Open Universiteit

Detailed Course Descriptions

Erasmus+ course catalogue | Science - Environmental Sciences

Erasmus+ course catalogue of the Open University of the Netherlands. Each course has an English title; the Dutch name, as used in our course offer, is shown as well. Descriptions have been translated into English.

Questions? Please contact subsidieadvies@ou.nl

Each course shows: type, language of the course, ECTS (study credits) and price in euros. A dash instead of a price means that no price is charged.

Science - Environmental Sciences

90 courses and programmes in this document.

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NB2612 - Analysing Big Data for Dynamic Systems: an introduction to R
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NB2812 - Citizen initiatives and sustainability
NB2902 - The sustainable city
NB3002 - Health in perspective: nutrition and environment
NB5001 - Open education Bachelor's Environmental Natural Sciences
NB5002 - Open education Bachelor's Environmental Natural Sciences
NB5004 - Open education Bachelor's Environmental Natural Sciences
NB950J - Capita selecta Bachelor's Environmental Natural Sciences
NB950K - Capita selecta Bachelor's Environmental Natural Sciences
NB950L - Capita selecta Bachelor's Environmental Natural Sciences
NB950M - Capita selecta Bachelor's Environmental Natural Sciences
NB950N - Capita selecta Bachelor's Environmental Natural Sciences
NB950O - Capita selecta Bachelor's Environmental Natural Sciences

NB950P - Capita selecta Bachelor's Environmental Natural Sciences
NB950Q - Capita selecta Bachelor's Environmental Natural Sciences
NB950R - Capita selecta Bachelor's Environmental Natural Sciences
NB950S - Capita selecta Bachelor's Environmental Natural Sciences
NB950T - Capita selecta Bachelor's Environmental Natural Sciences
NB950U - Capita selecta Bachelor's Environmental Natural Sciences
NB950V - Capita selecta Bachelor's Environmental Natural Sciences
NB950W - Capita selecta Bachelor's Environmental Natural Sciences
NB950X - Capita selecta Bachelor's Environmental Natural Sciences
NB950Y - Capita selecta Bachelor's Environmental Natural Sciences
NB950Z - Capita selecta Bachelor's Environmental Natural Sciences
NB9804 - Research Approaches in Environmental Sciences
NB9906 - Virtual environmental consultancy 2: Bachelor's graduation research
NC0510 - CPC Certified Professional Course Statistics and Big Data
NC0610 - Introduction to Anthrozoology
NC0710 - Introduction to Anthrozoology
NC0910 - Introduction to Anthrozoology
NC1010 - Introduction to Anthrozoology
NC1110 - Introduction to Anthrozoology
NM0001 - Open module (small) Master's Environmental Sciences
NM0004 - Open modules Master's Environmental Sciences
NM000O - Open education Master's Environmental Sciences
NM000P - Open education Master's Environmental Sciences
NM000Q - Open module Master's Environmental Sciences
NM000R - Open module Master's Environmental Sciences
NM000S - Open module Master's Environmental Sciences
NM000T - Open module Master's Environmental Sciences
NM000U - Open module
NM000V - Open module
NM000W - Open module
NM000X - Open module
NM000Y - Open module
NM000Z - Open module
NM0103 - Environmental problems: crossing boundaries between science, policy and society
NM0113 - Environmental Issues: Crossing Boundaries between Science, Policy and Society
NM0203 - Environmental governance in times of global change
NM0403 - Environmental Health Sciences
NM0503 - Open education Master's Environmental Sciences
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NM0712 - Research proposal Master's Environmental Sciences
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NM0903 - The Science of Environmental Change
NM1003 - Sustainability transitions
NM9903 - Research Methods in Environmental Sciences
NM990A - Thesis Master's Environmental Sciences

NM9919 - Thesis Master's Environmental Sciences
OBAMNW-2026-2027 - Open Bachelor's programme in Environmental Natural Sciences
SMAES-2026-2027 - Bridging programme Environmental Sciences

BMW-2026-2027 - Bachelor's programme in Environmental Natural Sciences (BSc)

Dutch name: Bachelor Milieu-natuurwetenschappen (BSc) **Type:** Training **Language:** Dutch **ECTS:** 180 **Price:** -

In the Bachelor's programme, you build up a solid foundation step by step in the natural sciences and learn everything about the latest developments in the field of sustainability and the environment. You learn not only to understand problems, but also to think along in a targeted way about solutions. In doing so, you look both at the technical side of environmental issues and at the way in which people and society deal with them. From the first year, you already take part in current academic research. Think of making our living environment more climate-resilient, investigating the consequences of microplastics, improving environmental policy or finding new sustainable energy sources. You regularly work on examples from your own living or working environment, so that you experience directly how you can apply theory in practice.

Structure

You start with the courses Earth, humans and environment 1 and Earth, humans and environment 2, a solid introduction to the field. You then build further with:

- mathematics, chemistry, physics and life sciences
- data analysis
- the integrated natural science practical, in which you carry out real experiments

In this way, you lay the foundation for deepening your knowledge of environmental issues and sustainable solutions in the rest of the programme. Four times a year there are theme days with guidance, lectures and meetings with lecturers and fellow students, ideal for building your network. Do you want to know more about the content? Request the study guide.

FONAD-2026-2027 - Focus programme Earth and Sustainability

Dutch name: Focusopleiding Aarde en Duurzaamheid **Type:** Training **Language:** Dutch **ECTS:** 15 **Price:** -

This focus programme consists of the following courses from our Bachelor's programme in Environmental Natural Sciences. In the course Earth, humans and environment 1 (NB0122), you become acquainted with the basic principles of the natural sciences that relate to different parts of the Earth's environment. You learn about soil, continental waters, ocean and atmosphere, energy flows in the biosphere, nutrient cycles, and ecosystems and adaptation. In this way, you gain more insight into how this environment makes life possible. The course Earth, humans and environment 2 (NB0222) is about the influence of humans on the Earth system (water, soil and atmosphere). But also about activities in the field of sustainable development and solving environmental problems (environmental policy, environmental technology, sustainable production of energy and food). You learn to establish a connection between the causes of the ecological and social problems, their impact on people and the environment, and the answers that society formulates to them. In the course Environmental sciences and sustainable development (NB1212), you go deeper into the concept of sustainable development and the role of environmental science knowledge in social issues in this area. The meaning of sustainable development as a concept and as a strategy for social change. And the role that (environmental) scientific knowledge can play in the social arena.

FONBDL-2026-2027 - Focus programme Citizen engagement and sustainable living environment

Dutch name: Focusprogramma Burgerbetrokkenheid en duurzame leefomgeving **Type:** Training
Language: Dutch **ECTS:** 15 **Price:** -

This focus programme consists of the following courses from our Bachelor's programme in Environmental Natural Sciences. In the course Citizen initiatives and sustainability (NB2812), you get an overview of citizen initiatives in the field of sustainability and of the different forms of citizen participation in governance and policy with regard to the living environment. On the basis of concrete examples and academic literature. With attention also to the underlying ideas about democracy and governance in relation to citizen involvement, views on sustainability and the role of citizens, and the impact of citizen involvement on sustainability. In the course The sustainable city (NB2902), the major urban sustainability transitions in the areas of energy, climate, mobility and circularity, and urban green space are central. You look at current sustainability problems and possible solutions, but also at the goals of urban policy makers and the challenges in achieving them. In the course Environmental sciences and sustainable development (NB1212), you delve further into the concept of sustainable development and the role of environmental science knowledge in social issues. The meaning of sustainable development as a concept and as a strategy for social change and the role that (environmental) scientific knowledge can play in the social arena.

MAES-2026-2027 - Master's programme in Environmental Sciences (MSc)

Dutch name: Master Environmental Sciences (MSc) **Type:** Training **Language:** Dutch **ECTS:** 60 **Price:** -

A strong foundation in environmental sciences

You start with two introductory courses that give you a solid base:

- Environmental Issues: Crossing Boundaries between Science, Policy and Society (7.5 EC) shows you how sustainability issues arise and why they affect so many different parties and interests. You learn to understand this complexity and discover which role you can play as an expert.
- Research Methods in Environmental Sciences (7.5 EC) puts into your hands the research methods to collect, analyse and integrate natural-science and social-science data. Indispensable tools for sound environmental research.

Choose your specialisation: Environmental Sciences or Sustainability Transitions

In the Master's track, you delve into the domain that best fits your ambitions.

1. Track Environmental Sciences

You focus on the natural-science side of climate and environmental problems.

- The Science of Environmental Change (7.5 EC) shows you how factors such as population growth, pollution and land use affect our ecological systems, with special attention to climate change.
- Environmental Health Sciences (7.5 EC) zooms in on the relationship between environment and health. You study exposure, health effects and risk analyses, substantiated with practical examples from toxicology and epidemiology.

2. Track Sustainability Transitions

Here you investigate how social systems change towards sustainability.

- In the course Sustainability Transitions (7.5 EC), you analyse current sustainability issues and develop strategies to accelerate transitions.

- Environmental Governance in Times of Global Change (7.5 EC) offers insight into national and international environmental policy on, among other things, climate, energy, mobility, agriculture and biodiversity. You learn to assess policy developments critically and translate them into future-proof solutions.

Graduation: putting your expertise into practice

The last part of the Master's programme revolves around your own research project. You work out a clear research plan and then carry out your research in the thesis. In this way, you give your studies a personal focus, often a subject that directly connects with your future career. Do you want to see exactly what each course covers? Then request the study guide.

NB0112 - Earth, humans and environment - introduction to the environmental natural sciences 1

Dutch name: Aarde, mens en milieu - introductie in de milieu-natuurwetenschappen 1 **Type:** Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 396.00

The course is built up from 4 learning units: 1. Soil, continental waters, ocean and atmosphere, 2. Energy flows in the biosphere, 3. Nutrient cycles, and 4. Ecosystems and adaptation. Although many processes within the compartments of atmosphere, soil or water cannot be separated from each other, in the first learning unit we nevertheless zoom in on separate processes within these compartments. In this way, we also hope to give a clear picture of the processes that take place in living nature, including processes that are important for the continued existence of living organisms, such as plants, animals and humans. By studying the following learning units, it will become increasingly clear how all compartments are interrelated. In doing so, it is unavoidable that we address the human factor here and there, for example when dealing with subjects such as the carbon cycle and photosynthesis. The course Earth, humans and environment 2 (NB0222) then goes effectively into the influence of humans on various Earth processes, including the influence on primary necessities of life and its consequences. In this way, you gain more insight into how we can keep the Earth's environment habitable. After following both Earth, humans and environment courses, you can also describe the most important requirements for a sustainable use of the Earth.

Learning objectives

After studying the course, you are familiar with basic natural-science knowledge about the various compartments that are part of the Earth's environment. You also gain more insight into how this environment makes life possible.

NB0122 - Earth, humans and environment 1: introduction to the environmental natural sciences

Dutch name: Aarde, mens en milieu 1: introductie in de milieu-natuurwetenschappen **Type:** Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 410.00

The course is built up from 4 learning units: 1. Soil, continental waters, ocean and atmosphere, 2. Energy flows in the biosphere, 3. Nutrient cycles, and 4. Ecosystems and adaptation. Although many processes within the compartments of atmosphere, soil or water cannot be separated from each other, in the first learning unit we nevertheless zoom in on separate processes within these compartments. In this way, we also hope to give a clear picture of the processes that take place in living nature, including processes that are important for the continued existence of living organisms, such as plants, animals and humans. By studying the following learning units, it will become increasingly clear how all compartments are interrelated. In doing so, it is unavoidable that we address the human factor here and there, for example when dealing with subjects such

as the carbon cycle and photosynthesis. The course Earth, humans and environment 2 (NB0222) then goes effectively into the influence of humans on various Earth processes, including the influence on primary necessities of life and its consequences. In this way, you gain more insight into how we can keep the Earth's environment habitable. After following both Earth, humans and environment courses, you can also describe the most important requirements for a sustainable use of the Earth.

