



Environment and Resource Management MSc

VU University Amsterdam - Fac. der Aard- en Levenswetenschappen - M Environment and Resource Management - 2015-2016

The one-year Master programme Environment and Resource Management (ERM) aims to ensure that students acquire theoretical concepts, practical skills and operational techniques that allow them to find solutions for societal problems that relate to natural resources and the environment. Students are trained to bring in their disciplinary knowledge and co-operate in multidisciplinary teams so that they can contribute to an integrated approach towards problem analysis and problem solving in private, public, national, and international organisations dealing with natural resources and the environment.

The programme offers four specializations:

- Environmental studies
- Energy studies
- Climate and Water
- Ecosystems Services and Biodiversity

The year schedule can be found at the FALW-website.

Further programme information can be found at www.environmentmaster.nl.

A complete programme description can be found at the FALW-website.

New course on international development issues in the context of sustainable development available at the VU!

This innovative elective course is administered cooperatively by the Society for International Development (SID) and the Institute for Environmental Studies (IVM), and is open to all Master students from Dutch and European universities.

For more information click [here](#).

Index

Expired programme components Environment and Resource Management	1
specialisation Climate and Water	1
specialisation Ecosystems Services and Biodiversity	1
specialisation Energy Studies	1
specialisation Environmental Studies	1
optional modules	2
choose at least one of these courses	2
MSc ERM, compulsory courses	2
Course: Causes and Consequences of Environmental Change (Period 1)	3
Course: Climate and Policy (Period 3)	5
Course: Climate Modelling (Ac. Year (September), Period 3)	6
Course: Energy Governance (Period 3)	7
Course: Energy System Transitions (Period 3)	7
Course: Environmental Economics for ERM (Period 2)	8
Course: Environmental Policy (Period 2)	10
Course: Governance of Ecosystem Services (Period 3)	11
Course: Methods of Environment and Resource Management (Period 4)	13
Course: Modern Climate and Geo-ecosystems (Period 1)	14
Course: Research Project (Ac. Year (September))	15
Course: Research Workshops (Period 4)	17
Course: Sedimentary Environments and Climate Archives (Period 1)	17
Course: Selected Issues: Global Environmental Governance (Period 2)	18
Course: Sustainable Energy Analysis (Period 1)	19
Course: Theories and Approaches in International Relations (Period 1)	21
Course: Value of Ecosystem Services (Period 1)	22
Course: Water and Policy (Period 1)	24
Course: Workshop in Global Environmental Governance (Period 4)	25

Expired programme components Environment and Resource Management

The course programme components presented in the list below will no longer be part of the examination programme in academic year 2014-2014.

Courses:

Name	Period	Credits	Code
Energy System Transitions	Period 3	6.0	AM_468019

specialisation Climate and Water

Courses:

Name	Period	Credits	Code
Climate and Policy	Period 3	6.0	AM_450188
Water and Policy	Period 1	6.0	AM_468023

specialisation Ecosystems Services and Biodiversity

Courses:

Name	Period	Credits	Code
Governance of Ecosystem Services	Period 3	6.0	AM_468025
Value of Ecosystem Services	Period 1	6.0	AM_468024

specialisation Energy Studies

Courses:

Name	Period	Credits	Code
Energy Governance	Period 3	6.0	AM_1155
Sustainable Energy Analysis	Period 1	6.0	AM_468018

specialisation Environmental Studies

Programme components:

- [optional modules](#)

- choose at least one of these courses

optional modules

Courses:

Name	Period	Credits	Code
Climate Modelling	Ac. Year (September), Period 3	6.0	AM_450004
Modern Climate and Geo-ecosystems	Period 1	6.0	AM_1124
Sedimentary Environments and Climate Archives	Period 1	6.0	AM_450330
Selected Issues: Global Environmental Governance	Period 2	6.0	S_SIGEG
Theories and Approaches in International Relations	Period 1	6.0	S_TAIR
Workshop in Global Environmental Governance	Period 4	12.0	S_WGEG

choose at least one of these courses

Courses:

Name	Period	Credits	Code
Climate and Policy	Period 3	6.0	AM_450188
Governance of Ecosystem Services	Period 3	6.0	AM_468025
Sustainable Energy Analysis	Period 1	6.0	AM_468018
Value of Ecosystem Services	Period 1	6.0	AM_468024
Water and Policy	Period 1	6.0	AM_468023

MSc ERM, compulsory courses

Courses:

Name	Period	Credits	Code
Causes and Consequences of Environmental Change	Period 1	6.0	AM_1049
Environmental Economics for ERM	Period 2	6.0	AM_468020
Environmental Policy	Period 2	6.0	AM_468021
Methods of Environment and Resource Management	Period 4	6.0	AM_1135

Research Project	Ac. Year (September)	18.0	AM_468017
Research Workshops	Period 4	6.0	AM_1136

Causes and Consequences of Environmental Change

Course code	AM_1049 ()
Period	Period 1
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	dr. A.J.A. van Teeffelen MSc
Examinator	dr. A.J.A. van Teeffelen MSc
Teaching staff	dr. M.H. Lamoree, prof. dr. P.H. Pattberg, prof. dr. ir. P.H. Verburg, dr. ir. C.J.E. Schulp, dr. A.J.A. van Teeffelen MSc, prof. dr. F.H.B. Biermann
Teaching method(s)	Lecture, Study Group, Computer lab, Seminar
Level	400

Course objective

To develop a common knowledge base about the causes and consequences of environmental change and about how different disciplines perceive and address environmental problems.

