencies and NGOs, including environmental assessment organisations.

### ADMISSION REQUIREMENTS

see page 40 or look on the website.

## Related programmes

MSc Geographical Information Management and Applications - MSc Forest and Nature Conservation - MSc Landscape Architecture and Planning - MSc Environmental Sciences - MSc Biosystems Engineering.



# MSc International Development Studies



**STUDENT JANNEKE VREUGDENHIL.** Poor people are very vulnerable to natural disasters. Some development projects therefore include "Disaster Risk Reduction" strategies. The irrigation system in the province Oddar Meanchey in Cambodia is an example of this type of development project. It has been built to allow rice production during the dry season. Janneke Vreugdenhil spent some time studying how effective this development project has been for the local community. Has the irrigation system reduced the risks of drought for food production and so reduced the vulnerability of the community? By investigating the benefits to the local community from this Disaster Risk Reduction project, Janneke is already actively involved in development during her studies.

## Specialisations

### SOCIOLOGY OF DEVELOPMENT

This specialisation focuses on social transformation processes, especially the local consequences of globalisation and environmental change, and the way people cope with uncertain circumstances. Themes studied include natural resource degradation, refugees and migration, post-disaster reconstruction, social unrest, poverty, and lack of access to resources crucial to livelihoods of people. This specialisation applies sociological and anthropological perspectives to development problems with special attention given to understanding the differing interests and views of numerous actors. You can choose a major in Disaster Studies, Environmental Policy, Rural Development Sociology or Rural Sociology.

### ECONOMICS OF DEVELOPMENT

The central themes in this specialisation are the role of agriculture in development, food security and the global food crisis, regional economic issues, sustainable use of natural resources, rural-urban income disparities, and issues related to poverty and the role of institutions. These themes are examined from a microeconomic perspective to gain insight into the behaviour of individuals and institutions, and from a macroeconomic perspective to obtain insight into development processes at regional and national levels. You can major in Agricultural Economics and Rural Policy, Development Economics, Environmental Economics and Natural Resources or Regional Economics.

### COMMUNICATION, TECHNOLOGY AND POLICY

In this specialisation social transformation and sustainable development are examined with a specific focus on communication, technological innovations, and policy processes. An important theme is how technologies and policies are developed in the interaction between various parties (e.g. governments, social organisations, and citizens) and the role of communication in these processes. Another theme is the relationship between technological change (in the agricultural and food sectors), institutional processes and social transformation. You can choose a major in Communication and Innovation Studies, Law and Governance or Technology and Agrarian Development.

### RESEARCH MASTER VARIANT

To prepare for a future career in scientific research (e.g. a PhD position), you can opt for the Research Master Variant of this programme. This variant places extra emphasis on research competencies and knowledge of disciplines and can be followed within each of the specialisations. An additional assessment will be made after being admitted to the MSc programme.



## Related programmes

MSc Development and Rural Innovation - Health and Society (specialisation) - MSc Applied Communication Science - MSc International Land and Water Management - MSc Leisure, Tourism and Environment - MSc Management, Economics and Consumer Studies.

## Programme summary

This programme deals with worldwide processes of development and change with an emphasis on livelihoods, agro-food networks and the environment. It focuses on transformation processes both in Europe and in developing countries in a dynamic international context. It approaches the study of social, economic, political, technological, and environmental change from various perspectives. You will develop a critical understanding of recent development theories, learn to plan and conduct research, and acquire skills to translate research findings into recommendations for policies and intervention strategies. You will learn to include the diverging views of various stakeholders and to work in multi-disciplinary teams. Depending on your previous education, you can follow one of the specialisations.

## Your future career

Graduates are employed in capacities such as researcher, teacher, consultant, advisor, communication advisor or policy maker in various (inter)national organisations. You could work, for example, as policy maker in a government or semi-governmental institute, as development expert in an international (non-)governmental organisation (such as FAO, World Bank, European Union, ActionAid International, Oxfam Novib, or Fair Trade), or (consultancy) company, or as researcher and/or teacher at a university or research institute.

### ADMISSION REQUIREMENTS

see page 40 or look on the website. If you have a background in a technical or life sciences field and an interest in development studies, refer to the MSc programme Development and Rural Innovation.

# MSc International Land and Water Management



**ALUMNUS STEF SMITS.** After graduation Stef Smits joined the IRC International Water and Sanitation Centre in Delft, the Netherlands. IRC is a knowledge institute in the field of drinking water supply and sanitation for developing countries. Stef works on applied research and learning projects in the field of small-scale domestic water supplies and integrated water resources management in various developing countries. During short visits, he supports partner organisations and their research through, for example, training courses and dissemination activities. "The nicest thing is that one day you may be on a field visit at meetings with communities and the next day you do a presentation for Ministers or donors or may be at a conference or workshop."

## Specialisations

### LAND DEGRADATION AND DEVELOPMENT

Although soil and water are our most important natural resources, they are often not used in a sustainable manner, resulting in land degradation and waste of water. This specialisation deals with land and water management interventions in farming systems - at both field and watershed scale - aimed at preventing, reducing or reversing losses of soil, water and plant nutrients. These losses occur in all climate zones and in nearly all farming systems. The focus in education and research is on rain-fed agriculture and natural resources management. Topics covered include erosion processes as well as the planning, design and socio-economic evaluation of soil and water conservation measures.

### IRRIGATION AND WATER MANAGEMENT

Students in this specialisation concentrate extensively on water use in agriculture, with irrigation - from farm to watershed level - as the main focus. Topics include irrigation processes, irrigation systems design, and improvement of existing systems and practices. Irrigation and Water Management emphasises the complete integration of engineering and agronomic issues with the socioeconomic and institutional aspects of irrigation development. Topics therefore include not only the design and operation of irrigation systems, but also the social frameworks that define water management, such as gender issues and institutional and legal constraints to land and water development.

### INTEGRATED WATER MANAGEMENT

This specialisation focuses on the integrated management of hydrological systems such as catchments and river basins. Integrated water management involves a process of participatory planning, decision making and implementation to achieve sustainable use of land and water resource systems. Competition for water - in terms of both quantity and quality - between various uses and users has turned water management into a political issue that must be managed according to the needs of various stakeholders at all policy levels. Graduates must be capable of analysing different forms of water use by various stakeholders within a given context, and have to understand the strategies and viewpoints of decision-makers and assess alternative water management systems.



## Related programmes

MSc Earth and Environment - MSc International Development Studies - MSc Development and Rural Innovation - MSc Geo-information Science - MSc Landscape Architecture and Planning - MSc Forest and Nature Conservation.

## Programme summary

The MSc International Land and Water Management focuses on the scientific analysis of the physical, environmental, technical and socio-economic aspects of land and water management and their mutual interactions. Students develop comparative insights into the development of land and water management, take a scientific approach to various research paradigms and acquire a problem-oriented, interdisciplinary attitude towards land and water management and rural development issues. Graduates will not only be able to study these issues but also design sustainable and efficient solutions to land and water management problems.

## Your future career

Graduates find jobs in a wide range of fields, including design and implementation, policy making, project management and research and education. They are employed by international organisations such as the Food and Agricultural Organisation of the UN (FAO), the International Water Management Institute (IWMI), or NGOs involved in international or national development such as the Netherlands Development Organisation (SNV) or Oxfam International. Some graduates also work for ministries and other governmental organisations in the field of international cooperation, such as the Dutch DGIS and the German GTZ, while others find jobs in private or public institutes in their home countries. For graduates interested in design and implementation, there are also job opportunities at international consultancies. In the Netherlands this includes firms such as Arcadis, Grontmij, Oranjewoud and DHV Consultants.

## ADMISSION REQUIREMENTS

see page 40 or look on the website.

# MSc Landscape Architecture and Planning



**ALUMNI INGE KERSTEN AND JORRIT NOORDHUIZEN.** “With our design we want to wake up the inhabitants of the unique environment of North Carolina and show them that they can improve the experience of their environment step by step, without regulations from above. A five day excursion to North Carolina during our master atelier triggered us to do more research within this area. We were expecting a very natural coast line, but nothing appeared less true. When we came back we realized that we would be crazy if we would not take this chance to design on this dynamic coast line with so many pressing problems. In our research and design we implemented the experience of the environment through image and sound. We have won the second price of the international IFLA student competition from more than 390 entries.”