Learning objectives

After studying the course, you are familiar with basic natural-science knowledge about the various compartments that are part of the Earth's environment. You also gain more insight into how this environment makes life possible.

NB0222 - Earth, humans and environment 2: introduction to the environmental natural sciences

Dutch name: Aarde, mens en milieu 2: introductie in de milieu-natuurwetenschappen **Type:** Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 410.00

The course Earth, humans and environment 2 is about the influence of humans on the Earth system (water, soil and atmosphere) and about activities aimed at sustainable development and solving environmental problems (environmental policy, environmental technology, sustainable production of energy and food). You learn to establish a connection between the causes of the ecological and social problems, their impact on people and the environment, and the answers that society formulates to them. For this, you learn at a basic level to use the widely used environmental-science analysis framework DPSIR (Driving forces - Pressures - States - Impacts, Responses). The DPSIR analysis framework was developed by, among others, the European Environment Agency.

Learning objectives

After studying the course, you can:

- explain what environmental problems are and indicate the relationship between environmental problems and sustainable development;
- indicate what the general scientific method is for systematically analysing environmental problems, what its possibilities but also its limitations are, and apply this approach to an environmental problem;
- give a global overview of the history of environmental problems and the policy and social responses to them, with an emphasis on recent decades;
- indicate important challenges and possible directions for solutions for sustainable development in the future;
- apply the DPSIR model for analysing environmental problems to an environmental problem in practice and indicate what the possibilities and limitations of this model are.

More information

For chemical and biological processes, which we describe within these learning units, we make the necessary natural-science prior knowledge available in the first introductory course Earth, humans and environment 1 (NB0102).

NB0302 - Mathematics for environmental sciences

Dutch name: Wiskunde voor milieuwetenschappen **Type:** Standard product **Language:** Dutch **ECTS:** 5
Price: € 410.00

The course Mathematics for environmental sciences focuses on the mathematical instruments needed to get by as an environmental scientist. Specifically, the mathematical skills that are applied in the various courses of the Bachelor's programme in Environmental Natural Sciences are practised. A number of themes are covered, including exponential, logarithmic and trigonometric functions, differentiation, integration, differential equations and matrix calculus. Each theme includes on the one hand the necessary theoretical foundation, and on the other hand many concrete examples from environmental science practice. Each mathematical subject is introduced on the basis of an example or problem situation in the environmental sciences. After a brief treatment of the mathematical theory, it is applied to solve the problems outlined. The mathematics is thus used mainly to analyse problems and find solutions.

Learning objectives

After studying the course, you have mathematical insight and skills around exponential, logarithmic and trigonometric functions, integration and mathematical modelling.

NB0412 - Life sciences: evolution

Dutch name: Levenswetenschappen: evolutie **Type:** Standard product **Language:** Dutch **ECTS:** 5
Price: € 410.00

In biological evolution, the environment plays an important, selecting role. What happens when that environment changes through human influence? Or when humans create a new type of environment, such as densely built-up cities? This course offers a broad basis of knowledge and insights around biological evolution. From that basis, the course goes into various examples of (unintended) human influence on evolutionary processes. The course begins at the level of populations. Genetic variation, variation in appearance (phenotype) and the link between the two are addressed. From that knowledge, evolutionary processes are covered. The later learning units zoom out to the longer time scale: the emergence of adaptations, of new species, and of biodiversity on Earth. You apply the theory in a continuous case about the grove snail (Cepaea nemoralis), in which you can make observations in your immediate living environment, and in a continuous case about Anolis lizards on Caribbean islands.

Learning objectives

After studying the course, you have knowledge of:

- the meaning of the most important evolutionary terms and the concept of biodiversity.

You also have insight into:

- the explanatory role of evolutionary theory for the whole of biology;
- the evolutionary process, including the role of heredity;
- the variability of the environment on various time scales (geological, historical) and its effects on biodiversity;
- the knock-on effect of human action on evolutionary processes.

NB0502 - Chemistry for environmental sciences 1

Dutch name: Scheikunde voor milieuwetenschappen 1 **Type:** Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 396.00

In the course, the basic knowledge of chemistry that an environmental scientist may need in daily practice is provided by means of a number of application-oriented study tasks. To be able to work out these study tasks, the underlying subject matter is covered in the course books. For each subject of the material, a number of practice exercises are included. For each subject, where necessary, a reference is included to sources for refreshing the prior knowledge required for the subject concerned. Sometimes the prior-knowledge material is included in the course book. To complete the course with good results, good numeracy, a passive knowledge of English and a basic knowledge of chemistry at pre-university (VWO) level are necessary. Knowledge of mathematics, physics and chemistry at VWO final-examination level is desirable.

Learning objectives

After studying the course, you have:

- knowledge of the basic concepts of chemistry;
- knowledge of the structure of an atom;
- knowledge of the different types of chemical bonds;
- insight into the different interactions between particles that determine the state of matter of a substance;
- insight into the different crystal models for the solid;
- knowledge of the different kinds of chemical reactions, in particular acid-base reactions and redox reactions;
- knowledge of the different kinds of chemical equilibria, of reaction kinetics and of reaction mechanisms.

NB0512 - Chemistry for environmental sciences

Dutch name: Scheikunde voor milieuwetenschappen **Type:** Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 410.00

In the course, the basic knowledge of chemistry that an environmental scientist may need in daily practice is provided by means of a number of application-oriented study tasks. To be able to work out these study tasks, the underlying subject matter is covered in the course books. For each subject of the material, a number of practice exercises are included. For each subject, where necessary, a reference is included to sources for refreshing the prior knowledge required for the subject concerned.

Learning objectives

After studying the course, you have:

- knowledge of the basic concepts of chemistry;
- knowledge of the structure of an atom in the quantum-mechanical atomic model;
- knowledge of the basic concepts of carbon chemistry that are important for a programme in the environmental sciences;
- knowledge of a number of reaction pathways within carbon chemistry that are important within the environmental sciences, for both aliphatic and aromatic reactions;
- knowledge of the different types of chemical bonds;
- knowledge of the different kinds of chemical reactions, in particular reactions that are important in electrochemistry;

- knowledge of the different kinds of chemical equilibria, of reaction kinetics and of reaction mechanisms.

NB0702 - Life sciences 2: physiology

Dutch name: Levenswetenschappen 2: fysiologie **Type:** Standard product **Language:** Dutch **ECTS:** 5
Price: € 410.00

Physiology is about the 'workings' of living organisms such as plants and animals. Physiology is important in environmental science because it gives insight into the limits within which life is possible. Physiology also offers possibilities to understand how living organisms (including humans) can or cannot maintain themselves under environmental stress. To function and survive, an organism must take up energy, maintain a fairly constant internal environment, and be able to respond to external threats. This is possible through all kinds of chemical and physical processes in cells and in organs. This course covers the workings of living organisms from the level of biomolecules in the cell to the cooperation of organs in the organism. The course begins at the basis, with cell biology. First the different types of biomolecules are covered. Building on this, the course deals with metabolism in cells. First, photosynthesis in plants is addressed, the capture of light energy that is at the basis of the food chain and food supply. This knowledge about photosynthesis can be put directly into practice in the course 'Integrated Practical Natural Sciences' (NB0802), which takes place in parallel with the course Life sciences 2: physiology. After the photosynthesis component, there is attention to the other ways in which cells can meet their energy needs, with an emphasis on animal cells. That knowledge is applied in the Metabola game, which can be played with fellow students. In the second part, attention shifts to the level of organs and the organism. Here the physiology of animals and humans is central. Aspects covered include the maintenance of a state of equilibrium (homeostasis), energy and a diverse group of organs involved in it. Both parts of the course consist of concise study texts, followed by a few academic articles.

Learning objectives

After completing this course, you can:

- explain the meaning of the most important terms within cell metabolism and physiology.

You also have insight into:

- the different ways in which organisms meet their energy needs;
- the most important processes in the metabolism of plants and animals;
- structure, growth and reproduction and protection at the cellular level;
- the processes, organ systems, organs, cells and cell organelles involved in homeostasis.

You can also:

- extract the most important messages from English-language academic reviews;
- apply a number of calculations commonly used in physiology at a basic level.

NB0802 - Integrated natural sciences practicum

Dutch name: Geïntegreerd practicum natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 5 **Price:** € 410.00

The Integrated Practical Natural Sciences (GPN) is aimed at learning to experiment in the field of the natural sciences. The practical has as its theme physiological and genetic adaptations of the photosynthesis process. It consists of a preparatory phase, an experimental phase and a concluding phase. In the preparatory phase, the most important backgrounds of the photosynthesis process are covered in the written material. The experimental phase takes place at Wageningen University and Research. This part of the practical consists of six consecutive days, preceded by a preparatory meeting in Utrecht. On the first practical day, a few

elementary laboratory techniques are practised. A number of experiments are then carried out that are meant to give more insight into physiological and genetic adaptations of the photosynthesis process. The last practical day is used to investigate a self-formulated research question further experimentally. The results of this are reported orally to fellow students and supervisors. The practical is concluded with a concluding phase. The data collected during the practical must be processed into a thematic report.

Learning objectives

After completing the course:

- you have insight into the (sub)processes of photosynthesis and the possibilities of physiological and genetic adaptation;
- you are able to formulate a testable hypothesis and to set up a simple experiment to test a hypothesis;
- you have insight into the problems in carrying out experiments and into the possibilities and limitations of the methods and techniques used;
- you have some insight into the reliability of experimentally obtained data and are more familiar with processing and statistically analysing it;
- you are able to evaluate the experimental data in the light of the hypothesis, to process the results obtained into a report and to make suggestions for follow-up research.

NB0932 - Data and inference

Dutch name: Gegevens en gevolgtrekkingen **Type:** Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 410.00

This course includes an introduction to scientific reasoning and an introduction to statistics. With this course, we want to teach you the skill of assessing scientific information. How reliable is the statement that the average temperature on Earth will have risen by 2-4 degrees Celsius by 2050? And how reliable is the prediction that summers in the Netherlands will become wetter? In today's society, trust in science sometimes seems hard to find, and scientific knowledge sometimes seems uncertain. But the scientific tradition and scientific reasoning are precisely aimed at increasing the certainty of our knowledge. In addition, it is becoming increasingly clear how closely environmental science issues are connected with society: our behaviour and our choices influence the environment. It is therefore more important than ever that knowledge is interpreted and applied correctly. Would you like to know more about this? And would you also like to have a bit more 'scientific assertiveness', so that you are able to assess the validity of alleged relationships and, if necessary, refute them? Or would you like to be able to assess scientific articles critically and make well-founded statements about them? Then the course Data and inferences is for you.

Learning objectives

Given these aims, the course has the following general learning objectives:

- to give insight into the principles of informal logic;
- to give insight into the nature and function of theories and models;
- to give insight into the function of experimental designs and statistical tests;
- to provide skill in assessing deductive reasoning;
- to provide skill in probability calculation and carrying out statistical tests;
- to provide skill in assessing the suitability of experimental designs and statistical tests in concrete experimental situations.