By the end of this course, students:

1. can classify and illustrate the diversity of environmental problems;
2. can explain key concepts from the natural and the social sciences as they apply to the analysis of environmental problems;
3. are able to analyse causality for a selection of environmental problems, using the DPSIR framework in particular;
4. can critically reflect on frameworks and indicators used in analysing environmental trends;
5. are able to explain the roles of the economic system and the function of policy and governance in dealing with environmental problems;
6. understand different perspectives on the causes and consequences of environmental change, including their own, and can contrast these;
7. have demonstrated skills, notably: writing, framing, presenting, and reviewing.
8. demonstrated a capacity to collaborate in interdisciplinary teams and contribute to a shared goal;

Course content

At present, unsustainable modes of consumption and production worldwide threaten to alter core functions of the earth system. Anthropogenic climate change and the accelerating loss of biodiversity are two pressing problems that receive much media attention. However, there are many other environmental problems at scales varying from local to global. These include for example: declining bluefin tuna populations; unforeseen effects of contaminants; human protein needs and disruption of the nitrogen cycle; and the invasion of the Wadden Sea by foreign species such as the Pacific oyster. In short, more sustainable development pathways are urgently needed. Identifying such pathways requires an interdisciplinary understanding and the involvement of numerous academic disciplines, including the natural and social sciences.

To provide such integrated understanding, this course will introduce students to one prominent analytical framework, called Drivers-Pressures-States-Impacts-Responses (DPSIR) framework. DPSIR serves to structure problems and to identify different disciplinary contributions to understanding, analysing and dealing with problems. It contributes to the disentangling of complex problems, taking into account also limits to fully understanding such problems, for example inadequate scientific knowledge, uncertainty with regards to the benefits of environmental remediation (and particularly when the costs are known), reluctance of societies to acknowledge or to deal with environmental change, or scale mismatches between a problem and its management.

DPSIR may be seen to comprise two 'arms': causes of environmental change (Drivers, Pressures, States), and consequences of environmental change (Impacts and Responses). Because the impacts and responses are covered in other ERM courses, notably environmental economics and environmental policy in Period 2, this course places more emphasis on causality. Topics range from land use, fisheries, poverty, the setting of environmental standards, stakeholders, and climate change. These topics have been selected to highlight the breadth of challenges for environment and resource management, as well as to illustrate different disciplinary perspectives. The natural science perspective attempts to understand how environmental problems emerge. The economic perspective focuses on the growth debate (does economic growth increase social welfare?) and the use of economic instruments to redress the impacts of environmental change and to implement policy. The social science perspective assesses how environmental policy and governance can modify or redirect the patterns of behaviour that are common, if not inherent, in our societies.

Form of tuition

The course is worth 6 ECTS credits which corresponds to 168 hours of work per student.

The course comprises two sets of activities. The first takes place in classes, where information is presented through lectures, presentations, workshops, debates, seminars etc. The second includes assessments where student's ability to achieve the course's objectives is tested. Assessment involves group activities, assignments undertaken in pairs, and the exam. Feedback opportunities are included in class activities as well as assessments.

Approximate time allocation:

- Class: 55 hours
- Reading and exam preparation: 50 hours
- Assignment & peer review: 35 hours
- Presentations: 25 hours

Type of assessment

- group activities (two presentations) worth 30% of the final grade
- assignment and peer review worth 30% of the final grade
- exam worth 40% of the final grade.

Course reading

Subject to revision – see course manual for final version.

Boersema, J. & L. Reijnders (eds.) 2009. Principles of Environmental Sciences. Springer, Berlin. (available in PDF). Chapters 1, 5, 6, 7, 9, 10 (excl. 10.5.3 - 10.6.4), 11 (pp 192-204), 12 (pp 207-211; 232-236), 13, 14.

Tietenberg, T.H. & L. Lewis. 2014. Environmental economics and policy.

Target group

Students who have completed their bachelor's degree. Masters' students.

Remarks

Guest lecturers for selected topics:

Prof. Jeroen van den Bergh

Dr. Jaap Mulder

Prof. Arthur Petersen

Climate and Policy

Course code	AM_450188 ()
Period	Period 3
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	prof. dr. P.H. Pattberg
Examinator	prof. dr. P.H. Pattberg
Teaching staff	prof. dr. P.H. Pattberg
Teaching method(s)	Seminar
Level	400

Course objective

After studying this course, students should be able to define and explain key concepts of relevance to the climate change governance issue; understand the causes, impacts and effects of climate change and the key scientific controversies in the regime; be able to identify, explain and analyze the various policy options for mitigation and adaptation at different levels of governance; be able to understand and analyze the key political challenges in the climate change regime, the common problems facing all countries, the coalitions in the regime, the North-South, North-North, South-South, European and domestic political issues; be able to explain and assess the long-term objective, the principles, the commitments of countries and other key elements of the Climate Change Convention, the quantified commitments of developed countries, and the flexibility mechanisms under the Kyoto Protocol; be able to explain, analyze and form a judgment on the role of forestry in the climate change regime, and the various aspects of policy with respect to deforestation and land degradation; be able to define and explain the role of market mechanisms in the climate change regime, their advantages and disadvantages, and their potential in addressing the climate change problem; be able to integrate the information learnt thus far to assess and identify possible long term solutions to the climate change problem and the research questions that emerge from a study of the climate change regime; and be able to make a judgment about which principles, policy instruments and approaches are likely to be most efficient, equitable and/or effective in addressing the climate change problem.