## Specialisations

### LANDSCAPE ARCHITECTURE

Landscape Architecture is concerned with challenging and sustainable landscape design on the basis of a sound understanding of landscape formation processes together with contemporary design theory and methodology. It links creative design processes both to the arts and to scientific knowledge covering ecological and behavioural fields of study. Design of metropolitan landscapes and the urban realm is the core of the major.

### SOCIO-SPATIAL ANALYSIS

Socio-spatial Analysis focuses on the analysis of the interaction between space and society. This is accomplished by examining how social and cultural developments and changing policies transform spatial practices, characteristics and perceptions. The dual relationship between space and society is approached from a multidisciplinary perspective, incorporating theories and methodologies from sociology, anthropology, geography and psychology.

### SPATIAL PLANNING

Spatial planning is concerned with the organisation of planning processes, and both the theoretical and practical knowledge needed for spatial interventions. It must be carried out with recognition of an ever changing society, including its different ambitions, conflicts and interests. The focus of the spatial planning specialisation is to reflect on planning processes against the background of the environmental, social, cultural, economic and political needs of society. It also studies implementation strategies for spatial plans. In particular attention is paid to the planning of metropolitan landscapes in river deltas.



## Related programmes

MSc Earth and Environment - MSc International Development Studies - MSc Development and Rural Innovation - MSc Geo-information Science - MSc Landscape Architecture and Planning - MSc Forest and Nature Conservation

## Programme summary

The Landscape Architecture and Planning master's programme focuses on the human activities that shape and govern landscapes at various scales and how these landscapes are experienced and used by people. It centres on the process of intervention in landscapes to create new or revitalized places by means of planning and design, and on sound academic reflection on this process. Landscape architects and spatial planners also contribute to the improvement of the quality of decision-making on landscape transitions. The relationships between citizens, governments and private institutions are continuously redefined. Landscape architects and spatial planners are finding new roles as facilitators who navigate between the various actors, and as managers and coordinators of spatial interventions.

## Your future career

Graduates of Landscape Architecture and Planning work in various fields and positions related to landscape, land use and the environment. The programme prepares students for five major career paths: landscape architects, spatial planning consultants, project managers, policy advisers and landscape researchers. Most graduates are employed by consultancy and engineering companies, planning and design bureaus, district water boards, government agencies and universities. A number of graduates work for large, multinational firms (such as Oranjewoud, Arcadis or Grontmij), while others are employed by small and medium sized companies.

### ADMISSION REQUIREMENTS

see page 40 or look on the website. In addition to these admission requirements, a design portfolio is requested if you want to apply for the specialisation Landscape Architecture.

# MSc Leisure, Tourism and Environment



**ALUMNA ANA RAGUZ.** "My Master in Leisure, Tourism and Environment brought me a diversity of perspectives, cultures, experiences, sources of both theoretical and practical knowledge as well as the critical way of thinking, inspiring me for a creative action. It constantly triggered my personal and professional development and I adored and enjoyed it! For me many things started to fall into the place so suddenly and with such ease. It was a period of spreading ideas, trusting in them and working hard and thoroughly to realize them. At some point the right people started appearing and I was able to develop the project of harvesThink and with two colleagues I have been maturing the idea of opening my own company."

## Programme summary

The Leisure, Tourism and Environment programme is characterised by a worldwide, transdisciplinary, critical and innovative approach. The focus is on the relationship between leisure and environment with special attention for tourism.

More and more people throughout the world are spending a growing proportion of their time and money on leisure. This means that the economic and social importance of leisure and tourism services is growing tremendously. There is increasing awareness that leisure in all its manifestations has major consequences for cultural, political, technological, economic and geographical transformations throughout the world. In this respect, leisure has become a powerful agent of both cultural globalisation and regionalisation. Leisure and tourism can provide a major contribution to quality of life and social well-being. They have long been recognised for their role in community and regional development but also for their impact on the environment.

The aim of the Leisure, Tourism and Environment programme is to analyse the development behind the fast growing leisure and tourism industry. It involves the study of leisure and tourism from a historical and philosophical perspective in a global, multicultural context. The study integrates the role of governmental, business and 'third sector' organisations in the innovation process towards sustainable (tourism) development. Debates about globalisation processes as well as the experience of leisure and tourism within the spatial, natural and social environment comprise a large part of the programme. Besides this theoretical approach to leisure and tourism, the study also focuses on advanced quantitative and qualitative research methods, and techniques commonly used in research concerning leisure and tourism.

The programme is international and multicultural. Faculty members from many parts of the world come to Wageningen and give lectures in the programme, bringing together an extraordinarily wide range of academic experience. Also, the class room itself is very international with students from various educational and professional backgrounds coming together to critically discuss contemporary issues.

## Your future career

The MSc Leisure, Tourism and Environment programme is designed for students who seek a career as an academic professional or as a scientist. The programme prepares students for work in three major areas: policy and planning, research or consultancy, and development. A large proportion of our graduates find employment with government agencies or non-governmental organisations, in the areas of policy development and implementation. This is achieved at local, regional or international levels. Many graduates are employed by consultancy agencies, research institutes or network organisations that link different interest groups, such as leisure and tourism organisations with conservation institutions or private business with government organisations and communities. Others continue their academic careers by entering a PhD programme at an university.

### ADMISSION REQUIREMENTS

see page 40 or look on the website.

## Related programmes

MSc International Development Studies - MSc Management, Economics and Consumer Studies - MSc Development and Rural Innovation - MSc Applied Communication Studies - MSc Landscape Architecture and Planning.



# MSc Management, Economics and Consumer Studies



**STUDENT BART ZWARTJES.** Innovate a new chip flavour, assist in expanding an encyclopedia made by consumers (Wikipedia), or write a review of a purchased product. These are just a few examples of co-creating as a consumer. Co-creation is a joint effort by company and consumer. Companies have a lot to gain by this. Namely, 50-70% of all product innovations fail at market entry. Co-creation allows companies to offer products and services that meet consumer needs better. But why would consumers spend their free time helping out companies? Together with Capgemini Consulting, Bart Zwartjes is trying to find out through his thesis research project what it is that makes a co-creation initiative successful according to the consumer.

## Specialisations

### MANAGEMENT STUDIES

This specialisation includes several options. Students can investigate and analyse the strategies and operations of companies in production and distribution networks as well as the dynamic decision-making processes involved in production. Alternatively, you may choose to focus on the various aspects of marketing and consumer behaviour in business, agribusiness and the food industry. It is also possible to acquire expertise in facility management, information systems, operations research (logistics), information management or quantitative decision modelling.

### CONSUMER STUDIES

This specialisation allows you to study the behaviour, lifestyles and consumption patterns of consumers and households. Students will acquire insight into the economic and sociological aspects of consumers and households, and the factors determining consumption behaviour and patterns. Alternatively, the role of communication between the various actors in the food chain or consumer technology can be studied.

### ECONOMICS, ENVIRONMENT AND GOVERNANCE

Analyse the economic behaviour of various participants in the agricultural sector and rural areas in developed countries or study the pivotal role of agricultural and rural development in low-income countries. You can also specialise in Public Administration and Policy when you are interested in the governance of complex problems in domains of sustainable agriculture, climate change or water management. If students are more interested in environmental issues, they can focus on the economic or policy aspects of national and international environmental problems or the processes of environmentally-induced social change in modern industrial and developing societies.

### MANAGEMENT, INNOVATION AND LIFE SCIENCES

The goal of this specialisation is to integrate technical and managerial knowledge. Examples of how this interaction can be of optimal use are complex innovation processes in production, logistics or market development. These processes have a high technological character in which innovation plays a central role and for which good communication and managerial skills are necessary. Three different profiles can be studied within this specialisation: Innovation management, innovation in decision support and economics, and innovation in operations management.