NB1002 - Physics for environmental sciences

Dutch name: Natuurkunde voor milieuwetenschappen **Type:** Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 410.00

In this course, the physical principles are presented in an environmental science context. These are physical concepts that can mostly be represented through mathematical relationships. Special attention is paid to the role that the various facets of Physics, observing, modelling and monitoring, play in solving environmental problems and promoting sustainability. In the general introduction, the social importance of Physics is outlined and an overview of the subject matter is given. This is followed by the study task Classical mechanics, in which you apply knowledge in the area of forces and energy to the energy consumption of a means of transport (car, bicycle, aeroplane) and the workings of a tidal basin. In the study task Electromagnetism, you learn how knowledge of electricity can be applied to wind energy. In the study tasks Heat and Heating, thermodynamic principles are applied in and around the home (insulation and the heat pump). The study task Optical radiation is applied to measuring air pollution. The study task Radioactivity is framed in examples from nuclear energy and from medical imaging and therapy. The study task Sound is applied to reducing noise nuisance. The integrating study task around Climate shows how the various facets of Physics can contribute to a better understanding of our climate and climate change. The course is concluded with a general summary, in which the ten subjects come together and are placed (once again) in the perspective of sustainability. The course includes a reflection assignment (1/2 hour) on threshold concepts in physics. You carry out this assignment after the last study task and before the exam. A threshold concept is a key concept that can be regarded as a gateway that gives access to a new way of thinking about the subject matter of the field. In this assignment, you also reflect on the physical concepts and the extent to which they have contributed to a better understanding of the environmental sciences. The course is examined by means of a digital individual exam (DIT) with multiple-choice questions.

Learning objectives

After studying the course Physics for Environmental Sciences, you have knowledge and understanding of:

- the role that physics has in the environmental sciences. This concerns mostly mathematical relationships between physical quantities that can be represented by formulas;
- classical mechanics: forces and energy, applied to the energy consumption of a means of transport (car, bicycle, aeroplane) and the workings of a tidal basin;
- electromagnetism and the workings of the electric motor; application takes place on the wind turbine;
- the principles of thermodynamics, applied to the heat loss through a wall and the heating [...]

NB1112 - Environmental policy: theory and practice

Dutch name: Milieubeleid: theorie en praktijk **Type:** Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 410.00

The course consists of an electronic workbook in the online learning environment and the textbook ‘Milieubeleid: analyse en perspectief’ (eds. Driessen and Leroy, 2007). For Flemish students, six chapters of the textbook are supplemented with a Flemish variant. The course is built up from four parts:

1. Start

Via the online learning environment, you become acquainted with the members of your team. You then take part in the online kick-off meeting (compulsory), where you meet your group members and the lecturer. In this phase, you can also already work through (parts of) the textbook.

2. Orientation

In the orientation, a number of subjects are covered that are important for a (first) introduction to environmental policy: the relationship between environment and society, the development of the policy field, the objectives and starting points of environmental policy, and the political context. A number of central concepts that will come up regularly in the rest of the course are addressed.

3. Deepening

This part goes into the institutionalisation of environmental policy, both in terms of policy and in legal terms. Various analysis methods are then covered for (learning to) understand and explain environmental policy better. A distinction is made between the goal-rational, social-interactive and institutional perspectives on environmental policy. Central concepts that will be applied in the rest of the course are also covered. You also learn how you can set up, with your group members, a policy study focused on climate change. The worked-out research design counts as preparation for the next part of the course.

4. Assessment

In the last part of the course, you carry out a study into the policy around the climate problem or another environmental problem in a municipality in the Netherlands (or Belgium). You use the knowledge and insights from the course and the research design from the previous part. The group result is worked out in a written group report and summarised in a PowerPoint presentation. Both group products are part of the (individual) final assessment for this course, alongside an assessment of the group process and the individual contribution.

Collaborative learning

The course is considered indispensable for students who will come into contact with aspects of environmental policy in their (later) professional practice. This may involve positions in government, business or environmental organisations. An important feature of the field is working together with others on environmental issues, and making a translation of this into (one's own) environmental policy. Differences in underlying perspectives, values, norms, interests and positions mean that environmental policy is not merely a matter of 'thinking out', but often also a matter of 'fighting out'. To prepare you somewhat for this, this course is based on collaborative learning. From the start of the course, you are expected [...]

NB1212 - Environmental sciences and sustainable development

Dutch name: Milieuwetenschappen en duurzame ontwikkeling **Type:** Standard product **Language:** Dutch
ECTS: 5 **Price:** € 410.00

In the course Environmental sciences and sustainable development, you increase your knowledge of the concept of sustainable development and of the role of environmental science knowledge in social issues in this area. The course builds on the knowledge acquired in the courses Earth, Humans & Environment (AMM) 1 and 2 and/or comparable knowledge acquired elsewhere. An important part of the course is carrying out a literature study on a concrete environmental issue and reporting on it in a scholarly way in a paper. For this literature review, you can choose from a number of current dossiers, such as the nitrogen problem, making energy use in cities more sustainable, environmental pollution by plastics and the preservation of biodiversity. The course consists of four parts and a concluding writing assignment. The first part goes into the meaning of sustainable development as a concept and as a strategy for social change. The second part goes into the role that (environmental) scientific knowledge can play in the social practice of environmental problems. You get to work translating a knowledge question as it lives in society into a research question with which you can search in a targeted way for information within various environmental science areas of expertise. Subsequent parts of the course are aimed, among other things, at acquiring skills such as being able to find academic literature and processing and reporting on this information. On the basis of one of the above-mentioned

dossiers, you analyse an issue of your choice. You then translate the insights obtained into a substantiated (academic) text.

Learning objectives

After studying the course:

- you have knowledge and understanding of the concept of sustainable development;
- you have insight into the role of the environmental sciences in helping to bring about sustainable development;
- you are able to translate a knowledge question as it lives in society into a research question with which you can search in a targeted way for information within various environmental science areas of expertise;
- you are able to apply knowledge and insights from the course material to a concrete environmental problem and to report on this in an academic text.

NB1312 - Climate change and adaptation

Dutch name: Klimaatverandering en adaptatie **Type:** Standard product **Language:** Dutch **ECTS:** 5
Price: € 410.00

In the course Climate change and adaptation, we start from the Earth as a system. Through this interdisciplinary concept, we distinguish the main subsystems such as climate, atmosphere, biosphere, hydrosphere and lithosphere. You learn what the important mechanisms are in the interaction between a changing climate and geological processes on and near the Earth's surface, and how these determine the Earth system in the past and present. From this knowledge of palaeoclimate and its connection with the dynamics of the Earth system, you learn what the difference is between natural climate change and anthropogenic climate change. You learn to apply this knowledge in the context of environmental and climate issues (at global, regional and local level), for which you are given an overview of analysis methods and examples of climate adaptation measures, and also learn to assess these critically. The first part of the course focuses mainly on the exogenous processes of the Earth system and how natural and anthropogenic conditions influence the various subsystems. The course focuses mainly on the Earth's climate system and the dynamics of climate processes. You also learn the various feedback mechanisms that influence this climate system and the other 'earth systems'. In this part, you also gain insight into how scientists study climate change as an anthropogenic process, in the past and future, by means of analyses with climate models and Earth observations. From the insight into the workings of these climate models, we briefly discuss the IPCC and KNMI climate scenarios, and how these can be used for planning aimed at climate adaptation and mitigation of greenhouse gases (GHG). We also discuss the findings from the department's research on nature-based solutions (NbS) and how these dynamic adaptation measures can be connected with mitigation through carbon sequestration in the soil. You become acquainted with various methods for reconstructing climatic changes in the past. You learn to explain the most important spatial processes in climate change on and near the Earth's surface in North-West Europe. In the second part, you go deeper into the consequences of anthropogenic climate change and the possible interventions. The focus is on the local level. There is attention to the Urban Heat Island effect and its causes and to 'lock-in' effects for local climate adaptation policy. Insight into this supports you in developing effective strategies for climate adaptation. The course gives you an overview of analysis methods, including the climate stress test, for determining the vulnerability of a region. You learn to use tools to develop adaptation measures from the local level (of city and region) and from the goal (heat, flooding, high water) and effect [...]

NB1402 - Chemistry for environmental sciences 2

Dutch name: Scheikunde voor milieuwetenschappen 2 **Type:** Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 410.00

In the course, the basic knowledge of chemistry that an environmental scientist may need in daily practice is provided by means of a number of application-oriented study tasks. The first part of the course covers (part of) carbon chemistry. To clarify the subject matter, a molecular model kit is part of the course material. The study tasks are derived as far as possible from environmental chemistry and public health practice. In this way, they also connect well with the second part of the course, which describes the research methods in environmental chemistry. To be able to work out the study tasks, the underlying subject matter is covered in the course books. For each subject of the material, a number of practice exercises are included. For each subject, where necessary, a reference is included to sources for refreshing the prior knowledge required for the subject concerned. Sometimes the prior-knowledge material is included in the course book. Refreshing prior knowledge is not part of the total study load of the course.

Learning objectives

After completing the course:

- you have knowledge of the basic concepts of carbon chemistry;
- you recognise from the structure of an aliphatic carbon compound why that compound shows a certain behaviour in the environment;
- you know a number of reaction pathways of aliphatic carbon compounds;
- you know the most important properties and reaction types of aromatic compounds;
- you have knowledge of the analytical procedure in environmental chemical analysis and you recognise the problems involved.

NB1512 - Nutrition: health and environment

Dutch name: Voeding: gezondheid en milieu **Type:** Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 410.00

Nutrition plays a crucial role for both our health and the environment. But can what we eat be healthy and sustainable at the same time? Our health is influenced by various factors, including the living environment, but also by behaviour such as food choice. In the Netherlands, half of the population is overweight, nine out of ten people eat too few vegetables and fruit, and almost thirty per cent of our food consists of products of animal origin. This eating pattern contributes not only to health problems, but also causes a considerable environmental burden. The course Nutrition: Health and Environment investigates the interplay between nutrition, health and sustainability. In the first part, healthy nutrition is central. Students gain insight into the basic principles of nutritional science, including the role of macronutrients (proteins, carbohydrates and fats), micronutrients (vitamins and minerals) and water. The processes of digestion and energy balance are also covered. In the second part, attention shifts to the environmental aspects of our eating behaviour. Students investigate how food choices influence not only their own health but also that of the planet. In this way, Nutrition: Health and Environment offers students an academically substantiated insight into how healthy and sustainable nutrition can reinforce each other. The course stimulates awareness and prepares future professionals to make choices that are good for people and the environment.

Learning objectives

After studying the course, you can:

- identify and quantify determinants of public health, with an emphasis on environmental factors and healthy behaviour;

- name the relationship between health and the most important environmental factors (air pollution, noise nuisance and climate);
- define the most important basic concepts within the nutritional sciences;
- describe the chemistry, function and contribution to health of the macronutrients (proteins, carbohydrates and fats), the micronutrients (vitamins and minerals) and water;
- describe the digestion and absorption of nutrients as well as the energy economy of humans: energy metabolism and energy balance;
- report briefly orally to what extent healthy and sustainable nutrition go together.

NB1602 - Ecosystems and Human Well-being

Type: Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 396.00

This course focuses on the interaction between humans and ecosystems. There are two main questions: what is the importance of ecosystems for human well-being, and how do humans influence the functioning of ecosystems? To study this interaction, the course makes use of the conceptual framework that was developed within the so-called Millennium Ecosystem Assessment (MA). This 'assessment' is an evaluation of the state of ecosystems worldwide, the expected developments, and the options for (more) sustainable management of ecosystems. The final report of the MA serves as the common thread for the course. The content of this report is supplemented and deepened with a textbook with supporting ecological knowledge and knowledge about the relationship between ecosystems and social systems. In the course, you acquire knowledge, insight and skills relating to the analysis and solution of environmental problems associated with the degradation of ecosystems. Through study tasks, you focus on the value of ecosystems for human well-being, the changes that have occurred in ecosystems over the past fifty years, and the possibilities for reversing the current trend of continuing degradation. On the basis of a number of striking case descriptions, you delve further into the precise causes, mechanisms and consequences of anthropogenic changes in ecosystems. To conclude the course, you carry out an ecosystem assessment of a case area yourself on the basis of a collection of sources.