Course content

International policy on human-induced climate change and its mitigation is a hotly debated subject. Current (international) climate policy is

the result of a complex and long-lasting negotiation process at multiple levels of governance. In this process, the science of the complex earth and climate system is closely linked to questions on the socio-economic effects of climate change, the options for global environmental governance as determined by the structure of international organizations, international economic and political relations and environmental law. These close relations between earth system research and economic/political questions make this course an interesting subject for students with a bachelor's degree in different subjects. The course includes:

- an overview of the science of climate change, its impacts (IPCC Fifth Assessment Report) uncertainties, mitigation, adaptation;
- climate change policy options at multiple levels of governance;
- analysis of the political challenges in climate change and the positions of different countries and actors;
- assessment of the international legal instruments including the Climate Change Convention and the Kyoto Protocol,
- assessment of the economics of climate change including analysing the flexible mechanisms (Emission trading, Clean Development Mechanisms, Reducing Emissions from Deforestation and Forest Degradation) and options for Post Kyoto measures; and paper discussions on a topical area of climate governance.

Form of tuition

The course consists of 7-8 interactive lectures including class presentations and uses modern didactic approaches, films, and role play to help the students internalize many of the concepts and theoretical approaches developed.

Type of assessment

The students will be examined on the basis of a paper (50%) and a closed book written examination (50%). Students must get a grade of 5.5 in each to pass in the examination.

Course reading

Reader

Recommended background knowledge

Basic knowledge of social science concepts such as governance

Target group

Students with an interest in governance and policy

Climate Modelling

Course code	AM_450004 ()
Period	Ac. Year (September), Period 3
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	prof. dr. H. Renssen
Examinator	prof. dr. H. Renssen
Teaching staff	prof. dr. H. Renssen, prof. dr. A.J. Dolman, dr. D.M.V.A.P. Roche
Teaching method(s)	Seminar, Computer lab
Level	400

Course content

Geological archives show convincingly that the climate system experiences variability on a wide range of time-scales. For Quaternary studies, climate variations at the following time-scales are most important: glacials-interglacials, millennia and centuries-decades. This course focuses at the mechanisms behind these variations, thereby using climate models as a tool, i.e. numerical computer models in which the dynamics of the climate system are calculated. The combination of these models and geological data will be treated extensively. The course consists of lectures giving an overview of climate models and their application (different types for different time-scales) and of discussion meetings, in which students discuss the recent literature in detail. In this way the course considers case studies for the different time-scales and deals with recent developments in climate modelling. The following two questions are central to the course: 1) What is the driving mechanism behind climate change at a particular time-scale? 2) How can we optimise the combination of climate models and geological data in order to increase our understanding of climate evolution?

Form of tuition

Lectures, discussion meetings and computer exercises.

Type of assessment

Compulsory participation in discussion meetings, computer exercises, oral presentation and written exam.

Course reading

Lecture notes and selected papers (made available through Blackboard).

Remarks

The course is open for participation to students from alternative M.Sc. programmes at the VU University Amsterdam, or from other universities. If you are a professional and wish to attend this course you can also participate on a contract basis. In both cases please do contact the course coordinator to find out if you fulfill the background knowledge requirements and for enrollment procedures.

Energy Governance

Course code	AM_1155 ()
Period	Period 3
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	prof. dr. P.H. Pattberg
Examinator	prof. dr. P.H. Pattberg
Teaching method(s)	Seminar
Level	400

Energy System Transitions

Course code	AM_468019 ()
--------------------	--------------

Period	Period 3
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Teaching method(s)	Study Group
Level	400

Course objective

The learning objectives are to gain insight into:

- The way government and the energy sector deals with environmental issues, including the way they steer innovation;
- The concepts of industrial transformation and transition management and;
- The scientific and political debates with respect to key energy options.

Course content

Energy policies are increasingly based on the premise that government alone cannot guarantee improvement of environmental conditions and that the technological advances will not suffice given the complexity of the current environmental problems. A change toward sustainability (transition, industrial transformation) involves issues of socio-technical innovation as well as cultural and institutional transformations of the systems.

Such a change, although radical in character, will be gradual in practice as it is believed to last 25 years or more. An important new debate has emerged about the scale at which these socio-technological and institutional changes should take place in order to achieve desired sustainability goals. Theoretical and historical aspects of system innovation and a transition towards sustainability will be addressed.

The objective is to give students a critical perspective, and to make the link to questions of social and political shaping of transition processes. In working groups, the students gain experience with exploring options to stimulate long-term transition processes by using a backcasting method.

Form of tuition

Lectures and workshops.

Type of assessment

A written closed book examination (50%) and a short (1000- 2000 words) paper (50%). Both the paper and the examination must be a 5. 5 or higher. Not only the material in the reader, but also the material presented during the classes will be examined in this course.