### RESEARCH MASTER VARIANT

To prepare for a future career in scientific research, such as a PhD position, opt for the Research Master Variant. This variant offers an extra focus on research competencies and knowledge of disciplines. It can be followed within the specialisations Management Studies, Consumer Studies and Economics, Environment and Governance. More specific information on this specialisation is available on [www.wageningenuniversity.eu/mme](http://www.wageningenuniversity.eu/mme).

### ADMISSION REQUIREMENTS

see page 40 or look on the website.

## Related programmes

MSc International Development Studies - MSc Food Quality Management - MSc Applied Communication Science - Health and Society (specialisation) - MSc Development and Rural Innovation.

## Programme summary

Management, Economics and Consumer Studies deals with the interrelationships between producers, consumers and society-at-large. The programme studies the dynamics in the agri-food chain involving suppliers, producers, retailers and consumers, focusing on how they affect each other and how they are affected by, the economy and society. The domain of this programme is business and all the components of industry including production, distribution and final use or consumption. It covers managerial, economic, sociological and environmental aspects - internal and external - of households and businesses in the Netherlands, Europe and the rest of the world, in both developed and developing countries.

## Your future career

Graduates with a Management Studies specialisation have career prospects as managers or consultants in the traditional business sector and in hospitals, financial institutions, auditing or accounting companies and government departments. Graduates with a Consumer Studies specialisation have career prospects as consultants, researchers, managers or teachers in public or private research organisations, businesses, research institutions, government agencies or universities. Graduates with a Economics, Environment and Governance specialisation have prospects in research, teaching or policy making at universities, the public sector (government agencies), non-profit organisations or research organisations in the private sector. Graduates with a Management, Innovation and Life Sciences specialisation have prospects as managers or consultants in business, especially in the biotechnology industry, the health sector and in product development and innovation, or as university instructors or researchers. Graduates in the Research Master Variant are well prepared to pursue a career in scientific research.

# MSc Molecular Life Sciences



**PROJECT FLU VACCINATION FOR BACTERIA.** Together with some colleagues, Professor John van der Oost unravelled part of the working of the immune systems of bacteria that had been infected by a virus. Theoretically, this knowledge allows for other bacteria to be protected against specific viruses and, thus, may be considered to be a flu vaccination for bacteria.

## Specialisations

### BIOLOGICAL CHEMISTRY

By combining the principles of chemistry, biochemistry, molecular biology, cell biology, microbiology, genetics and bioinformatics, this specialisation enables students to contribute new insights to the life sciences. Increasingly complex areas are studied such as the molecular regulation of growth and cell differentiation, gene control during development and disease, and the transfer of genetic traits. Another important field is enzymology, where enzyme mechanisms are studied with the aim of understanding and modifying their properties to make new compounds or biological membranes.

### PHYSICAL CHEMISTRY

This specialisation uses the most advanced technologies to focus on the chemical and physical properties of molecules and their behaviour in chemical and biochemical processes. The processes in nature are used as models for studying and synthesising new compounds with interesting chemical or physical properties for applications such as LCDs, biosensors or food science. Students can major in fields such as biophysics, organic chemistry or physical chemistry and colloid science.

### BIOMEDICAL RESEARCH

This specialisation equips graduates with key skills in the natural sciences and enables them to use these skills as part of an integrated approach. Many recent breakthroughs in biomedical research have taken place at the interface between chemistry, biology and physics, so it is logical that many of our graduates enter careers in biomedical research. The explicit aim of this specialisation is to prepare students for careers at a medical research institute, academic hospital or a company in the pharmaceutical industry. As a result, students also complete their internships at such locations.

### PHYSICAL BIOLOGY

Students in this specialisation learn to view biomolecules from a physical point of view. They use techniques in biophysics, physical chemistry, microspectroscopy and magnetic resonance (MRI) to contribute to areas such as cell-cell communication, transformation of light into chemical energy, and protein interactions. Students can major in fields such as biochemistry, biophysics, microbiology, molecular biology, plant physiology, physical chemistry and colloid science.

### ENVIRONMENTAL CHEMISTRY

This specialisation offers a fundamental approach to environmental issues including drinking water preparation, wastewater treatment and renewable energy. In the programme you will learn how to apply knowledge and techniques on, for example, the antifouling properties of polymers on surfaces used for drinking water preparation, the thermodynamic aspects of energy conversions using water and solar energy (blue and green energy), the chemodynamics of pollutant metal species in aqueous systems, and the electrochemical aspects of hydrogen production through microbial electrolysis.

## Programme summary

The Molecular Life Sciences programme focuses on molecules and their properties. It seeks to discover relationships between the physical and chemical properties of molecules, particularly the role of complex molecules in living systems. It is an interdisciplinary programme that combines chemistry, physics and biology. The aim of the programme is to enable students to conduct independent research at the interface of chemistry, biology and physics, or in an applied field such as medicine, the environment, food sciences or (bio)nanotechnology. The programme is tailor-made and thesis-oriented, with the thesis being the culmination of the study.

## Your future career

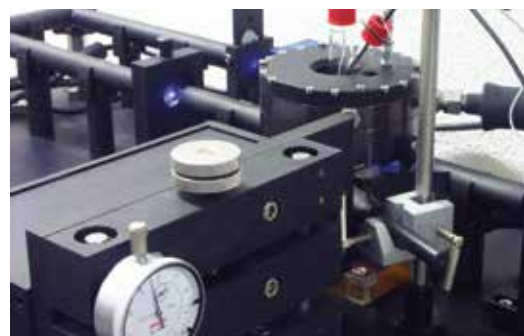
By combining the power of chemistry, physics and biology, graduates are able to make a significant contribution to fundamental and/or applied research in fields such as bionanotechnology, biotechnology, environmental research, biomedical research, nutrition and the food sciences. Our graduates enter careers at universities, research institutes and industrial laboratories. Many enter PhD programmes, while others become science journalists, managers or consultants in government or industry.

### ADMISSION REQUIREMENTS

see page 40 or look on the website.

## Related programmes

MSc Biotechnology - MSc Food Technology - MSc Bioinformatics - MSc Nutrition and Health - MSc Plant Biotechnology - MSc Biology.



# MSc Nutrition and Health



**ALUMNUS JAN WESTSTRATE.** Dr. Jan Weststrate was the first Wageningen nutritionist to work for Unilever and many graduate nutritionists have followed in his footsteps since then. "Wageningen graduates are prominently present at Unilever due to their high level of expertise. They have broad interests, a hands-on approach and are internationally oriented." After having worked at Unilever for almost 23 years, Weststrate joined PepsiCo in January 2011 responsible for the R&D in the Asia, Middle East and Africa region. PepsiCo is the second largest global food and beverage company and has defined the Asia, Middle East and Africa region as a growth region. Weststrate's background in food plays a large role in his new function in light of the importance of health in product innovation.

## Specialisations

### EPIDEMIOLOGY AND PUBLIC HEALTH

Do you think it is interesting to research the role that food and lifestyle play in the development of diseases? Epidemiologists try to determine causal relationships in large groups of people, such as the elderly or people with cardiovascular problems, between food, lifestyle and the development of diseases. Research results act as starting points for health advice and lead to a greater understanding of cause and effect. If it is known that certain behaviour leads to a disease, then you can do research into impacting that behaviour, and measuring its effectiveness. The acquired knowledge can be used in health policy making and intervention programmes in both developing and developed countries. You will be helping to improve the overall health of people and may be able to prevent food-related diseases from developing.

### NUTRITIONAL PHYSIOLOGY AND HEALTH STATUS

Do you ever wonder what the influence of food is on the functioning of the body? In this specialisation, you will research various age groups and situations, such as growth, pregnancy, and food consumption behaviour. You will also review special situations including serious diseases (clinical food), or during sports and activity. You may also research the food consumption behaviour and habits of individuals and how you may be able to influence that, for example, through portion sizes. The focus of this research will be on people in certain life stages and per geographical regions. You can also study the methods to precisely measure food consumption. In short, you will review different aspects and will learn what the effects are of food consumption patterns and the physiological processes on the body and what that means for the status of its health and illness.