Learning objectives

After studying the course, you have knowledge and understanding of:

- the functioning of ecosystems;
- the current state of ecosystems at global level;
- the possibilities for sustainable management of ecosystems.

You can also:

- analyse the interaction between humans and ecosystems with the 'conceptual framework for ecosystem assessment';
- independently carry out a simple ecosystem assessment.

NB1612 - Ecosystems and Human Well-being

Type: Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 410.00

This course focuses on the interaction between humans and ecosystems. There are two main questions: what is the importance of ecosystems for human well-being, and how do humans influence the functioning of ecosystems? To study this interaction, the course makes use of the conceptual framework that was developed within the so-called Millennium Ecosystem Assessment (MA). This 'assessment' is an evaluation of the state of ecosystems worldwide, the expected developments, and the options for (more) sustainable management of ecosystems. The final report of the MA serves as the common thread for the course. The content of this report is supplemented with recent assessments and deepened with a textbook with supporting ecological

knowledge and knowledge about the relationship between ecosystems and social systems. In the course, you acquire knowledge, insight and skills relating to the analysis and solution of environmental problems associated with the degradation of ecosystems. Through study tasks, you focus on the value of ecosystems for human well-being, the changes that have occurred in ecosystems in recent decades, and the possibilities for reversing the current trend of continuing degradation. To conclude the course, you carry out an ecosystem assessment of a case area yourself on the basis of a collection of sources.

Learning objectives

After studying the course, you have knowledge and understanding of:

- the functioning of ecosystems;
- the current state of ecosystems at global level;
- the possibilities for sustainable management of ecosystems.

You can also:

- analyse the interaction between humans and ecosystems with the 'conceptual framework for ecosystem assessment';
- independently carry out a simple ecosystem assessment.

NB1722 - Environmental Toxicology

Type: Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 410.00

Nowadays, living organisms, including humans, are exposed to an ever-growing number and an ever-greater variety of harmful substances. Sometimes the effects of an exposure can have disastrous consequences, but in practice it is much more common for exposure to be to lower doses over a longer period and for the consequences to come to light only much later. The study and risk evaluation of harmful chemicals in the environment, the way in which they enter organisms, their effect from the molecular to the population level and the protection mechanisms they evoke make up the field of environmental toxicology. This English-language course focuses specifically on acquiring knowledge about the behaviour of chemical substances in the environment and their adverse effects on ecosystems, including humans. Both the processes that determine exposure and those that determine the toxic effect on an organism and on the ecosystem are covered. Finally, there is attention to environmental epidemiology, the study of the occurrence and spread of environment-related diseases and their determining factors.

Learning objectives

Acquiring knowledge about the basic principles of (environmental) toxicology, including human toxicology, epidemiology and risk analysis.

NB1812 - Engergy Analysis

Type: Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 410.00

To be able to understand developments in our energy supply properly and to think along about possible options for the future, it is important to be able to understand energy systems well. The English-language course Renewable energy systems offers an introduction to the analysis of energy systems and energy technologies. The course pays attention both to systems that supply energy and to systems that determine the demand for energy. During the course, various methods and tools for analysing energy systems are covered, including: energy in a social context, energy services and energy demand, energy extraction and conversion, energy markets, energy analysis and management, exergy analysis, energy chains, life cycle analysis of energy, measuring energy efficiency and energy intensity, energy technologies, energy scenarios

and policy aimed at efficient energy use and renewable energy. The course is taught in English and is examined by means of a number of assignments.

Learning objectives

After studying the course, you can:

- explain which systems supply energy and which systems determine the demand for energy;
- apply methods and tools with which you can analyse energy systems, including: energy management, life cycle analysis of energy, indicators of energy efficiency and intensity, analysis of energy technologies, energy scenario analysis and analysis of energy policy.

NB1922 - Soil and water: a catchment approach

Dutch name: Bodem en water: een stroomgebiedbenadering **Type:** Standard product **Language:** Dutch
ECTS: 5 **Price:** € 396.00

Sufficient and clean water plus a healthy soil. It is not an easy task; after all, in the Netherlands and Belgium we live, many of us, in a vulnerable delta. In a strongly changing climate, we are increasingly running up against the limits of the soil-water system. How do we deal, for example, with flooding in residential areas, drought damage in agriculture, raising of landfill sites, subsidence of peat soils and sea-level rise? Governments therefore want water and soil to be guiding in decisions about the spatial design of our landscape. In this natural science course, you learn the basics of the earth sciences to understand how, where and why soil and water are so inextricably linked. You start close to home: you study the landscape around you and compare it with soil-water systems in the Netherlands and Flanders. In doing so, you always work from a catchment approach. In this way, you also come into contact with your lecturers' research into land-use transitions. You thereby learn to solve all kinds of questions such as: How can we deal sustainably with the limited drinking water supplies? How can water shape the landscape? How can the interaction between soil and water be used to reduce or even prevent the risk of drought and flooding? How great is the impact of human intervention on the soil-water system? You learn to look at these societal tasks from a worldwide perspective: the Sustainable Development Goals (SDGs). In doing so, you learn to use 'open data' sets to make an analysis on the basis of indicators. We test the knowledge and insights you have gained with a DGT exam (multiple choice and open questions). As an exam assignment (fact sheet), you unravel the dynamics of one of these soil-water tasks (of your own choice). You present and discuss your first findings with your fellow students in one of the online feedback sessions. On the basis of the feedback received, you produce your final, society-oriented fact sheet as the assignment to be assessed.

Learning objectives

After studying this course, you can, with support, contribute to mapping an environmental science issue and defining this problem more closely (diagnosis competence). You can also, with support, contribute to investigating an environmental issue from a natural science angle and to reporting on it to the environmental professional field (research competence). In addition, you have gained insight into the coherence between the various subsystems (in particular soil, surface water and groundwater) and, in particular, the way in which they interact. You are therefore able to describe and explain a natural science phenomenon in the soil-water system, and to indicate the impact on society of activities in this system.

NB2002 - Systems analysis, models and scenarios

Dutch name: Systeemanalyse, modellen en scenario's **Type:** Standard product **Language:** Dutch **ECTS:** 5
Price: € 410.00

In this English-language course, Environmental Systems Analysis and Scenarios, you learn how various examples of natural systems can be converted into mathematical models, and how you can analyse this with the computer program Stella. For example, you learn to model how to obtain a maximum fish catch while still maintaining a sustainable balance of the fish population. While working on models, you gain, for example, more insight into how feedbacks work between different subsystems in the environment, such as the soil-water system. As examples, we analyse (i) how to obtain a maximum fish catch while still maintaining a sustainable balance of the fish population by using the exponential and logistic growth equation, (ii) how alien substances spread in lakes and how chemical reactions influence this, and (iii) how interactions and feedbacks play a role in numerous systems such as a predator-prey or competition model. In the last part of the course, you learn the meaning of scenarios in the mathematical modelling of environmental systems. You learn to formulate simple scenarios for future environmental projections. As a final assignment, you apply the competences you have gained by developing a model with scenarios yourself.

Learning objectives

After completing this course, you can:

- explain and apply, at a basic level, systems analysis to analyse environmental issues and to put forward solution strategies;
- formulate mathematical models in order to model real systems;
- analyse mathematical models by means of computer simulations;
- understand the role of scenarios within the environmental sciences and develop alternative scenarios.

NB2122 - Geographical Information Systems (GIS)

Type: Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 410.00

With the rise of platforms such as Google Maps, the use of digital maps and satellite images has become part of daily life for many people. But within environmental science research too, using and analysing geographical images through geographic information systems (GIS) offers countless possibilities. For example, from behind our desk we can gain insight into the spread of plastic pollution in rivers, the link between living environment and health, and the effects of rainfall on the behavioural patterns of elephants. GIS is an instrument (often a software package) used for managing geographical data, analysing spatial components and making clear digital maps to share this knowledge with others. In many social issues, the spatial component plays an important role. GIS is therefore used for numerous applications and in a wide range of social sectors. This English-language course gives, through examples and exercises, a broad introduction to the concepts of spatial analysis and GIS. In addition to theory, there are exercises and case studies in which you learn to analyse spatial data with the computer program QGIS.

Learning objectives

After studying this course, you can:

- explain the main principles and basic concepts of geographic information systems;
- organise spatial data from various sources, including remote sensing;
- indicate the difference between various spatial interpolation and estimation methods;
- translate an issue into a series of operations by means of a flowchart and carry out the analysis using QGIS;
- present results visually on an informative map;

- apply acquired knowledge and skills in a case in the field of environmental sciences.

NB2612 - Analysing Big Data for Dynamic Systems: an introduction to R

Type: Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 410.00

In recent years, we as a society have made incredible leaps in collecting and analysing data, some even call this the Big Data era. This development has led to new opportunities in studying the dynamic interactions between humans and the environment. Examples are vegetation patterns in tropical rainforests, the behaviour of plastic particles in the environment and the analysis of energy networks. To make good use of these opportunities, it is important that researchers can work with specific tools to manage and analyse that big data. One of those tools is R. R is currently one of the most popular computer languages for analysing data. The program was originally developed for statistical purposes, but can also be used as a programming language and for data visualisation (graphics). At first R was mainly used by statisticians and data miners, but nowadays more and more scientists, such as biologists, psychologists and environmental scientists, have found their way to it. In this course, you learn how to use the R language efficiently for managing, analysing and visualising large quantities of environmental data. Since it is impossible to study all aspects of R in this 5 EC course, we also teach you how to acquire new R skills yourself. This course is suitable for students who have relatively little knowledge and experience in the field of data management and programming, but do have some affinity for it. The course consists of 8 learning units, two individual project assignments and a written exam. The learning units successively cover the following subjects:

1. The Basics I: R interface, simple operations, assigning objects, vector and matrix operations, writing scripts;

2. The Basics II: data types, data structures, extracting and replacing elements;

3. Data Management I: workspace, working directory, loading data, writing out, cleaning and merging;

4. Data Management II: subsets, sequences, sorting, conditional constructions;

5. Data Analysis: summary statistics, cross tabulations, distributions, outliers;

6. Plotting: making graphs and charts, adjusting colour and text, layout, saving;

7. Iteration: repeating code in loops, errors in loops, functions of the Apply Family;

8. Outlook: working with R packages, tracking down errors, finding help.

The learning units consist of a combination of texts, processing questions and knowledge clips. Learning units 3 to 7 are concluded with a number of practice assignments. After the learning units follow two integral project assignments that cover all of the subject matter. The first assignment is for practice; the second assignment is part of the exam. The course is concluded with a digital group exam.

Learning objectives

After completing this course, you can:

- use the R programming language in a [...]

NB2712 - Environment and economics

Dutch name: Milieu en economie **Type:** Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 410.00

The course Environment and Economics offers students insight into the complexity of environmental problems from both an economic and an ethical perspective. During this course, students investigate the causes of environmental problems, with an emphasis on the concept of collective action, in which the theories of Hardin and Ostrom are central. Students learn how environmental problems can be controlled by

means of economic theories and policy instruments such as subsidies, prohibitions and market solutions such as cap-and-trade and Pigouvian taxes. In the second half of the course, the focus shifts to ecological economics and alternative views of economic growth. Students are challenged to think about alternative indicators of prosperity, such as the ecological footprint and broad prosperity, and the relationship between the environment and social justice. New models such as the circular economy and the doughnut model are discussed, as well as the role of companies in a sustainable society. The course emphasises the need to reflect on the values that drive sustainability, such as the ethical dimensions of the environment and the role of companies in corporate social responsibility (CSR). Students investigate themes such as business ethics, ESG reporting and the importance of transparency and accountability in business operations. Through interactive assignments, such as group discussions, case studies and a statements game, students are encouraged to think critically about the challenges and possibilities of sustainability in an economic context.