Course reading

Reader composed of scientific papers selected by the lecturers

Environmental Economics for ERM

Course code	AM_468020 ()
Period	Period 2
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen

Coordinator	dr. P.J.H. van Beukering
Examinator	dr. P.J.H. van Beukering
Teaching staff	dr. P.J.H. van Beukering
Teaching method(s)	Seminar, Study Group
Level	400

Course objective

This module gives an introduction to the economic analysis of environmental problems, and aims to give an overview of economic environmental policy instruments in different policy contexts from the local through to the global level. A critical cause of environmental problems is that not all of the costs (including environmental) caused by economic agents are borne by those responsible for generating them.

This problem will be conceptualized in this course through the notion of externalities. There are various instruments and institutional arrangements for addressing such externalities. Criteria for their selection and evaluation will be studied. Applications of environmental policies at various administrative levels (i.e. local, national, international), different economic sectors and different country contexts will be discussed. This course tackles some of the most pressing environmental problems that our planet faces today, such as the depletion of fish stocks, climate change, environmentally-induced poverty, and environmental effects of trade and globalization.

The overarching objective of this course is to familiarize students with the economic analysis of environmental problems. After following this course, students should be able to judge how well certain policy instruments and institutional arrangements perform in terms of effectiveness, efficiency and the distribution of welfare in society.

Course content

After having participated in this module, students should be able to answer the following questions:

- What is the fundamental nature of environmental problems from an economic perspective, in relation to notions like externalities, public goods and free riding, and what does this imply for the feasibility of (easy) solutions?
- Under which conditions are environmental regulations necessary or when are self-regulation / economic instruments more appropriate?
- How are poverty, development, and the environment interlinked, and what is the role of globalization in stimulating or hampering sustainable development?
- How to derive optimal levels of pollution and resource use from a societal perspective?
- Which economic policy instruments are available, and what are their (dis)advantages in view of the selection criteria and in specific country contexts?
- What are critical and debatable assumptions of core policy insights within environmental economics, such as related to economic costs-benefit analysis of climate policy?

In this course "Environmental Economics", one distinct subject will be addressed per week. This implies that various activities (e.g. (guest) lectures, interactive events) will take place on a weekly basis addressing a distinct central topic. The subjects and lectures are as follows:

- Policy instruments (Week 1)
- Government versus self-regulation (Week 2)
- Optimal resource use (Week 3)
- International trade and the environment (Week 4)
- Risk and uncertainty (Week 5)
- Poverty and the environment (Week 6)

Type of assessment

Assignment (35%), closed-book exam (65%)

Course reading

Harris, J.M. & Roach B. (2013). Environmental and Natural Resource Economics: A Contemporary Approach - Third Edition. Routledge: Taylor & Francis Group, London.

Entry requirements

This course is suited for students with a broad range of disciplinary backgrounds. A background in economics is no prerequisite.

Target group

This course is suited for students with a broad range of disciplinary backgrounds. This course provides some of the fundamental building blocks for the MSc Environmental and Resource Management (ERM). It provides the basic framework for economic re-search methods, such as cost-benefit analysis and environmental valuation, which be treated in the ERM course Environmental Policy Tools. We encourage students who are more interested in only theoretical/mathematical analysis to follow the environmental economics course provided by the Faculty of Economics and Business Administration.

Remarks

This course will provide a sound balance between theoretical lectures and guest lectures by academic and policy experts of a relevant field of environmental economics. Several interactive sessions stimulate active learning of students. To stress the societal importance of environmental economics, guest lecturers performing in this course typically come from outside academia, and include among others:

- Dr Annië Mauser (Director Sustainability - Unilever);
- Dr Bertholt Leeftink (Deputy Secretary General - Ministry of Economic Affairs)
- Dr Mathijs Bouman (Economic Journalist / Commentator - FD, RTL-Z)
- Prof Ruud Huirne (Director Food & Agri - Rabobank)
- Carel Drijver (Director Marine Department - WWF)
- Dr Sander de Bruyn (Chief Economist - CE Delft)
- Danielle Hirsch (Director - Both Ends)

Environmental Policy

Course code	AM_468021 ()
Period	Period 2
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	prof. dr. P.H. Pattberg
Examinator	prof. dr. P.H. Pattberg
Teaching method(s)	Seminar, Lecture

Level	400
--------------	-----

Course objective

The overall aim of the ERM master program is to enable students to develop abilities and multidisciplinary techniques which will allow them to apply to societal problems relating to natural resources and the environment. Environmental Policy contributes to this overall aim by introducing students to the actors, institutions and instruments relevant in the design and implementation of environmental policies at the local, national and supranational levels. Accordingly the course objectives -defined rather broadly are the following:

1. Give a basic understanding of the public and private actors and institutions involved in environmental governance at local, national and supranational levels.
2. Be able to evaluate the effectiveness and legitimacy of actors and institutions involved in environmental governance at local, national and supranational levels.
3. Understand and be able to explain, analyze and propose solutions regarding the complexity of decision-making structures, procedures and negotiations of environmental issues.
4. Apply the knowledge learned on the basis of two written assignments , a role-play (simulation) game and a written exam.