### MOLECULAR NUTRITION AND TOXICOLOGY

Do you want to know what happens exactly in the body? What do fat cells do and how do they influence our health? Why are certain substances healthy or unhealthy? The answers to these types of questions can be found by delving at the lowest levels; cells and DNA. You will learn to use techniques, at molecular and cellular levels, to discover the mechanism driving the relationship between food and health. At toxicology, you will learn to research the possible poisonous effects of substances present in food. For instance, new ingredients in food products and additives, but also natural substances present in our food. The relationship between food consumption, food and medicines can also be researched and through this research, you will find many new leads to improving our health.

### SENSORY SCIENCE

For information about Sensory Science see page 37.



## Related programmes

MSc Food Safety - Health and Society (specialisation).

## Programme summary

Nutrition and Health focuses on the role of dietary and lifestyle factors in human health and disease. This role is studied from a biomedical perspective at the individual and population levels. In addition, the mechanisms underlying beneficial and adverse effects are studied at the sub-cellular (DNA), cellular and organ/organism levels. Human nutrition is a multidisciplinary field of expertise. To solve problems in nutrition and health, you must consider chemical and biochemical characteristics, physiological and biomedical aspects, the social and behavioural context of nutrition, and the relationships between these factors. Solving problems in this domain requires multidisciplinary biomedical knowledge and skills as well as an interdisciplinary approach to communication with experts in human nutrition and other fields.

## Your future career

Surveys show that our graduates greatly value the research skills they acquired in the programme. Many of them began working after graduation as researchers (38%) or PhD students (7%). Another group became advisors (13%), trainers or took up other jobs in the private sector. The majority of graduates found employment at universities (including university medical centres), research institutes (TNO Nutrition or RIVM), in the public sector (national, regional and local governments, Netherlands Nutrition Centre, District Health Authorities) or companies involved with nutrition, pharmacology and toxicology (Unilever, Nutricia, Numico Research, Novartis Pharma, Organon). As graduates progress in their careers, they usually advance to a managerial level.

## ADMISSION REQUIREMENTS

see page 40 or look on the website.

# MSc Organic Agriculture



**ALUMNUS KARST KOOISTRA.** Many people get a job after finishing their MSc but few truly realise the opportunities for a career abroad. This is how Karst Kooistra, MSc Organic Agriculture, ended up working for Morgenland, a company in Organic produce trade, in Germany. The company runs its own production of nuts, cotton and a variety of fruits. Kooistra is head of the department of Agricultural Production and it is his job to optimise the production process. He monitors the product's lifecycle to guarantee quality and to find out which part of production can be improved the most.

## Specialisations

### AGRO-ECOLOGY

Due to concerns about the sustainability of conventional farming practices, food safety issues and pollution of the environment, an evergrowing group of consumers is demanding natural and wholesome agricultural products that are produced in an environmentally-friendly and socially acceptable manner. Organic agriculture could satisfy these requirements. In addition to the demand for organic products by consumers in industrialised countries, there is a need for scientific ecological farming practices in developing countries and countries in economic distress. This is because farmers in those regions cannot afford external inputs such as pesticides, fertilisers or expensive seeds. A systems approach that integrates interdisciplinary knowledge is crucial to the study of different aspects of plant and animal production at various levels ranging from crop and herd farming to agricultural and rural areas. Courses are geared towards the analysis and design of sustainable, organic farming systems; examining the relationships between plant and animal production, soil and natural habitats; understanding management options for sustainable, organic farming compared with conventional farming; ethics of animal welfare; biodiversity conservation; studying the factors affecting plant and animal health; and quality of organic products. Finally, students learn to conduct integrated research (including the appropriate evaluation methodology) and participate in research projects involving organic farming systems or rural development.

### CONSUMER AND MARKET

To achieve the widely shared goal of expanding organic production, the demand for organic products needs to grow. Socio-economic constraints are major bottlenecks to such an expansion. To attain the societal goal of a healthy and environmentally friendly food and fibre production system, improved understanding of consumer preferences, psychology and communication theory is essential. Production, processing and the marketing of organic products are increasingly being affected by international and national policies and legislation. Insight into the development and formulation of such legislation is crucial to the expansion of organic food and fibre production systems. Courses are geared towards the following: Analysis of consumer perception of product quality; use of theories and models to analyse consumer behaviour in view of developing marketing strategies; knowledge and insight into the interrelations between government policy and consumer behaviour; development of strategies for certification and trademarks for organic products; understanding and designing an institutional environment conducive to marketing chain agreements; logistics for processing and marketing of organic products; price formation for organic products; and regionalisation versus internationalisation of production and consumption. Finally, students acquire the skills to analyse complex problems at the intersection of organic agriculture and society in preparation of their thesis research.



## Programme summary

This programme has been designed to train students in multiple aspects of organic agriculture and the associated processing and marketing chain. An important goal is to prepare for interdisciplinary teamwork at an academic level. The programme is unique in its combination of detailed consideration of the underlying principles and processes from a natural science perspective with social and economic studies. Creative thinking is required to design new sustainable farming and marketing systems instead of simply optimising existing systems. The programme has an international character that uses case studies and offers project opportunities in both the developed and developing world. The curriculum has been carefully formulated to provide a balance between fundamental and applied science. Various university groups participate including agronomy, ecology, soil science, animal sciences, pest and disease management, food technology, sociology, communication science and economics, making this a well-rounded and holistic programme.

## Your future career

Graduates will have career opportunities in agribusiness, research, nongovernmental organisations and public administration. They often hold jobs, such as scientist, consultant, policy maker or quality assurance officer.

### ADMISSION REQUIREMENTS

see page 40 or look on the website.

## Related programmes

MSc Food Quality Management - MSc Environmental Sciences - MSc Plant Sciences - MSc Animal sciences - MSc Biology - MSc Management, Economics and Consumer Studies - MSc Forest and Nature Conservation.



# MSc Plant Biotechnology



**ALUMNA LOTTE WESTERHOF.** She studied Biotechnology in Leeuwarden at VHL University of Applied Sciences. "I really enjoyed working in the lab and took pride in delivering clear cut results. Still, I wanted to be more involved. Not just carrying out experiments, but also deciding on the next steps in a particular investigation. That's why I enrolled for Plant Biotechnology." She is now doing her PhD, working on plant-based biopharmaceuticals for Inflammatory Bowel Disease therapy. "After my PhD I would like to act as a go-between between scientists and funding organisations, bridge the gap between management and research. To be successful in such a job you have to know what it's like to do your own research and that's why I chose to do a PhD."

## Specialisations

### FUNCTIONAL PLANT GENOMICS

Genomics profoundly affects plant molecular biology and genetics. Genomic information on Arabidopsis and rice has revolutionised insight into plant genetics. By using array technology, gene expression can be studied to improve our understanding of the complexity of the plant transcriptome and the interactions between genes and gene products.

### PLANTS FOR HUMAN AND ANIMAL HEALTH

Plants are increasingly being used as a safe and inexpensive alternative for the production of valuable proteins and metabolites for food supplements and pharmaceuticals. This specialisation provides a fundamental understanding of how plants can be used for the production of foreign proteins and metabolites. In addition, biomedical aspects such as immunology and food allergy, as well as nutritional genomics and plant metabolomics, can also be studied.

### MOLECULAR PLANT BREEDING AND PATHOLOGY

Molecular approaches to analysing and changing qualitative and quantitative traits in cultivated plants are highly effective in improving the yield and quality of food and renewable resources, disease resistance and abiotic stress tolerance. Molecular Plant Breeding focuses on the application of molecular markers and genomics as a means to explore natural variation and the development of transgene technologies to expand genetic variation. Molecular Plant Pathology aims to provide a greater understanding of plant-insect, plant-pathogen and crop-weed interactions in addition to developing new technologies for integrated plant health management. These technologies include improved molecular detection of pathogens and transgene methods to introduce resistance genes into crops.

## Related programmes

MSc Biotechnology - MSc Molecular Life Sciences - MSc Plant Sciences - MSc Nutrition and Health - MSc Bioinformatics - MSc Biology.

## Programme summary

Due to rapid technological developments in the plant sciences, genomics and molecular genetics, the use of molecular marker technology has accelerated the selection of new plant varieties with many favourable traits. It also facilitates the design, development and management of transgenic plants.