Learning objectives

The aim of this course is to introduce you to the interaction between the economy, economic science and the living environment. After studying this course, you can:

- understand the collective-action structure of environmental problems;
- name and discuss economic instruments for environmental management;
- name and explain economic and alternative models of growth;
- reflect critically on economic assumptions;
- apply ethical principles to environmental issues within the economy;
- explain the role of companies in the field of sustainability;
- reflect on the role of values in a sustainable economy.

NB2812 - Citizen initiatives and sustainability

Dutch name: Burgerinitiatieven en duurzaamheid **Type:** Standard product **Language:** Dutch **ECTS:** 5
Price: € 410.00

The course Citizen initiatives and sustainability gives an overview of citizen initiatives in the field of sustainability and of the different forms in which citizens participate in governance and policy with regard to the living environment. On the basis of concrete examples and academic literature, definitions and different forms of citizen initiative and participation are addressed. Attention is also paid to the underlying ideas about democracy and governance in relation to citizen involvement, views on sustainability and the role of citizens, and the impact of citizen involvement on sustainability. You also get to work on a reflection on the role of citizen initiatives and participation in democracy, governance and policy, and at the end of the course you are given the assignment to set up a plan for a concrete citizen initiative or a participation process that contributes to sustainability. The course is intended to give a broader insight into the possibilities, but also the limitations, of citizen initiatives and participation on the way to a more sustainable society. To that end, the material considers both the perspective of citizens and that of participation professionals who guide the dialogue with citizens about sustainability.

Learning objectives

After completing the course, you can:

- indicate what role citizen initiatives can play in achieving the Sustainable Development Goals;
- explain what citizen initiatives are and how they relate to the roles and responsibilities of other parties in environmental issues;
- explain the historical development of the relationship between citizens and the government;
- explain the formal frameworks and procedures for citizen initiatives and citizen participation in the Netherlands and Flanders;

- explain the different strategies of citizen initiatives;
- set up a global strategy yourself for a concrete citizen initiative or a participation process.

NB2902 - The sustainable city

Dutch name: De duurzame stad **Type:** Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 410.00

If we want to make our society more sustainable, this will have to happen above all in the city. After all, the vast majority of people live in cities, and economic activity is also concentrated in cities. Making the city more sustainable is a major challenge, though. At present, cities emit large quantities of greenhouse gases and consume large quantities of raw materials. The city is not well able to withstand extreme rainfall and heat, and in many places the air quality is poor. How can cities make the transition to renewable energy sources, a climate-resilient design, and reuse of materials? This course goes into the major urban sustainability transitions in the areas of energy, climate, mobility and circularity, and urban green space. There is ample attention to the nature of current sustainability problems and to possible solutions, but also to the goals of urban policy makers and the challenges in achieving them. The course is based on current data and recent insights into the course of urban sustainability transitions in the Netherlands and beyond.

Learning objectives

After studying the course, you can:

- define the key concepts in the field of urban sustainability;
- describe the course of sustainability transitions and explain which factors determine that course;
- explain which important sustainability issues cities are confronted with;
- list various solutions that cities can implement to become more sustainable;
- describe the policy frameworks and the challenges of policy implementation;
- analyse urban sustainability issues and transitions and, on that basis, give recommendations for policy and/or practice.

NB3002 - Health in perspective: nutrition and environment

Dutch name: Gezondheid in perspectief: voeding en milieu **Type:** Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 396.00

Ask any Dutch person what is most important in life and chances are that he or she will say: my health. Health is an interplay of a healthy body and feeling good in your skin mentally and socially. Health is determined, among other things, by behaviour (smoking, unhealthy diet, little exercise, alcohol use) and by physical living conditions (outdoor environment and indoor environment). The RIVM report (2018) Wat ligt er op ons bord? Veilig, gezond en duurzaam eten in Nederland (What is on our plate? Safe, healthy and sustainable eating in the Netherlands) states that most Dutch people are healthy and life expectancy is rising; that half of the Dutch have overweight; that 9 out of 10 people eat too few vegetables and fruit and almost 30 per cent of our food is of animal origin; that our diet leads not only to loss of health but also to a large burden on the environment; that every year we waste 47 kilograms of food per person; that food in the Netherlands is predominantly safe: about 1 in 24 people experiences a food infection every year, which is usually not serious; and that for most chemical substances in food the risk to public health is negligible. The course Health in perspective: nutrition and environment goes into the above subjects. In the course, as the title already indicates, human health is central and the focus is mainly on how nutrition and environment influence it. The course works according to the principles of activating academic distance education and consists of five study tasks: health, environment and health, healthy nutrition, safe nutrition and sustainable nutrition.

Learning objectives

After studying this course, you can:

- name and describe indicators and measures for various aspects of public health and disease;
- identify health determinants of public health, with an emphasis on unhealthy behaviour (unhealthy diet and little physical exercise) and physical environmental characteristics, such as environmental factors (air pollution, noise nuisance);
- name the relationship between health and the most important environmental factors;
- indicate what the effects of climate change are on human health;
- indicate the 'hazards of food' (nutrients, environmental contaminants, natural toxins, additives) for health;
- name the relationship between health and a number of factors related to nutrition;
- name the influence of nutrition on physical activity and the influence of physical activity on health;
- name the relationship between health and sustainable nutrition;
- use information from reliable (Dutch) information sites (RIVM, VTV, Voedingscentrum, Gezondheidsraad) when studying subjects from this course;
- relate media reporting on nutrition/environment and health to available academic information.

NB5001 - Open education Bachelor's Environmental Natural Sciences

Dutch name: Open onderwijs BSc Milieu-natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 2.5 **Price:** € 205.00

Content and supervision are to be determined individually and approved by the Examination Board for Natural Sciences.

NB5002 - Open education Bachelor's Environmental Natural Sciences

Dutch name: Open onderwijs BSc Milieu-natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 5 **Price:** € 410.00

Content and supervision are to be determined individually and approved by the Examination Board for Natural Sciences.

NB5004 - Open education Bachelor's Environmental Natural Sciences

Dutch name: Open onderwijs BSc Milieu-natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 10 **Price:** € 820.00

Content and supervision are to be determined individually and approved by the Examination Board for Science (Examenkamer Bètawetenschappen).

NB950J - Capita selecta Bachelor's Environmental Natural Sciences

Dutch name: Capita Selecta BSc Milieu- natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 3.0 **Price:** € 246.00

Content and supervision are to be determined individually and approved by the Examination Board for Natural Sciences.

NB950K - Capita selecta Bachelor's Environmental Natural Sciences

Dutch name: Capita Selecta BSc Milieu- natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 2.3 **Price:** € 191.26

Content and supervision are to be determined individually and approved by the Examination Board for Natural Sciences.

NB950L - Capita selecta Bachelor's Environmental Natural Sciences

Dutch name: Capita Selecta BSc Milieu-natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 1.2 **Price:** € 95.74

Content and supervision are to be determined individually and approved by the Examination Board for Natural Sciences.

NB950M - Capita selecta Bachelor's Environmental Natural Sciences

Dutch name: Capita Selecta BSc Milieu-natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 1.8 **Price:** € 150.26

Content and supervision are to be determined individually and approved by the Examination Board for Natural Sciences.

NB950N - Capita selecta Bachelor's Environmental Natural Sciences

Dutch name: Capita Selecta BSc Milieu-natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 0.3 **Price:** € 27.26

Content and supervision are to be determined individually and approved by the Examination Board for Natural Sciences.

NB950O - Capita selecta Bachelor's Environmental Natural Sciences

Dutch name: Capita Selecta BSc Milieu-natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 2.8 **Price:** € 232.26

Content and supervision are to be determined individually and approved by the Examination Board for Natural Sciences.

NB950P - Capita selecta Bachelor's Environmental Natural Sciences

Dutch name: Capita Selecta BSc Milieu-natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 1.3 **Price:** € 109.26

Content and supervision are to be determined individually and approved by the Examination Board for Natural Sciences.

NB950Q - Capita selecta Bachelor's Environmental Natural Sciences

Dutch name: Capita Selecta BSc Milieu-natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 1.5 **Price:** € 123.00

Content and supervision are to be determined individually and approved by the Examination Board for Natural Sciences.

NB950R - Capita selecta Bachelor's Environmental Natural Sciences

Dutch name: Capita Selecta BSc Milieu-natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 2.4 **Price:** € 191.48

Content and supervision are to be determined individually and approved by the Examination Board for Natural Sciences.

NB950S - Capita selecta Bachelor's Environmental Natural Sciences

Dutch name: Capita Selecta BSc Milieu-natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 1.6 **Price:** € 136.52

Content and supervision are to be determined individually and approved by the Examination Board for Natural Sciences.

NB950T - Capita selecta Bachelor's Environmental Natural Sciences

Dutch name: Capita Selecta BSc Milieu- natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 0.7 **Price:** € 54.74

Content and supervision are to be determined individually and approved by the Examination Board for Natural Sciences.

NB950U - Capita selecta Bachelor's Environmental Natural Sciences

Dutch name: Capita Selecta BSc Milieu- natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 3.6 **Price:** € 300.52

Content and supervision are to be determined individually and approved by the Examination Board for Natural Sciences.

NB950V - Capita selecta Bachelor's Environmental Natural Sciences

Dutch name: Capita Selecta BSc Milieu- natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 1 **Price:** € 82.00

Where applicable, you can register for the capita selecta on the recommendation of the Examination Board for Natural Sciences. The content and supervision are determined individually.

NB950W - Capita selecta Bachelor's Environmental Natural Sciences

Dutch name: Capita Selecta BSc Milieu- natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 3.2 **Price:** € 259.74

Where applicable, you can register for the capita selecta on the recommendation of the Examination Board for Natural Sciences. The content and supervision are determined individually.

NB950X - Capita selecta Bachelor's Environmental Natural Sciences

Dutch name: Capita Selecta BSc Milieu-natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 2 **Price:** € 164.00

Where applicable, you can register for the capita selecta on the recommendation of the Examination Board for Natural Sciences. The content and supervision are determined individually.

NB950Y - Capita selecta Bachelor's Environmental Natural Sciences

Dutch name: Capita Selecta BSc Milieu-natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 1.4 **Price:** € 109.48

Where applicable, you can register for the capita selecta on the recommendation of the Examination Board for Natural Sciences. The content and supervision are determined individually.

NB950Z - Capita selecta Bachelor's Environmental Natural Sciences

Dutch name: Capita Selecta BSc Milieu- natuurwetenschappen **Type:** Standard product **Language:** Dutch
ECTS: 0.2 **Price:** € 13.74

Where applicable, you can register for the capita selecta on the recommendation of the Examination Board for Natural Sciences. The content and supervision are determined individually.

NB9804 - Research Approaches in Environmental Sciences

Type: Standard product **Language:** Dutch **ECTS:** 10 **Price:** € 820.00

The course enables you to acquire essential academic research competences for environmental scientists. After the course, you can characterise the main research approaches of the environmental sciences and related (sub)disciplines. The core of the course consists of the following 4 parts:

- the scientific approach in the environmental sciences;
- problem formulation and literature review;
- research design and research methods;
- academic reporting and reflection.