Course content

The course consists of four main components: (A) National Environmental Governance, (B) European Environmental Governance, (C) Global Environmental Governance, and (D) Private Environmental Governance. More specifically, part A introduces basic concepts related to environmental governance particularly at the national level. Part B introduces the history, principles, institutions and processes of EU environmental governance. Part C introduces the history, principles and institutions of global environmental governance. Finally, part D introduces newly emerging environmental governance initiatives beyond the state, discussing developments involving private actors and institutions. A general introduction and a conclusion on future prospects of environmental policy round up the course.

Form of tuition

The course is worth 6 ECTS points which corresponds to 150 hours of work per student.

Type of assessment

2 written assignments (20%) – a mid-term exam (40%) and a final exam (40%)

Course reading

currently being revised; it will become available in September

Target group

Master students

Governance of Ecosystem Services

Course code	AM_468025 ()
Period	Period 3
Credits	6.0

Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	dr. P.J.H. van Beukering
Examinator	dr. P.J.H. van Beukering
Teaching staff	prof. dr. P.H. Pattberg
Teaching method(s)	Lecture, Seminar
Level	400

Course objective

The governance of ecosystem services and biodiversity is in its infancy. The current governance system has evolved through ad-hoc measures taken at national (e.g. protection of forests and wetlands), supranational (e.g. EU Bird's directives) through to international levels (e.g. Convention of Biological Diversity). However, the governance of comprehensive approaches to ecosystem and biodiversity protection has yet to emerge. There is considerable literature on the linkages between biodiversity, ecosystems and ecosystem services and their (economic) value, but studies and policies on how these values can be effectively incorporated into policy making and how the provisioning of ecosystem services can be safeguarded are much more scarce. This course will discuss the emerging literature; address policy and legal frameworks for ecosystem and biodiversity governance, identify and debate on the different instruments for ecosystem management; elaborate on the multi-scale and multidimensional challenges of ecosystem services; and discuss the politics and economics of this complex and emerging field. After having participated in this module, students should be able to assess and form judgments on:

- The characteristics of ecosystems and biodiversity and how these relate to the governance of ecosystem services and biodiversity worldwide
- What policy instruments are available at different governance levels and what the strengths and the weaknesses of the different policy instruments are.
- The trade-offs associated with the protection of ecosystems and biodiversity and how the interests of local communities can be incorporated in ecosystem and biodiversity governance.
- The current best practice examples of ecosystem services and biodiversity governance and ways forward to safeguard the protection of ecosystem service provisioning in the long run.

Course content

The course will focus on how ecosystems are currently managed and what would be required to safeguard the provision of ecosystem services in the long run. It will discuss the concept of ecosystem services, and its critiques, discuss the different types of policy instruments at different governance levels, introduce the existing national and international legal frameworks for ecosystem and biodiversity conservation, discuss the challenges associated with payments for ecosystem payments, and their effective design, introduce the concept of community co-management and private-public partnerships in ecosystem service provisioning, and provide an understanding of the different policy instruments available to govern ecosystems and protect biodiversity at multiple scales.

Form of tuition

This course has 6 credits. This implies that there is a study load of 168 hours on students. The course has 32 contact hours; 7 lectures, 2 working sessions, 1 presentation session and 1 concluding session/wrap up. For each of the lectures, we selected 3 academic papers for you to study; in total 21 papers, plus the power points. In addition, we expect you to select an additional 4 peer-reviewed papers for your case study paper. The readings are provided as full papers and aim to give you a broad understanding of the issue concerning ecosystem and biodiversity governance as befits a master's programme. The structure of the lectures in class will help you identify the key questions on which you will be examined.

Type of assessment

The students will be asked to select a topic which will form the basis for a presentation and a paper. The course ends with a closed book examination. The examination will count for 50% of the final results, the paper for the other 50%. Students should pass both paper and exam.

Course reading

See Study Manual (which will become available December 2013. It will contain 21 academic papers. If you want to get an impression of the literature requirements please contact the coordinator for last year's study manual).

Recommended background knowledge

Students are encouraged to also take course 468024 'Values of ecosystem services and biodiversity'.

Target group

MSc students Environmental Resource management (doctoral students or other MSc students are also welcome: please contact the coördinator)

Remarks

Several guest lecturers will give presentations, like for example from the Initiative Sustainable Trade (IDH-on certification), IUCN (on community co-management), the Dutch Environmental agency (PBL- on legal frameworks for ecosystem protection) and the Dutch development bank (FMO- on financing biodiversity protection). Given the heavy study load, students are discouraged to register for more than one specialization course.

Methods of Environment and Resource Management

Course code	AM_1135 ()
Period	Period 4
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	dr. P.J. Ward
Examinator	dr. P.J. Ward
Teaching staff	dr. P.J. Ward
Teaching method(s)	Seminar, Computer lab, Excursion, Lecture, Study Group,
Level	400

Course objective

The objective of the course is to provide the students with an overview of relevant methods and techniques for environmental resource management and to teach them how to apply these methods. At the end of the course students should know which types of methods are available, for which problems they can be used and what the strengths and weaknesses of the methods are in practice.

Course content

This course provides an overview of the more technical tools that can be used to support environmental and resource management. For each class of tools an introduction is given, followed by a seminar or tutorial in which the tool is actually used. The students apply the tool to a (simplified) problem and reflect on the results.