Plant Biotechnology aims to impart understanding of the basic principles of plant sciences and molecular biology, as well as the integration of these disciplines, to provide healthy plants in a safe environment for food, non-food, feed and health applications.

Besides covering the technological aspects, Plant Biotechnology also deals with the most important environmental, quality, health, socioeconomic and infrastructural aspects.

## Your future career

The main career focus of graduates in Plant Biotechnology will be on research and development positions at universities, research institutes, and biotech or agribusiness companies. Other job opportunities can be found in the fields of policy, consultancy and communication in agribusiness and both governmental and nongovernmental organisations. Over 75 percent of Plant Biotechnology graduates start their (academic) career with a PhD.

### ADMISSION REQUIREMENTS

see page 40 or look on the website.



# MSc Plant Sciences



**ALUMNUS PETER MSIMUKO.** Peter Msimuko from Zambia came to study Plant Sciences at Wageningen University in 2007 on a scholarship from the Nunhems / Anne van den Ban Fund, which supports promising students from developing countries. His Master's research on the genetic variation of *Phytophthora infestans*, the pathogen which causes potato blight, won him the 2009 Rijk Zwaan Plant Sciences Award. A student research prize set up by Dutch vegetable breeding company Rijk Zwaan. Peter is planning to continue with a PhD within a couple of years.

## Specialisations

### CROP SCIENCE

Sound knowledge of crop science is essential to develop appropriate cultivation methods for a reliable supply of safe, healthy food, while considering nature conservation and biodiversity. An integrated approach is crucial to studying plant production at various levels (plant, crop, farm, region). This requires a sound understanding of basic physical, chemical, and physiological aspects of crop growth. Modelling and simulation are used to analyse yield constraints and to improve production efficiency.

### GREENHOUSE HORTICULTURE

Greenhouse horticulture is a unique agro-system and a key economic sector in the Netherlands. It is the only system that allows significant control of (a-)biotic factors through protected cultivation. The advances in this field are based on technological innovations. This specialisation combines product quality with quality of production and focuses on production, quality- and chain-management of vegetables, cut flowers and potted plants.

### NATURAL RESOURCE MANAGEMENT

The development of sustainable agro-ecosystems requires understanding of the complex relationships between soil health, cultivation practices and nutrient kinetics. Other important aspects include the interactions between agriculture and nature, and competing claims on productive land worldwide. Natural Resource Management provides knowledge and tools to understand the interactions between the biotic and abiotic factors in agro-systems to facilitate diverse agricultural demands: bulk vs. pharmaceutical products, food vs. biofuel, conservation of biodiversity, climate change, and eco-tourism.

### PLANT BREEDING AND GENETIC RESOURCES

Plant Breeding and Genetic Resources ranges from the molecular to the population level and requires knowledge on the physiology and genetics of cultivated plants. Plant breeding is crucial in the development of varieties that meet current demands regarding yield, disease resistance, quality and sustainable production. The use of molecular techniques adds to the rapid identification of genes for natural resistance and is essential for accelerating selection by marker-assisted breeding.

### PLANT PATHOLOGY AND ENTOMOLOGY

The investments made in crop production need to be protected from losses caused by biotic stress. Integrated pest management provides protection by integrating genetic resistance, cultivation practices and biological control. This specialisation focuses on the ecology of insects, nematodes and weeds, and the epidemiology of fungi and viruses, including transmission mechanisms. Knowledge of plant-insect, plant-pathogen, and crop-weed relations establishes the basis for studies in integrated pest management and resistance breeding.

## Programme summary

Plant Sciences is a very important sector in the international economy. It focuses on all aspects of crop production ranging from plant breeding and cultivation methods to the production of food, food ingredients, pharmaceuticals and raw materials. The MSc Plant Sciences programme is designed to help meet the worldwide demand for scientific expertise in the development of plant breeding, crop production, plant pathology and agro-ecology. It covers the technological aspects of crop production and deals with major environmental, quality, health and socio-economic aspects in an interdisciplinary way.

## Your future career

Graduates in Plant Sciences have excellent career prospects and most of them receive job offers before graduation. They are university-trained professionals who are able to contribute to the sustainable development of plant production at various integration levels based on their knowledge of fundamental and applied plant sciences and their interdisciplinary approach. Graduates with a research focus are employed at universities, research institutes and biotech or agribusiness companies. Other job opportunities are in management, policy, consultancy and communication in agribusiness and (non-) governmental organisations.

### ADMISSION REQUIREMENTS

see page 40 or look on the website.

## Related programmes

MSc Biosystems Engineering - MSc Biotechnology - MSc Biology - MSc Forest and Nature Conservation - MSc Organic Agriculture - MSc Plant Biotechnology.

# MSc Urban Environmental Management



**ALUMNA LU LIU.** She is working as a research & development engineer for the environmental company Everbright Environmental Protection in Beijing. She is involved with management of all environmental projects that the company is engaged in. Her work covers, for instance, governmental projects but also the introduction and market exploration of technologies in China. "My MSc study helped me to be independent and to be able to solve problems myself."

## Programme summary

The world we live in is an increasingly urban one. Over the past century, a great population shift has occurred from rural to urban areas. Cities now hold half of the world's population and it is estimated that three out of every five people will live in an urban environment by 2030. This development calls for measures to control the environmental impacts of urbanisation, such as growing traffic, increasing waste emissions, deteriorating air and water quality, and rising energy and resource consumption. Of particular concern are the speed and scale of urbanisation in the developing world as many Asian, African and Latin-American cities are incapable of providing adequate housing and basic urban services. Inadequate water supply, sanitation, waste collection and waste management systems are the cause of serious urban pollution and health hazards. Sustainable management of the urban environment has become one of the major challenges for the future.

The Urban Environmental Management MSc programme aims at equipping its students with the outlook, concepts and tools to manage the urban environment. The programme unites four essential perspectives on the urban environment: environmental quality and health, environmental infrastructure and technology, spatial planning, and governance. Besides integrated theories and views from several disciplines, urban environmental management requires technical and managerial competencies and skills for its implementation. Consequently, the programme provides a balanced curriculum of theory, tools and application. It emphasises the development of an interdisciplinary outlook, critical-thinking, analytical problemsolving and practical decision-making skills through a combination of teamwork, practical simulation exercises, field trips and an individual research project.

The internship programme offers a valuable opportunity to gain practical experience in a country and organisation as desired. Students can conduct their major thesis research within seven thesis tracks:

- Environmental Economics
- Environmental Policy
- Environmental Systems Analysis
- Geo-information Science
- Management Studies
- Spatial Planning
- Urban Environmental Technology and Management

Experimental thesis research will usually be part of ongoing research programmes of chair groups or research institutes of Wageningen University and Research Centre. Otherwise, thesis topics originate from the student's own research interests or from discussions with potential supervisors.

## Related programmes

MSc Environmental Sciences - MSc International Development Studies -  
MSc Landscape Architecture and Planning.

## Your future career

Graduates from the MSc Urban Environmental Management are well equipped with the skills and knowledge to continue their academic training as a PhD student or to begin careers in city management, environmental research, urban planning, environmental consulting, water and waste management, and construction and building stock management.

### ADMISSION REQUIREMENTS

see page 40 or look on the website.



# Health and Society

A specialisation within the MSc Applied Communication Science programme.



**ALUMNA FIEKE FRANKEN.** Fieke is the first student who graduated from Health and Society. "I work as a researcher for the Dutch Institute for Policy on Alcohol (STAP). My job is very diverse. It consists especially of carrying out research on local alcohol policy and in particular on the legal drinking age of the youth. At this moment, I am organising an educational trip for professionals working with alcohol policy and the youth. We will go to Stockholm because Sweden's alcohol policy is quite different than the one we have in the Netherlands."

## Programme summary

Health is a resource that enables people to lead an individually, socially and economically productive life. For many centuries, the care for individual and population health has been the domain of medical sciences. However, it is widely acknowledged that contemporary health problems are complex and cannot be solved by simply extending existing health services. Chronic illnesses such as cardiovascular disease, cancer and diabetes are important contributors to the burden of disease, as are communicable diseases such as HIV/AIDS and other sexually transmittable diseases.