You learn to analyse environmental problems in different ways. The above parts are covered on the basis of a research topic. Several research topics are available from the faculty's environmental research domains, such as environmental natural sciences, environmental futures studies, environmental policy, and sustainable development.

Learning objectives

After studying this course, you can:

- contribute, with support, to mapping and defining more closely an environmental science problem (competence area: diagnosis);

- draw up, with support, a (Bachelor's) research proposal (competence area: research) and your academic environmental competences and academic skills are sufficiently developed for this;
- weigh up issues around academic integrity in a responsible way;
- organise a research proposal in a planned way (prepare, work out and complete);
- convey scientifically substantiated information, ideas and opinions to clients and colleagues (academic reporting);
- reflect on your own development in the field of research skills.

NB9906 - Virtual environmental consultancy 2: Bachelor's graduation research

Dutch name: Virtueel milieuadviesbureau 2: BSc Afstudeeronderzoek **Type:** Standard product **Language:** Dutch **ECTS:** 15 **Price:** € 1,230.00

This course forms the graduation research of the BSc programme in Environmental Natural Sciences. A characteristic of the Virtual environmental consultancy is that students work together in teams of about five students via the online learning environment to carry out the research assignment. The team receives this assignment from an external client selected by the OU. Per run there are several clients, so there are various assignments from which the student can state a preference at the start via an application. On the basis of preferences, we put the teams together in the first week: one team per client assignment. The course cannot be studied individually. Over one semester, you carry out the research with the team. Under the guidance of a project coach, you and the client together determine the research question. Each student gets to work on an individual sub-question for this research, resulting in their own work package report. As a team, you synthesise these individual results into an answer to the research question posed in an advisory report to the client. The examiner determines the final grade on an individual basis, on the basis of your individual results and your team results, assessed by the project coach/lecturer and the client. The Virtual environmental consultancy is a form of practice-oriented education in which students work together on real environmental assignments from clients in the environmental professional field. In the Virtual environmental consultancy InCompany Environmental Advice, students fulfil positions that closely resemble positions in the practice of the environmental professional field. Via an online working and learning environment, the lion's share of the work can be done from home. The essence of the consultancy is that working and learning are made into one activity. It is also essential that this is done largely jointly, in teams. Working in the company is aimed at the student acquiring all kinds of competences. Knowledge acquisition is thus not an end in itself, but only a means to acquiring competences. Individual agreements are made with each student about learning and working in the company; this records which individual competences you want to focus on. Such a performance can be, for example, 'leading a project', 'writing a (partial) report for an external client', 'making model calculations for a project' or 'giving a presentation on project progress'. How you work in a targeted way on acquiring these agreed personal learning goals is part of your assessment. The graduation assignment of the Bachelor's programme in Environmental Natural Sciences is an integral part of the Virtual environmental consultancy; you carry out this Bachelor's graduation research as an individual work package within the environmental assignment that you report on as a team to the external client. The final assessment is based on individual [...]

NC0510 - CPC Certified Professional Course Statistics and Big Data

Dutch name: CPC Certified Professional Course Statistiek en Big Data **Type:** Standard product **Language:** Dutch **ECTS:** 1 **Price:** € 595.00

In this game, you experience for yourself what impact different sectors have in the current economic situation, but also what is needed to bring the world back into balance. The game represents the complexity of the sustainability transition. This game is played during a one-day meeting.

In this 5-hour serious game for 14 to 22 players, you experience in 4 rounds of play the effects of the transition to a sustainable society. As a player, you are challenged to bring the world back into balance from the perspectives of different stakeholders (government, financiers, the energy, food or construction sector). A balance between economic growth and acting within our planetary boundaries. In Conquest for Paradise, you have to lobby, consult, cooperate, make deals and keep the bigger picture in mind. Together with the other players, you have the potential to make a difference, but can their individual interests be reconciled with the common goal? By playing this game:

- you learn what impact different sectors have on climate change;
- you experience the complexity of this systemic issue;
- you gain insight into the behaviour, the strategic choices and the business models needed to realise the transition;
- you experience the effects of your own actions on the transition;
- a shared perspective and shared support emerge for the multi-year challenge we face.

This game is held on location (Brightlands Smart Services Campus (5th floor), Smedestraat 2, 6411 CR Heerlen). After the game, you complete a reflection assignment within yOUlearn, the OU's learning environment.

NC0610 - Introduction to Anthrozoology

Type: Simple product **Language:** English **ECTS:** 0.2 **Price:** € 0.00

Content The course offers theoretical video lectures spiced up with real examples from the project pilot sites. For enthusiastic and advanced learners, the course provides additional reading materials, developed within the project. The course participants can accomplish assignments to check their understanding of the materials. To share ideas and thoughts, a discussion group is available for the participants. What will you learn in this training? The 5GDHC course offers the opportunity to gain exclusive knowledge and experience about 5GDHC from experts involved in implementing innovative district heating and cooling. In this course you will learn about 5GDHC principles, key performance indicators, advantages and disadvantages of the technology, differences of 5GDHC from other generations of district heating (and cooling), environmental aspects and possibilities of upgrading existing heating and cooling networks.

Description The course consists of eight sections on different 5GDHC topics. The first section starts with explanation why do we need 5GDHC and why 5GDHC is important. The second and third sections present how the 5GDHC works and what key principles it uses. You will learn about differences of 5GDHC from other district heating (cooling) systems in the fourth section. One of the most important topics, the key performance indicators of 5GDHC, is presented in section five. The advantages and disadvantages of the technology are described in section six. Section seven touches the environment aspects of 5GDHC. The final section eight concludes with possibilities of upgrading the existing networks.

NC0710 - Introduction to Anthrozoology

Type: Simple product **Language:** English **ECTS:** 0.2 **Price:** € 0.00

Content The course offers theoretical video lectures spiced up with real examples from the project pilot sites. For enthusiastic and advanced learners, the course provides additional reading materials, developed within the project. The course participants can accomplish assignments to check their understanding of the materials. To share ideas and thoughts, a discussion group is available for the participants. What will you learn in this training? In this course you will learn about technological aspects of 5GDHC. This course will take you through the main 5GDHC components, including the sources, thermal storages, drilling aspects, heat pumps, pipes and smart controllers that can be used in 5GDHC.

Description The course consists of seven sections on different 5GDHC topics. The first section starts with an overview of the main 5GDHC technology components. The second section presents heat/cold sources and their use in 5GDHC. The third section describes different types of thermal storages. You will learn about heat pumps and their use in 5GDHC in the fourth section. Topics about pipes and their networks are presented in section five. Demand side management and smart controllers are described in section six. The last section presents information about drilling aspects in 5GDHC networks.

NC0910 - Introduction to Anthrozoology

Type: Simple product **Language:** English **ECTS:** 0.1 **Price:** € 0.00

Description The whole course consists of three "modules" with different levels of difficulty. The Modules can be taken progressively or independently. For example, if you are already familiar with the concept of Blockchain and would like to dive deeper into its applications for energy trading, you could skip Module 1 and start with Module 2 or 3, depending on your interests. We recommend starting with Module 1 and completing the entire course. Module 1: Energy trading through blockchain technology: on your way to become a prosumer Module 2: Enterprise and energy trading through blockchain technology: vision and practical guide Module 3: The developers' essentials on energy trading through blockchain technology Content The course offers theoretical video lectures spiced up with real examples from the project pilot sites. For enthusiastic and advanced learners, the course provides additional reading materials, developed within the project. The course participants can accomplish assignments to check their understanding of the materials. To share ideas and thoughts, a discussion group is available for the participants. What will you learn in this course? This course consists of three independent modules. This is the first module, and it aims to provide a clear introduction to blockchain and its application to energy trading. It consists of four video lectures:1. Blockchain for beginners2. Blockchain technology advanced level3. How to become a prosumer4. Energy sharing and interaction of heat-power market

NC1010 - Introduction to Anthrozoology

Type: Simple product **Language:** English **ECTS:** 0.1 **Price:** € 0.00

Description The whole course consists of three "modules" with different levels of difficulty. The Modules can be taken progressively or independently. For example, if you are already familiar with the concept of Blockchain and would like to dive deeper into its applications for energy trading, you could skip Module 1 and start with Module 2 or 3, depending on your interests. We recommend starting with Module 1 and completing the entire course. Module 1: Energy trading through blockchain technology: on your way to become a prosumer Module 2: Enterprise and energy trading through blockchain technology: vision and practical guide Module 3: The developers' essentials on energy trading through blockchain technology Content The course offers theoretical video lectures spiced up with real examples from the project pilot sites. For enthusiastic and advanced learners, the course provides additional reading materials, developed within the project. The course participants can accomplish assignments to check their understanding of the materials. To share ideas and thoughts, a discussion group is available for the participants. What will you learn in this course? This second module aims to provide a deeper insight to blockchain and its application to energy sharing and trading. It consists of four lectures: European Energy Markets , Inside in the Euregio Meuse-Rhine KPIs for Energy Sharing Community Optimal renovation combined with energy sharing Setting up your own Blockchain exemplary with the BC4P Chain for P2P energy trading

NC1110 - Introduction to Anthrozoology

Type: Simple product **Language:** English **ECTS:** 0.1 **Price:** € 0.00

Description The whole course consists of three "modules" with different levels of difficulty. The Modules can be taken progressively or independently. For example, if you are already familiar with the concept of Blockchain and would like to dive deeper into its applications for energy trading, you could skip Module 1 and start with Module 2 or 3, depending on your interests. We recommend starting with Module 1 and completing the entire course. Module 1: Energy trading through blockchain technology: on your way to become a prosumer Module 2: Enterprise and energy trading through blockchain technology: vision and practical guide Module 3: The developers' essentials on energy trading through blockchain technology Content The course offers theoretical video lectures spiced up with real examples from the project pilot sites. For enthusiastic and advanced learners, the course provides additional reading materials, developed within the project. The course participants can accomplish assignments to check their understanding of the materials. To share ideas and thoughts, a discussion group is available for the participants. What will you learn in this course? This course is ideal for those who would like: To learn about smart contracts, their structure and content; To explore blockchain fundamentals, including Byzantine generals problem and Public Private Cryptography; To find out what is Self Sovereign Identity with examples from BC4P project; To learn about different consensus mechanisms, like proof-of-stake and proof-of-work, and their difference in energy consumption;

NM0001 - Open module (small) Master's Environmental Sciences

Dutch name: Open Module (small) MSc Environmental Sciences **Type:** Standard product **Language:** Dutch
ECTS: 2.5 **Price:** € 205.00

Where applicable, you can, after approval by the Examination Board for Science (Examenkamer Bètawetenschappen), register for an open education course. Its content and supervision are determined on an individual basis.

NM0004 - Open modules Master's Environmental Sciences

Dutch name: Open Modules MSc Environmental Sciences **Type:** Standard product **Language:** Dutch
ECTS: 10 **Price:** € 820.00

Where applicable, you can, after approval by the Examination Board for Science (Examenkamer Bètawetenschappen), register for an open education course. Its content and supervision are determined on an individual basis.

NM000O - Open education Master's Environmental Sciences

Dutch name: Open Onderwijs MSc Environmental Sciences **Type:** Standard product **Language:** Dutch
ECTS: 3 **Price:** € 246.00

Where applicable, you can, after approval by the Examination Board for Science (Examenkamer Bètawetenschappen), register for an open education course. Its content and supervision are determined on an individual basis.

NM000P - Open education Master's Environmental Sciences

Dutch name: Open Onderwijs MSc Environmental Sciences **Type:** Standard product **Language:** Dutch
ECTS: 2 **Price:** € 164.00

Where applicable, you can, after approval by the Examination Board for Science (Examenkamer Bètawetenschappen), register for an open education course. Its content and supervision are determined on an individual basis.