This course includes the following six classes of tools. Not all tools will be taken by all students:

- Scenario analysis
- Spatial analysis: use of Geographic Information Systems (ArcGIS);
- Stakeholder analysis
- Valuation, cost-benefit analysis (CBA), and Multicriteria analysis (MCA)

Form of tuition

This course provides an overview of the more technical tools that can be used to support environmental and resource management. For each class of tools, lectures are given, followed by seminars or tutorials in which the tools are actually used. The students apply the tools to (simplified) problems and reflect on the results.

Type of assessment

The assessment will consist of assignments and/or written examinations on the tools used by the students. Precise information will be made available via Blackboard.

Any exams will be closed book examinations. , i.e. you will NOT be allowed to consult any course material during the examination. You can bring no calculator, no mobile phone, laptops, I-pads or other tablets. Material relevant for the examination can be found in the Reader on Blackboard. Subjects taught in lectures and practicals are also material for the examinations. Example exams, if applicable, will be made available on Blackboard.

Resit

Resits of the assignments and/or written examinations will be organized. Precise information will be made available via Blackboard.

Course reading

See the study manual on BB

Modern Climate and Geo-ecosystems

Course code	AM_1124 ()
Period	Period 1
Credits	6.0
Language of tuition	English

Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	dr. G.M. Ganssen
Examinator	dr. G.M. Ganssen
Teaching method(s)	Excursion, Seminar
Level	400

Course objective

In the first part the course gives an introduction of modern atmospheric and oceanic processes which form an important basics for the reconstruction of the climate of the past. Next to important basic parameters which trigger the modern circulation of both spheres, atmosphere and oceans, the main circulation patterns will be discussed together with the implications for the global climate.

In the second part the modern ocean changes and their implications for the geoecosystems will be discussed. Together, this will form the basic understanding of processes which govern changes in the geological past.

Course content

- the basic parameters and properties for atmospheric and ocean processes leading to the formation and circulation of air and water masses
- characterization of climatic regions of the world from the poles to the tropics
- special features of the climate systems like the monsoon, ENSO and NAO systems
- the effect of ocean changes on geoecosystems now and in the recent past

Form of tuition

Lectures and workshops, literature reading, oral and written presentations by the students and discussing the results and quality of the presentation

Type of assessment

Written exam after week 2 about the basics (50% of the grade)
oral and written presentation of a topic (second part of the course, 50% of the grade)

Course reading

Lecture notes (powerpoints of the presentations by the teacher), selected papers and Ruddiman, W.F., 2013. Earth's Climate: past and future. W.H. Freeman and Company New York.

Entry requirements

Some basic knowledge of the climate system, interest in climate change

Target group

Students from the geo and environmental study areas

Registration procedure

Subscription via BB

Research Project

Course code	AM_468017 ()
Period	Ac. Year (September)

Credits	18.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	dr. ir. O.J. Kuik
Teaching staff	drs. M.I. Tromp Meesters
Teaching method(s)	Seminar
Level	500

Course objective

The main objectives of the RP are:

- 1.To further develop and apply the theoretical frameworks and methods elaborated in previous ERM courses in a specific environmental or resource context;
- 2.To independently apply the knowledge and skills obtained in the previous ERM courses to a particular research question;
- 3.To become acquainted and familiar with environmental and resource research in practice.

A RP is carried out individually and independently under supervision of an appointed supervisor and after approval of the RP Work Plan by the supervisor.

Course content

The subject is chosen based on the interest of the students as much as possible, and can be proposed by the students themselves or be proposed by the supervisors.

There are two options:

- Internal research project. A research placement at the Institute for Environmental Studies (IVM), or within the VU.
- External research project. A research placement externally, e.g. at a company or an (international) governmental organisation The Institute for Environmental Studies (IVM), as an internationally oriented research organisation, has a large network of outstanding environmental institutes and (non) governmental organisations that can supervise students doing research externally.

Form of tuition

The main product of this course is an environmental report that includes an introduction, a research question, a methodological section, results, discussion and conclusion. Independent, individual (peer reviewed and grey) literature research, gathering data from databases, interviews and modelling are some of the methods possible.

Type of assessment

The products of this course are an environmental report and a presentation. It may include a computer model, a website or another multimedia product. The actual research, including the Master thesis contributes 90% to the final grade, and the presentation 10%.

Course reading

The literature review is depending on the subject and the option chosen.

Entry requirements

Students must have obtained a minimum of 18 EC in the ERM programme by the 15th of February, 2013, and must have participated in the team work

assignment of the course Environmental and Energy Policy Tools (AM_468012).

Recommended background knowledge

Students are strongly recommended to have followed: Environmental Economics (AM_468020) and Environmental Policy (AM_468021)

Remarks

The Research Placement is subject to the FALW Work Placement and Thesis Regulations. These regulations require detailed written agreements between supervisor and student that specify the conditions for the Research Project. Please consult the Faculty's website for more information.