There is no single cause to such health problems. Biological factors aside, lifestyle and the social and physical environment are major contributors, both in a positive and negative way. Many diseases are related to the way in which people behave and take care of their own health, for example substance abuse (smoking, alcohol, drugs), nutrition, physical exercise, and sexual behaviour. Lifestyles are often rooted in the social environment of family and friends, the neighbourhood, and the school and working environment. Aspects of the physical environment also affect individual and population health, including housing conditions, environmental pollution, the availability of green space, and the availability and accessibility of health services. Moreover, societal changes, such as demography (e.g. aging populations, single parent families), consumption patterns, communication technology developments, globalisation and commercialisation influence the health status of individuals and populations.

As health is influenced by such a diversity of interconnected factors, the development of cross border public health policies is essential. Within the system of health care, organisations and professionals (both formal and informal) increasingly have to work together in the provision of care, prevention and health promotion.

The setup of the programme reflects its focus on societal issues in the domain of health, health promotion and systems of health care. The program covers a niche in the Netherlands by primarily taking a sociological approach to the domain, centralizing the link between health and human relationships. Here, human relationships are interaction patterns and dependencies, both differing in nature, scope and intensity. In conjunction with this sociological approach, anthropological and social psychological approaches are key to the social scientific analysis of health within the program.

The study programme takes a comparative perspective with respect to the empowerment of individuals, communities and populations, in other words, to the degree to which people have (financial) means to arrange their lives and can use facilities for health protection and health improvement. In that way emphasis is on the societal embedding of health and activities of health promotion in relation to social processes, structures and institutions. Together with sociology, the programme combines the domains communication science and health promotion but also includes perspectives from the economic domain, management and public policy.

## Your future career

The study domain is becoming more and more relevant as a consequence of the changing patterns in health problems and the factors influencing health. Policy makers are becoming more aware of the impact of health policy, and recent national and international policy documents have emphasised the importance of health promotion. The improvement and sustainability of acceptable levels of health remains a major challenge. This specialisation prepares you for careers as researchers, health promoters, health policy advisors or managers of health-oriented organisations

**ADMISSION REQUIREMENTS**  
see page 40 or look on the website.



## Related programmes

MSc Management, Economics and Consumer Studies - MSc International Development Studies - MSc Applied Communication Science - MSc Development and Rural Innovation.

# Sensory Science

A specialisation within the MSc Nutrition and Health and MSc Food Technology programmes of Wageningen University and the MSc Food Science and Technology programme of Copenhagen University - Faculty of Science.



**STUDENT GRACE HUI TAN.** "I've come from Singapore, where food is our national obsession. Growing up there has transformed me into a food-crazy person who loves to cook, eat, discuss and study food in every dimension. Hence, when the opportunity arose to bridge the food-based knowledge from my bachelor studies with actual human perception and behaviour, I ecstatically jumped at it! Sensory Science has exposed me to interesting new concepts with an industry-relevant consumer focus. Through this international programme, I've also experienced first-hand the multitude of ways that people perceive and respond to food in cultures that are worlds apart from my own. I hope to share some of my insights with my new blog venture so do drop me a visit sometime at <http://poorskinnychef.wordpress.com!>"

## Programme summary

Sensory Science is a cross-disciplinary scientific field dealing with the way humans perceive the world and act upon sensory input. It addresses how sensory systems function, from stimulation and perception to cognition and behaviour. Sensory food research aims to reach a better understanding of how the senses respond to food and eating, but also how our senses can be used in quality control and product design. The fields of study involve working with humans and products in different contexts and include sensory quality perception, preferences and acceptance, learning and memory, desires and satisfaction, communication and health, and individual well-being. The physiology of senses is studied and innovative ways to study sensory functions including satiety are developed. All to gain more insight and understanding, always keeping the link to application of this knowledge.

A unique feature of this programme is that you study together with your fellow students during the first year of this programme. You will spend one semester in Wageningen and one semester in Copenhagen. At this time, you will not only study principles of sensory science and instrumental sensory science, but also get advanced training in the field of food chemistry, product properties and statistics. In the second year, you choose where you wish to continue. Here, you will perform individual academic research in any of the many research topics offered by Wageningen or Copenhagen. After your thesis research project, you will follow an academic internship. The internship can be at a partner university, research institute or industry anywhere in the world.

Why choose Sensory Science?

- This programme is jointly developed by the University of Copenhagen, Faculty of Science (Denmark) and Wageningen University (the Netherlands), offering a unique combination of complementary expertise
- The two top ranking universities in the field of Food Science and Nutrition in Europe.
- The only European academic, research oriented programme in Sensory Science.
- An education with a unique focus on the European sensory sector. Challenging international internships.

### STRATEGIC PARTNERSHIP COPENHAGEN - WAGENINGEN

The University of Copenhagen, Faculty of Science and Wageningen University are strategic partners in the field of Food Sciences and Nutrition. Throughout the entire programme, practical experience and exercises are important to support the scientific understanding. The courses offered in Wageningen and Copenhagen will be complementary; resulting in an international experience for you. Upon graduation, you will receive an MSc degree in Nutrition and Health, or Food Technology from Wageningen University.

## Your future career

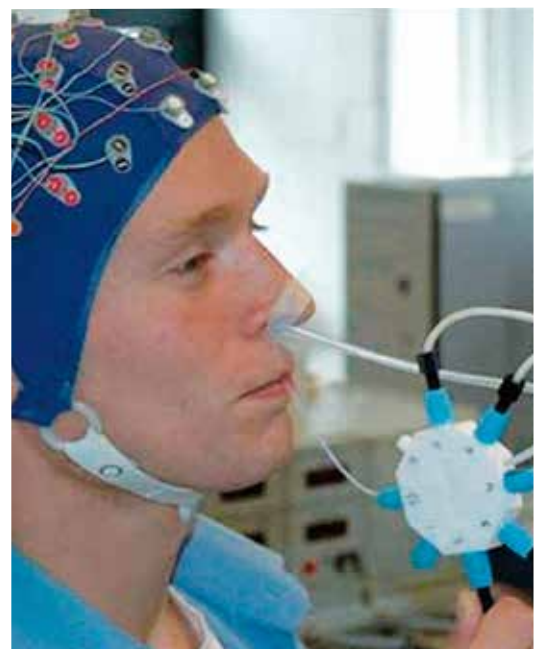
The programme was established in 2009. The Sensory Science specialisation prepares students for an international career. Graduates will find jobs in research at universities, in industry or at research institutes. Graduates might also find employment work in the field of sensory technology at innovation centres, innovative food companies or government research agencies.

### ADMISSION REQUIREMENTS

see page 40 or look on the website.

## Related programmes

MSc Food Technology - MSc Nutrition and Health



# Water Technology

A joint programme offered by Wageningen University, the University Twente and the University of Groningen.



**STUDENT ALEXANDRA FLOREA.** Alexandra comes from Romania. "How my life has changed? A 180 degrees. Every day I have the opportunity to improve and to learn more things. At this Wetsus academy I learned to feel free and comfortable to express myself. I know now that my work is appreciated. So when I started to look for an internship I knew what I was looking for, what I needed. I have a clear view on my future now. My message for you: keep it enthusiastic and doors will open easily."

## Programme summary

Breakthrough technological developments in the field of water (process) technology are required, not only to enable Dutch export ambitions of the water sector, but also to solve global threats and challenges. Traditional water treatment methods are often expensive and not sustainable enough to meet current and future discharge requirements or to recover minerals and energy from water.

The impact of water quality can hardly be overestimated. The presence of pathogenic bacteria, viruses and hazardous chemicals impose a direct threat to our health. Indirect effects arise from reduced agricultural yields, shortage of drinking and irrigation water, biotope destruction and long-term health effects. Water shortage increases due to pollution, population growth and climate change. This is already influencing several countries in the EU, but also in the rest of the world. The depletion of important minerals is among others also caused by non-sustainable water treatment. Absence of safe drinking water, irrigation water and sanitation in the 2nd and 3rd world is causing immense stress (as described in the UN Millennium Development Goals) and must be relieved by sustainable water technologies.