NM000Q - Open module Master's Environmental Sciences

Dutch name: Open module MSc Environmental Sciences **Type:** Standard product **Language:** Dutch
ECTS: 1.2 **Price:** € 93.48

Where applicable, you can, after approval by the Examination Board for Science (Examenkamer Bètawetenschappen), register for an open education course. Its content and supervision are determined on an individual basis.

NM000R - Open module Master's Environmental Sciences

Dutch name: Open module MSc Environmental Sciences **Type:** Standard product **Language:** Dutch
ECTS: 1.5 **Price:** € 123.00

Where applicable, you can, after approval by the Examination Board for Science (Examenkamer Bètawetenschappen), register for an open education course. Its content and supervision are determined on an individual basis.

NM000S - Open module Master's Environmental Sciences

Dutch name: Open module MSc Environmental Sciences **Type:** Standard product **Language:** Dutch
ECTS: 2.7 **Price:** € 216.48

Where applicable, you can, after approval by the Examination Board for Science (Examenkamer Bètawetenschappen), register for an open education course. Its content and supervision are determined on an individual basis.

NM000T - Open module Master's Environmental Sciences

Dutch name: Open module MSc Environmental Sciences **Type:** Standard product **Language:** Dutch
ECTS: 1.3 **Price:** € 111.52

Where applicable, you can, after approval by the Examination Board for Science (Examenkamer Bètawetenschappen), register for an open education course. Its content and supervision are determined on an individual basis.

NM000U - Open module

Type: Standard product **Language:** Dutch **ECTS:** 1 **Price:** € 82.00

Where applicable, you can, after approval by the Examination Board for Science (Examenkamer Bètawetenschappen), register for an open education course. Its content and supervision are determined on an individual basis.

NM000V - Open module

Type: Standard product **Language:** Dutch **ECTS:** 0.7 **Price:** € 52.48

Where applicable, you can, after approval by the Examination Board for Science (Examenkamer Bètawetenschappen), register for an open education course. Its content and supervision are determined on an individual basis.

NM000W - Open module

Type: Standard product **Language:** Dutch **ECTS:** 1.4 **Price:** € 104.96

Where applicable, you can, after approval by the Examination Board for Science (Examenkamer Bètawetenschappen), register for an open education course. Its content and supervision are determined on an individual basis.

NM000X - Open module

Type: Standard product **Language:** Dutch **ECTS:** 2.1 **Price:** € 182.04

Where applicable, you can, after approval by the Examination Board for Science (Examenkamer Bètawetenschappen), register for an open education course. Its content and supervision are determined on an individual basis.

NM000Y - Open module

Type: Standard product **Language:** Dutch **ECTS:** 2.8 **Price:** € 234.52

Where applicable, you can, after approval by the Examination Board for Science (Examenkamer Bètawetenschappen), register for an open education course. Its content and supervision are determined on an individual basis.

NM000Z - Open module

Type: Standard product **Language:** Dutch **ECTS:** 3.5 **Price:** € 287.00

Where applicable, you can, after approval by the Examination Board for Science (Examenkamer Bètawetenschappen), register for an open education course. Its content and supervision are determined on an individual basis.

NM0103 - Environmental problems: crossing boundaries between science, policy and society

Type: Standard product **Language:** Dutch **ECTS:** 7.5 **Price:** € 594.00

This course investigates the role of science within decision-making about the environment and nature. Most environmental issues can only be problematised with the help of the natural sciences. Environmental policy must therefore have a scientific basis, but there is more than one science. Different disciplines have different ways of ‘knowing’. They may disagree about the definition of the problem, the seriousness of the problem and the necessary interventions. Moreover, there is often scientific uncertainty. Such uncertainties must be communicated to policy makers and the wider public without making risks too large or too small. The course offers theories and concepts that help to better understand the role of science within policy and society. It investigates what science actually is and how science acquires authority in the knowledge domain. We look at

which options there are for collaborating with different scientific disciplines and how we can integrate knowledge by means of participatory processes. Finally, we also look at possible negative aspects of such 'multivocality'. Throughout the course, theoretical concepts are applied to concrete cases. In the final assignment of the course, you can apply the concepts you have learned to a case of your own choice.

Learning objectives

After completing the course, you can:

- recognise the demarcating character with which science distinguishes itself from other, non-scientific knowledge, and the way in which science maintains its authority;
- explain what 'framing' is (and how facts and values are intertwined in 'frames') and use 'frames' as an analysis tool in case studies;
- describe what the linear model of the interaction between science and policy is, distinguish the linear model from the 'information deficit model' and evaluate the analytical value of both models;
- recognise and describe the three types of knowledge uncertainty, incomplete knowledge, unpredictability and ambiguity;
- evaluate and apply different strategies for dealing with scientific uncertainties;
- name the different strategies for developing 'usable' knowledge for decision-making, namely knowledge that is credible, relevant and legitimate;
- explain and apply different strategies of interdisciplinary knowledge integration of different scientific viewpoints;
- explain what the advantages and limitations are of the different instruments of participatory (lay) knowledge production and make a considered choice within a specific case;
- define and recognise the different roles that environmental experts can take in the decision-making process, and reflect critically on your own role as an expert;
- explain what the different ways are to democratise knowledge production in the environmental domain [...]

NM0113 - Environmental Issues: Crossing Boundaries between Science, Policy and Society

Type: Standard product **Language:** Dutch **ECTS:** 7.5 **Price:** € 615.00

This course investigates the role of science within decision-making about the environment and nature. Most environmental issues can only be problematised with the help of the natural sciences. Environmental policy must therefore have a scientific basis, but there is more than one science. Different disciplines have different ways of 'knowing'. They may disagree about the definition of the problem, the seriousness of the problem and the necessary interventions. Moreover, there is often scientific uncertainty. Such uncertainties must be communicated to policy makers and the wider public without making risks too large or too small. The course offers theories and concepts that help to better understand the role of science within policy and society. It investigates what science actually is and how science acquires authority in the knowledge domain. We look at which options there are for collaborating with different scientific disciplines and how we can integrate knowledge by means of participatory processes. Finally, we also look at possible negative aspects of such 'multivocality'. Throughout the course, students work together in groups to apply theoretical concepts to a chosen case. Weekly group assignments together make up the final assignment. In addition, at the end of the course there is reflection on the relevance of these concepts in the role of environmental expert.

Learning objectives

After completing the course, you can:

- describe an environmental controversy, including a timeline and actors involved;

- analyse how an environmental controversy is 'framed' by different actors involved;
- evaluate which values, facts and uncertainties play a role in an environmental controversy;
- reflect on the relevance of integrating different types of knowledge in an environmental controversy, including lay knowledge and inter- and transdisciplinary ways of working;
- collaborate with others to develop new knowledge;
- give and receive feedback to improve your own work;
- reflect on your own role as an environmental expert;
- formulate advice on how different types of knowledge can best be integrated in an environmental controversy.

NM0203 - Environmental governance in times of global change

Type: Standard product **Language:** Dutch **ECTS:** 7.5 **Price:** € 615.00

Making society more sustainable and tackling all kinds of environmental and sustainability issues requires coordination, organisation and steering. The term 'environmental governance' refers to the whole of practices with which society gives direction to environmental and sustainability issues and to the academic field that has these practices as its object of study. Governments often have a central role in environmental governance, but companies, civil society organisations, citizens and interest groups are also important parties. The course Environmental Governance in Times of Global Change gives you a current overview of the most important policy developments in the field of the environment and sustainability and a sound theoretical basis for the analysis of those developments. This course pays attention, for example, to the role of the European Union in the field of the environment and sustainability and to the influence of international environmental agreements, such as the Paris Agreement (2015), which falls under the UN Framework Convention on Climate Change. The following questions are covered in this course: What does environmental and sustainability policy look like now? Which important policy developments determine what is going to happen in the coming years? Who has which role? Which theoretical perspectives and concepts are there to investigate the above? In addition, in this course you learn to reflect critically on future policy challenges.

Learning objectives

After studying this course, you can:

- explain the most important theoretical concepts and frameworks in the field of international, national and local environmental policy;
- analyse specific policy areas such as climate change and biodiversity from an environmental governance perspective;
- recognise and name trends and developments in environmental governance;
- independently apply the academic knowledge and insights from the course in an academically sound way;
- reflect critically on the relationship between international, national and local environmental policy and on future challenges;
- independently process the academic knowledge and insights from the course into a concept map, a timeline and a paper.

NM0403 - Environmental Health Sciences

Type: Standard product **Language:** Dutch **ECTS:** 7.5 **Price:** € 615.00

In the course Environmental Health Sciences, the central theme is the relationship between the living environment and human health. Numerous factors to which people are exposed via the environment can potentially influence the health or well-being of the individual. In the course, students learn to identify health

risks in the living environment. Subjects such as exposure, determining health effects and health-based guideline values are addressed. In addition to assessing the risks, there is also attention to communicating and arguing advice. The student must bring together and critically assess relevant information, think in a problem-solving way, indicate consequences of solutions and report on the findings in writing and orally. The case material covered gives a broad picture of the field and includes aspects of toxicology, epidemiology and health risk analysis.

Learning objectives

After studying the course:

- you can identify and quantify the various existing and emerging health risks in the living environment;
- you are familiar with the effects on human health as a result of exposure to risk factors in the environment;
- you are aware of differences in exposure and in sensitivity of certain groups;
- you can assess whether a certain dose/concentration is a risk to health or not, taking into account the limitations of the methods;
- you can name steps to limit the risk;
- you are able to assess the academic literature critically;
- you can formulate advice to those concerned and/or policy makers;
- you can communicate about health risks to a broad public;
- you can report on this in writing and orally.

NM0503 - Open education Master's Environmental Sciences

Dutch name: Open Onderwijs MSc Environmental Sciences **Type:** Standard product **Language:** Dutch
ECTS: 7.5 **Price:** € 615.00

Where applicable, you can, after approval by the Examination Board for Science (Examenkamer Bètawetenschappen), register for an open education course. Its content and supervision are determined on an individual basis.

NM0602 - Open module Master's Environmental Sciences

Dutch name: Open Module MSc Environmental Sciences **Type:** Standard product **Language:** Dutch
ECTS: 5 **Price:** € 410.00

Where applicable, you can, after approval by the Examination Board for Science (Examenkamer Bètawetenschappen), register for an open education course. Its content and supervision are determined on an individual basis.

NM0703 - Research proposal Master's Environmental Sciences

Dutch name: Research Proposal MSc Environmental Sciences **Type:** Standard product **Language:** Dutch
ECTS: 7.5 **Price:** € 615.00

The course Research Proposal MSc Environmental Sciences guides you in a targeted way in writing a research proposal in the environmental science domain. You investigate an environmental issue in the context of sustainable development and choose a subject that fits your personal background. The programme focuses in particular on subjects with a natural science, policy or health emphasis. The course consists of six chapters, namely in succession:

1. Quality criteria for a research proposal

2. The preliminary research proposal

3. The extended literature review

4. The research method

5. The planning

6. The final research proposal

In the six chapters of this course, you work out the research idea further into a concrete research proposal that comprises the first three chapters of a Master's thesis, namely the theoretical framework, the problem statement with the research questions and the method (including planning). During this course, you give two oral presentations, one at the start on the research idea and one at the end on the (draft) research proposal. Your research proposal is assessed on the following aspects: theoretical framework, problem statement, research questions, methods and techniques, social relevance, academic reporting, and planning and organising. Sufficient completion of this course is a condition for being admitted to the second part of the graduation track: the Thesis MSc Environmental Sciences.