Research Workshops

Course code	AM_1136 ()
Period	Period 4
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	prof. dr. P.H. Pattberg
Examinator	prof. dr. P.H. Pattberg
Teaching method(s)	Seminar, Study Group, Lecture
Level	400

Sedimentary Environments and Climate Archives

Course code	AM_450330 ()
Period	Period 1
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	dr. F.J.C. Peeters
Examinator	dr. F.J.C. Peeters
Teaching staff	dr. F.J.C. Peeters, dr. C. Kasse, dr. S.J.P. Bohncke, dr. M.A. Prins
Teaching method(s)	Excursion, Seminar
Level	400

Course objective

To learn and understand how environmental and climate changes are recorded in marine, coastal and terrestrial depositional environments, and to understand the recording process as a function of the dynamics of these environments.

Course content

The course deals with the sedimentology, geochemistry and stratigraphy of marine, coastal, fluvial, lacustrine and eolian palaeoclimate records. The focus is on those processes relevant for understanding how

climate/environmental change is recorded in the different palaeoclimate archives. In addition, the susceptibility of key aspects of those environments to climate- change impacts will be addressed. Marine and terrestrial palaeoclimate records receive equally attention.

Form of tuition

Lectures, literature study, group discussions.

Type of assessment

Written exam and report of the field excursion to Zuid-Limburg.

Course reading

Lecture notes, selected papers.

Recommended background knowledge

Bachelor courses: Terrestrial environments (450097), Climate Science (450240);
 Master courses: Modern Climate Systems (450185), Modern Geo-ecosystems

Target group

Course is part of the Master program Earth Surface Processes, Climate and Archives; Master students Earth and Environmental Geoscience; Master students in Paleoclimatology.

Selected Issues: Global Environmental Governance

Course code	S_SIGEG ()
Period	Period 2
Credits	6.0
Language of tuition	English
Faculty	Faculteit der Sociale Wetenschappen
Coordinator	prof. dr. P.H. Pattberg
Examinator	prof. dr. P.H. Pattberg
Teaching staff	prof. dr. P.H. Pattberg
Teaching method(s)	Study Group
Level	500

Course objective

- To increase students' knowledge of major empirical developments in Global Environmental Governance;
- To train students in identifying the policy relevance of the results of political research as well as detecting pitfalls and shortcomings;
- To invite reflection on the policy relevance and strategic consequences of research;
- To develop students' academic writing skills.

Course content

This course introduces students to the current state of research within the field of global environmental governance. Global environmental change is one of the great challenges humankind is facing today. Humans now influence almost all biological and physical systems of the planet. Scientists today see mounting evidence that the entire earth system now operates well outside the normal state exhibited over the past 500,000 years, and that human activity is generating change that extends well beyond natural variability – in some cases, alarmingly so – and at rates

that continue to accelerate. The perennial question from a social science perspective is how to organize the co-evolution of societies and their surrounding environment, in other words, how to develop effective and equitable governance solutions for today's global problems. This course builds on Theories and Approaches: International Relations and Political Concepts and Processes by teaching students how to apply core concepts of political science to substantial issues in international studies. At the same time, students will be made aware of the current state of research within the field of global environmental governance. This knowledge will be useful in the upcoming workshop later in the program.

Governance refers to the phenomenon that many public functions increasingly seem to be assumed and carried out by actors other than the government actors of the nation-state. In particular, the course further investigates three profound transformation in global environmental governance: (1) the increasing diversity of agency (i.e. the observation that authority to govern is vested not only in governments and public actors but in a host of non-state actors as well); (2) the institutionalization of novel governance mechanisms and instruments beyond international agreements (e.g. private certification schemes in global forest politics); and (3), the increased fragmentation of global environmental governance into a number of functionally interlinked but increasingly conflictive policy domains (e.g. the potential overlap between climate change and biodiversity governance). For each type of empirical transformation discussed above, a selection of important examples will be analyzed. Students are encouraged to make their own contributions in the form of one essay that presents original research and one class presentation that critically discusses a concrete empirical example of global environmental governance.

Form of tuition

Seminar

Type of assessment

Written assignment (50%) + class participation (10%) + group presentation (40%)

Course reading

We will use the following text book: Biermann, Frank, and Philipp Pattberg, editors (2012): Global Environmental Governance Reconsidered. Cambridge, MA: MIT Press.

A reading list will be made available via Blackboard.

Target group

MSc students Political Science

Remarks

This course is compulsory for students in the track Global Environmental Governance and optional for students in the other Master tracks.

Sustainable Energy Analysis

Course code	AM_468018 ()
Period	Period 1
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen

Coordinator	B. van der Kroon MSc
Examinator	B. van der Kroon MSc
Teaching method(s)	Seminar, Lecture
Level	400

Course objective

The unit is designed to familiarize students with the basic principles of sustainable energy analysis and equip them with the tools that will help them both to understand the main determinants of their use/diffusion and to critically evaluate the range of policy options to tackle related problems.

After following this course, students should be able to:

- Make use of scientific information about major energy resources and conversion processes in order to assess the social, economic and environmental impacts of existing and new technologies in the energy sector.
- Apply this scientific information in the widely different context of industrialised, emerging and least developed nations.
- Evaluate the sustainability implications of different energy technology choices in a comprehensive and balanced way.
- Assess the potential and implications of using biomass, wind, water and solar re-sources to replace fossil fuels for both rich and poor energy users.