Solving global water problems requires a multidisciplinary approach of knowledge and skills. The focus of the MSc Water Technology lies on the understanding of the basic principles of chemical and biological conversion technology, as well as the integration of this knowledge with separation technology. Students are challenged with examples and case studies of real research problems they might encounter in future.

## Cooperation with three Dutch universities

In 2008 the Wetsus Academy was established in Leeuwarden at the Technological Top Institute Wetsus. Wageningen University, University Twente and University of Groningen participate in this academy and together they offer a multidisciplinary master specialisation in Water Technology. In the study programme the universities have combined their state-of-the-art expertise from the field of biotechnology and chemical engineering, in a new challenging programme. The study programme is strongly related to the research objectives and experiences of Wetsus. In Wetsus, scientific experts from different Dutch and European knowledge institutes work together in a multidisciplinary research program to develop innovative and sustainable water technologies. This way, the universities provide students an advanced training in close contact with relevant research.

### NEW DEVELOPMENTS

Students registered at one of the three universities have been awarded a diploma of that specific university. In case you applied at Wageningen University, you received the MSc degree Biotechnology until 2012. Since 2010 Dutch regulation enables universities to develop MSc programmes as joint degree programmes. Therefore we decided to start the process of changing the MSc specialisation Water Technology into a joint degree MSc Water Technology. As soon as the joint degree Water Technology is accredited, students following the Water Technology programme have to be transferred to the MSc Water Technology.

## Your future career

The study domain is becoming more and more relevant due to the urgent need for new technologies to meet the global water problems. Water technology for public drinking water production and sewer water treatment is a very large market. Further, the largest use of fresh water is for irrigation purposes. The industrial water supply and industrial waste water treatment also represent a significant market. There is no question that business involved in water technology will grow tremendously. Besides this human capital is a basic condition to guarantee the success and continuity of the development of sustainable technologies and a European know-how economy in water technology. In many EU countries the lack of talented technological professionals is becoming an increasingly limiting factor. The program prepares students for a professional position in the broad area of water technology. Graduates have good national and international career prospects in business and research.

### ADMISSION REQUIREMENTS

see page 40 or look on the website.

The English language requirements and the period structure of the programme are different for this master. For more information visit [www.wetsusacademy.nl](http://www.wetsusacademy.nl).

## Related programmes

MSc Biotechnology - MSc Environmental Sciences





# Admission & Application

## Application Deadlines

	February 2014	September 2014	February 2015
EU/EFTA students	December 1, 2013	July 1, 2014	December 1, 2014
Non EU/EFTA students	October 1, 2013	May 1, 2014	October 1, 2014
Study programme	Bioinformatics	All programmes	Bioinformatics
	Biotechnology		Biotechnology
	Biology		Biology
	Environmental Sciences		Environmental Sciences
	Molecular Life Sciences		Molecular Life Sciences
	Organic Agriculture		Organic Agriculture
	Plant Biotechnology		Plant Biotechnology
	Plant Sciences		Plant Sciences

## General admission requirements

All MSc study programmes at Wageningen University have the following general admission requirements:

- A bachelor degree (or equivalent) in a field of science relevant to the selected programme;
- A cumulative grade point average (GPA) - or cumulative average mark - for the Bachelor's study, which is at least 70% of the highest grade, or mark achievable;
- Good working knowledge of mathematics and/or statistics;
- Fluency in English, both written and spoken (see schedule)

The Immigration Laws requires that all international students who require a residence permit will be subject to a yearly study progress check. Students must obtain at least 50% of the credits per year (or part of a year). The immigration office will cancel the residence visa of students who do not meet this criteria.



## Application procedure

### STEP 1: APPLICATION AND ADMISSION

- **A completed MSc application form** [www.wageningenuniversity.eu/applicationform](http://www.wageningenuniversity.eu/applicationform)
- **BSc Degree.** A copy of your Bachelor degree (or equivalent as recognized by Nuffic) in Dutch or English (or a certified English translation). Students in the final year of their Bachelor may also apply for admission prior to graduation. The Academic Committee on Admissions can tentatively admit students based on a transcript of their academic record and the expected date of graduation. Students must submit the official degree before September 1st.
- **Transcript of your academic records.** A copy in Dutch or English (or a certified English translation) including a list of marks or grades obtained during your Bachelor and your Grade Point Average (GPA).
- **Sufficient English language proficiency test results.**
- **A statement of motivation.**
- **Curriculum Vitae.**

Only complete applications will be submitted to the Academic Committee on Admissions. You will receive a registration letter by email containing a user-name and password with which you can check your application status in our Student Tracking Admissions Registration System (STARS).

### STEP 2: ADMISSION OF RESULT AND CONFIRMATION

Your application for admission will be evaluated by the Academic Committee on Admissions of Wageningen University. The decision will be communicated through an official letter, sent by email. The Committee will also inform candidates if the application



## English Language Proficiency

	Standard	Exceptions*
IELTS	6.0 (with a minimum sub score of 6.0 for speaking)	6.5 (with a minimum sub score of 6.0 for speaking)
TOEFL	80 internet (with a minimum sub score of 20 for speaking)	92 (with a minimum sub score of 23 for speaking)
Cambridge CAE	Pass at grade C	Pass at grade B
Cambridge CPE	Pass at grade C	Pass at grade B

\* MSc Applied Communication Science / MSc International Development Studies / MSc Management, Economics and Consumer Studies / MSc Development and Rural Innovation / Water Technology.

Note: IELTS, TOEFL and Cambridge tests should have been taken no longer than two years prior to the application.

## Study Expenses

Study expenses consist of tuition fees, research fees, living expenses (housing, foods, drinks) and other expenses (insurance, residence permit, handling fee, books, study materials).

	EU/EFTA students 2014/2015	Non EU/EFTA students 2014/2015
Tuition Fee	€ 1,900* / year	€ 14,000* / year
Research Fee		€ 1,400** / year
Living Expenses	€ 10,000* / year	€ 10,000* / year
Other Expenses	€ 500* / year	€ 1500* / year

\* Indication only, see the website [www.wageningenuniversity.eu/tuitionfee](http://www.wageningenuniversity.eu/tuitionfee) for up to date information.

\*\* A one-time fee to cover research expenses during internship and/or thesis in the second year.

is not accepted. The letter of admission is required before you can apply for most fellowships. When you have been admitted to the programme you are kindly requested to confirm your participation. Log on to STARS and complete the confirmation form.

### STEP 3: PAYMENT

Upon receipt of your confirmation form, an invoice will be sent to you or to your sponsor. The invoice includes important information about the payment. The required amount should be paid into our bank account before the deadline (see website). Do not make any payments before receiving the invoice.

### STEP 4: VISA (NON EU/EFTA NATIONALS ONLY)

Nationals from non-EU or non-EFTA countries (except nationals from Australia, Canada, Japan, Monaco, New Zealand, United States) require a special visa (called an Authorisation for Temporary Residence ATR; Dutch abbreviation: MVV) to study in the Netherlands. Upon receipt of the required payment, the International Office of Wageningen University will start the visa procedure for those students who require a visa. This can take up to two months. It is not possible for students to apply for the ATR/ MVV themselves.

### STEP 5: HOUSING AND INSURANCE

Wageningen University will arrange housing for all international Master students. Housing will be arranged for you after you have paid the required amount and completed the arrival/housing application form. In the Netherlands everyone is required to have health and liability insurance. If required, Wageningen University can assist international students in arranging a comprehensive insurance upon arrival in Wageningen.