Learning objectives

After studying the course, you can:

- write a research proposal consisting of a problem statement, research questions, the theoretical framework, methods and techniques and a planning;
- place your own research in current environmental science developments and indicate directions for solutions for the environmental problem to be investigated.

NM0712 - Research proposal Master's Environmental Sciences

Dutch name: Research Proposal MSc ES **Type:** Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 410.00

Registering for this course is only possible under certain conditions. For more information, contact the study advisers via studieadvies.natuur@ou.nl. The course Research Proposal MSc Environmental Sciences guides you in a targeted way in writing a research proposal in the environmental science domain. You investigate an environmental issue in the context of sustainable development and choose a subject that fits your personal background. The programme focuses in particular on subjects with a natural science, policy or health emphasis. The course consists of six chapters, namely in succession:

1. Quality criteria for a research proposal

2. The research proposal

3. The extended literature review

4. The research method

5. The planning

6. The final research proposal

In the six chapters of this course, you work out the research idea further into a concrete research proposal that comprises the first three chapters of the Master's thesis, namely the theoretical framework, the problem statement with the research questions and the method (including planning). During this course, you give two oral presentations, one on the research idea and one on the draft research proposal. Your research proposal is assessed on the following aspects: theoretical framework, problem statement, research questions, methods and techniques, social relevance, academic reporting, and planning and organising. Sufficient completion of

this course is a condition for being admitted to the second part of the graduation track: the Thesis MSc Environmental Sciences.

Learning objectives

After studying the course, you can:

- write a research proposal consisting of a problem statement, research questions, the theoretical framework, methods and techniques and a planning;
- place your own research in current environmental science developments and indicate directions for solutions for the environmental problem to be investigated.

NM0802 - Scientific and Professional Publishing on Environment and Sustainability

Type: Standard product **Language:** Dutch **ECTS:** 5 **Price:** € 410.00

In the course, you go through the whole publication process step by step. In doing so, you take on different roles: author, reviewer and editor. In this way, you experience how the publication process works. You write, receive comments from (anonymous) reviewers, comment on an article by another author and rewrite your own work. Lecturers and the research supervisor offer guidance and feedback during the process. At the end of the course, you have two articles, an academic article and a professional publication, that are ready for publication. That offers you a unique opportunity to show your research work to a broad audience. The course is concluded with an individual assignment in the context of your personal development and career orientation. In a report, you reflect on your writing skills and indicate what you want to do after completing the Master's programme and how you want to realise those ambitions.

Learning objectives

After completing the course Scientific and Professional Publishing on Environment and Sustainability, you have knowledge of the various aspects involved in writing and publishing an article and you can:

- write an outline and an abstract of an article;
- edit and review an article by another student;
- write a professional and academic article according to the guidelines of a journal.

NM0903 - The Science of Environmental Change

Type: Standard product **Language:** Dutch **ECTS:** 7.5 **Price:** € 615.00

In this course, you study the environmental challenges of modern times and become acquainted with the innovative skills needed to tackle them. Lectures and practical classes are seamlessly combined with problem-based learning, which encourages a holistic approach to tackling environmental changes. By combining theoretical knowledge with practical problem solving, at the end of the course you are able to take on the complicated challenges of environmental changes. Through interdisciplinary collaboration, critical thinking and effective communication, this course ensures that you are ready to make an important contribution to environmental science. In addition, you learn to understand the fundamentals of environmental change and to recognise the relationship between environmental systems. You also study the consequences of changes, analyse complex environmental interactions with a critical eye and apply scientific methods to monitor and study environmental changes. Moreover, you think about your personal and societal role in advocating for sustainability and environmental conservation, while contributing to positive change. The course is structured on the basis of the DPSIR framework (Driving Forces, Pressures, State, Impacts, and Responses) and offers an extensive exploration of environmental changes. From understanding the dynamics that underlie change to determining its impact on ecosystems and society.

Learning objectives

After studying this course, you can:

- explain the basic concepts around environmental changes, which include both natural processes and human activities;
- analyse and recognise the interconnectedness of environmental systems, including ecosystems, climate, biodiversity and human societies;
- explain the effects of environmental changes on a global and local scale, addressing issues such as climate change, pollution, loss of biodiversity and depletion of resources;
- apply critical thinking to assess the complex interactions between natural processes and human interventions and to predict possible consequences of environmental changes;
- explore and apply scientific methods, including data collection, analysis, modelling and interpretation, to monitor and study environmental changes;
- consider personal and societal roles in promoting sustainable practices, advocating for environmental conservation and contributing to positive change.

NM1003 - Sustainability transitions

Dutch name: Duurzaamheidstransities **Type:** Standard product **Language:** Dutch **ECTS:** 7.5 **Price:** € 615.00

Today's society faces numerous major challenges in the area of sustainability and the environment. Structural changes in patterns of production and consumption are needed to tackle problems such as climate change, the loss of biodiversity and pollution by PFAS, pesticides and plastics effectively. At all levels, from local to national and international, thought is being given to ambitions, goals and measures that can be taken to tackle problems and make our society more sustainable. In that field, terms such as sustainability transitions, societal transformations, climate adaptation, energy transition, food transition and circular economy are key. Governments play a major role in shaping and facilitating that societal change, but do so in interplay with numerous other parties, including companies, research and education institutions, civil society organisations and citizens. Transition policy focuses on driving innovation, stimulating sustainable initiatives and safeguarding the fairness of change processes. In this course, you gain insight into the main challenges, the main policy frameworks and the various practices of sustainability transitions. Theory and practice are worked out in coherence. Attention is paid to the various factors that play a role in sustainability transitions, and you learn, on the basis of a sound analysis, to arrive at a promising strategy for sustainability transitions.

Learning objectives

After completing this course, you can:

- map out the necessity and challenges of sustainability transitions;
- apply the relevant terminology and describe and explain the connection between different concepts;
- describe and apply the theoretical concepts for interpreting and analysing sustainability transitions;
- develop a global strategy for stimulating, organising or facilitating sustainability transitions;
- reflect critically on current developments around sustainability transitions and put forward a well-founded perspective of your own on them.

NM9903 - Research Methods in Environmental Sciences

Type: Standard product **Language:** Dutch **ECTS:** 7.5 **Price:** € 615.00

This course focuses on learning methods for data collection and data analysis and offers a framework for tackling complex environmental issues. You gain insight into a range of natural-science and social-science

methods, can substantiate the choice of a certain research method and learn to apply a number of methods. The course is built up in five parts (learning units). The first part focuses on different knowledge paradigms and academic traditions. The second part focuses on social-science methods (such as interviews, surveys, text analysis). In the third part, various natural-science methods are then highlighted. In the fourth, integrative part, it is then explained, under the umbrella of sustainability assessment, how a 'mixed methods approach' can be applied to current environmental issues. Finally, the last part is about statistics.

Learning objectives

After completing this course, you can:

- name and understand different knowledge paradigms;
- name and explain a range of methods for studying complex environmental issues;
- apply and combine a number of stakeholder-based and quantitative, natural-science methods;
- explain the strengths and weaknesses of a number of methods and justify the choice of a certain method.

NM990A - Thesis Master's Environmental Sciences

Dutch name: Thesis MSc Environmental Sciences **Type:** Standard product **Language:** Dutch **ECTS:** 25
Price: € 2,050.00

Two phases can be distinguished within the graduation research: the actual research phase and a concluding phase in which you write a report and give a presentation. In the research phase, the actual work is done: collecting, analysing, presenting, interpreting and evaluating scientific results and insights obtained yourself as a substantiation of recommendations for further research or formulated policy or management. The concluding phase consists of the written report and giving an oral presentation. A research report covers the following parts:

1. the problem and research question

2. a theoretical framing of the problem and research question

3. the research method(s) used

4. the results

5. a discussion

6. the conclusion and recommendations

7. a Dutch and English summary

8. a literature overview

A self-evident requirement for every report is that it is your own work. After approval of the written report, you give an oral presentation of about one hour, of which about 25 minutes is set aside for answering questions. This presentation follows, broadly, the structure of the written report. In the assessment, the three components are weighted with an emphasis on the work carried out (40%) and the reporting (50%), while the presentation (10%) can be used to round off the grade.

Learning objectives

After completing the course, you can:

- carry out research under guidance, describe it adequately and give a presentation on the work carried out and its results;
- integrate and apply competences acquired earlier in the graduation research.

NM9919 - Thesis Master's Environmental Sciences

Dutch name: Thesis MSc Environmental Sciences **Type:** Standard product **Language:** Dutch **ECTS:** 22.5
Price: € 1,845.00

Two phases can be distinguished within the graduation research: the actual research phase and a concluding phase in which you write a report and give a presentation. In the research phase, the actual work is done: collecting, analysing, presenting, interpreting and evaluating scientific results and insights obtained yourself as a substantiation of recommendations for further research or formulated policy or management. The concluding phase consists of a written publication and giving an oral presentation. The written publication takes the form of a research report or an academic article, in consultation with the graduation supervisor. The publication covers the following parts:

- the problem and research question;
- a theoretical framing of the problem and research question;
- the research method(s) used;
- the results;
- a discussion;
- the conclusion and recommendations;
- a Dutch and/or English summary;
- a literature overview.

The first three parts are prepared during (and are the product of) the course Research Proposal MSc Environmental Sciences (NM0703). The Thesis MSc Environmental Sciences starts with carrying out the graduation research. The course pays specific attention to academic and professional written presentation. Through a number of targeted tasks, attention is paid, among other things, to carrying out peer review, creating a clear structure in academic research texts and writing a (short) professional publication about your own research. A self-evident requirement for every report is that it is your own work. After approval of the written publication, you give an oral final presentation of one hour, of which about 25 minutes is set aside for answering questions. This presentation follows, broadly, the structure of the written publication. In the assessment, the three components are weighted with an emphasis on the work carried out (40%) and the written reporting (50%), while the oral final presentation (10%) can be used to round off the grade. In addition, the following course task must be fulfilled: a professional publication about your own research.

Learning objectives

After completing the course, you can:

- carry out research under guidance, describe it adequately and give a presentation on the work carried out and its results;
- integrate and apply environmental science competences and academic skills acquired earlier in the graduation research.

OBAMNW-2026-2027 - Open Bachelor's programme in Environmental Natural Sciences

Dutch name: Open bachelor Milieu-natuurwetenschappen **Type:** Training **Language:** Dutch **ECTS:** 180
Price: -

This programme is a combination of courses from the academic field of Environmental Natural Sciences with broadening courses from one or two other academic fields. There are various options in broadening packages. The combination of two or even three fields of study gives the programme a multidisciplinary character.

SMAES-2026-2027 - Bridging programme Environmental Sciences

Dutch name: Schakelprogramma Environmental Sciences **Type:** Training **Language:** Dutch **ECTS:** 5
Price: -

The premaster is an individual programme and is built around three competences: diagnosis, research and intervention. During the premaster you:

- delve into the most important concepts and processes within environmental sciences;
- learn how to use natural-science and social-science knowledge to analyse environmental problems;
- work on academic skills such as critical reading, researching, reasoning and reporting;
- build a solid bridge between your previous studies and the level of the Master's programme.

You study part-time and work independently via an online learning environment, with guidance from lecturers and interactive online meetings. In addition, there are theme days with lectures and work sessions in which you make the connection with current issues from the field. You determine the pace yourself: one, two or more courses per quartile. Together with the study adviser, you make a personal study plan. Do you want to see exactly which components the premaster contains? Then request the study guide. Do you have questions or doubts? Then schedule a personal advisory meeting with our study adviser.