# Programme outline



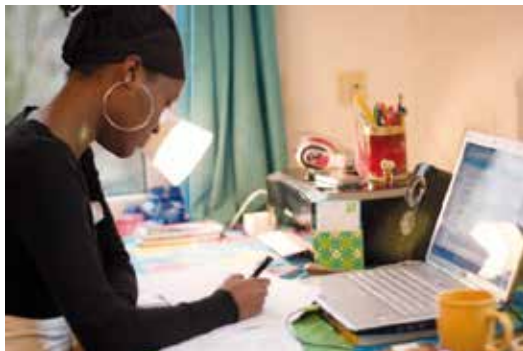
*New*

## Distance learning

From September 2015, we will also be offering the specialisations 'Plant Breeding and Genetic Resources' and 'Nutritional Epidemiology and Public Health' by Distance Learning. Check for more information

[www.wageningenuniversity.eu/onlinemaster](http://www.wageningenuniversity.eu/onlinemaster)

	Academic Year 2014/2015												Academic Year 2015/2016													
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
introduction		p1		p2		p3	p4		p5		p6		re-exams													
	Courses												Internship/ Minor Thesis					Major Thesis				re-exams	graduation			
	exams																									

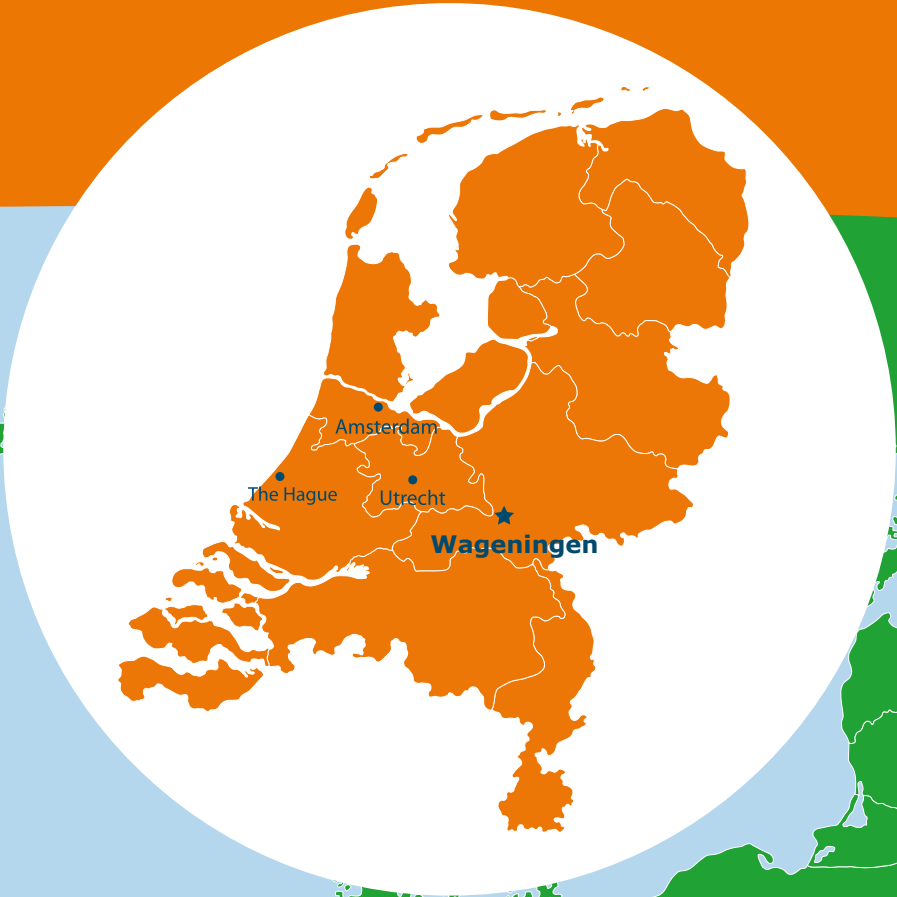
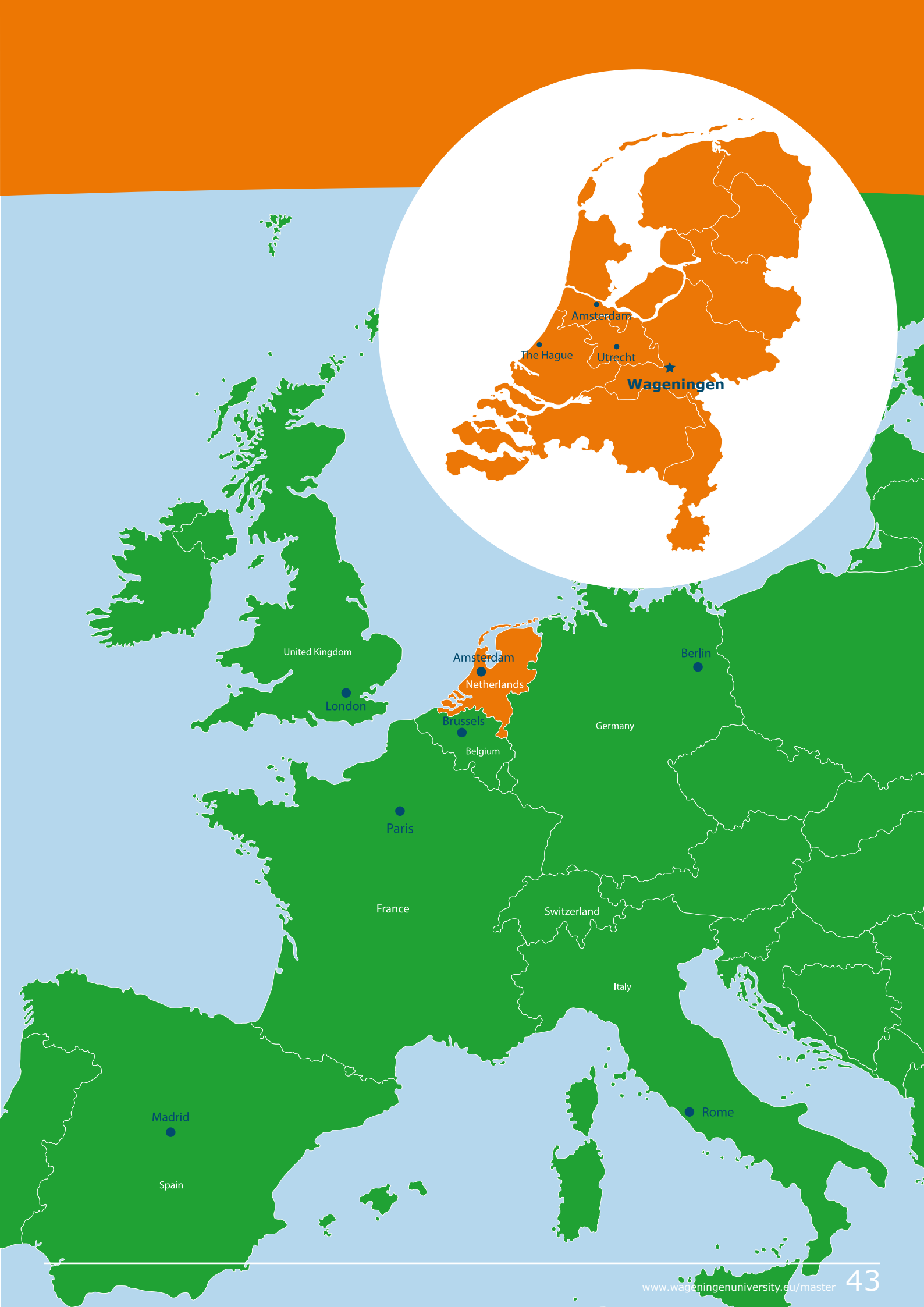


## Structure of the programme

Wageningen University offers 29 Master of Science (MSc) programmes and the language of instruction is English. All Master study programmes are full time, have a duration of two years and are comprised of 120 ECTS credits. Wageningen University has a period system counting six periods per year. During each period you follow one or two courses that are then completed with an exam. The change time of the European semester system coincides with the change time between period 3 and 4 of Wageningen University. Therefore it is easy to follow courses at other universities without having scheduling problems.

The first year of the Master study programme is comprised of mandatory courses, but you also have large freedom-of-choice to guide your studies towards your desired specialisation.

The second year includes an internship and a master thesis. The subject of the thesis is developed in consultation with a senior staff member of Wageningen University. Students usually propose their own thesis research topics while taking ongoing research in the relevant Wageningen University departments into account.



United Kingdom

London

Amsterdam  
Netherlands

Brussels  
Belgium

Paris

France

Madrid

Spain

Germany

Berlin

Switzerland

Italy

Rome



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+31 (0)317 48 48 48  
[study@wur.nl](mailto:study@wur.nl)

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The Netherlands.

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