Course content

Energy technology plays a central role on the road towards sustainable development. Energy is the engine of economic growth and therefore a key prerequisite for development. But at the same time it is causing persistent environmental problems. Assessing energy technology in the light of the long-term transition towards sustainability requires a basic understanding of available energy resources and conversion processes including their environmental impacts and opportunities for performance improvement. The potential role and impact of energy technologies are strongly dependent on the stage of economic development of the nation and sector where it will be applied.

The course introduces students to key concepts of sustainable energy analysis and technology choice. The unit will be a combination of theory and evidence/discussion, relating theoretical arguments with recent experiences in the domain of energy use. The module will focus both on renewable as well as non-renewable energy, and will analyse energy technologies in the context of both developed and developing countries.

Some of the topics dealt with in this course are:

- Economic feasibility of renewable energy
- Sustainable biofuels
- Smart energy cities
- Smart mobility
- Energy use in developing countries
- Business models for energy access

Form of tuition

Lectures, team assignment and workshop

25 hs for the Dragon's Den assignment and 195 hs for lectures.

Type of assessment

A written exam (80%) and a team presentation on the assignment (20%).

Course reading

Reader with open source literature

Theories and Approaches in International Relations

Course code	S_TAIR ()
Period	Period 1
Credits	6.0
Language of tuition	English
Faculty	Faculteit der Sociale Wetenschappen
Coordinator	prof. dr. P.H. Pattberg
Examinator	prof. dr. P.H. Pattberg
Teaching staff	prof. dr. P.H. Pattberg
Teaching method(s)	Study Group, Lecture
Level	400

Course objective

Objectives and learning goals:

- To provide students with an overview of the theoretical foundations of IR, thus enabling them to analyse concrete historical developments from various theoretical perspectives;
- To teach students to critically reflect upon the meta-theoretical foundations - and their methodological and normative implications – of (social science) theory (increasing their reflexive knowledge of both the main traditions and of paradigmatic change);
- To familiarize students with the critical assessment of political science literature, in particular by placing it within a historical context and by reflecting upon both the social constitution of theory as well as its socially constitutive effects.

Course content

Whereas IR traditionally (and narrowly) defined deals almost exclusively with relations between states, the 'discipline' has moved much beyond such a narrow state-centrism in order to embrace a much broader conception of world politics in which there is attention to both state and non-state actors and both interstate and other global social structures. This broader conception of world politics is point of departure for this introductory course and is in fact taken one step further by departing from the notion that contemporary world politics is of a fundamentally transnational nature. Thus, politics is not just between states but also the political struggle between various transnational interest groups, movements and social forces. Although there is no world polity, there is a European polity, and internationally there are numerous international organizations that constitute institutionalized structures of global governance. Policy, finally, is not just produced by states as foreign policy, but also by the aforementioned international organizations and by the EU. A second characteristic is that although we consider IR as a mature sub-discipline of political science which is grounded in various approaches and methods of general political science (and therefore clearly linked to the other stream of the MSc in Political Science), we also recognize the contributions from other disciplines (including philosophy,

economics, sociology, anthropology, and law) to the field and stress the importance of interdisciplinary research. This course is structured as a historical overview of the development of the discipline, placed in a wider historical context of 'real-world' developments in the global system - stressing the obvious links between those developments and the development of theory - as well as in a wider social science context, trying to see how IR theory developed in relation to other disciplines and to wider debates within the social sciences. Next to the historical context considerable attention is given to the meta-theoretical assumptions (and methodological implications thereof) underlying various approaches and theories as we believe that these are key to understanding the major debates, and that - for their own research - it is important that students critically reflect upon those assumptions.

Form of tuition

Seminar. Building on prior knowledge of students (i.e., students from our Bachelor's programme are assumed to have basic knowledge of the IR and European integration literature used in the bachelor, and students coming from outside to have an equivalent knowledge), students will work through the literature in tutorial form. The total amount of reading will be about 80 pages per session.

Type of assessment

Participation, including three pieces of homework (30%) and one final essay (70%).

Course reading

The course is based on Scott Burchill et al (2013). Theories of International Relations, 5th ed. London: Palgrave (to be bought). A reader will be made available.

Target group

MSc Political Science students.

Value of Ecosystem Services

Course code	AM_468024 ()
Period	Period 1
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	dr. P.J.H. van Beukering
Examinator	dr. P.J.H. van Beukering
Teaching staff	dr. P.J.H. van Beukering
Teaching method(s)	Lecture, Excursion
Level	400

Course objective

One of the hot topics in environmental management today is the concept of "ecosystem services". This concept can be defined as the benefits that people obtain from ecosystems. Important ecosystem services are food, fuel, timber and water provision, carbon storage and sequestration, soil formation, climate and disease regulation, aesthetic benefits and spiritual values. By putting ecosystem services central in the debate on nature conservation, the societal benefits of nature

conservation and the need to align conservation and development goals are stressed. Quantification and apportionment of ecosystem services and biodiversity are major challenges. This course aims to assess the importance of ecosystem services and biodiversity for nature, the economy and people.

Course content

The course focuses on an understanding of what specific services are provided by ecosystems, how these are linked to biodiversity. It attempts to remain close to the practicality of quantification. It will then continue to address the economics of ecosystem services. Various ecosystems (e.g. forests, coral reefs, wetlands, rivers) and forms of biodiversity are covered (e.g. wildlife, flora). Next to main and guest lectures and debate, the course contains a six-week case study carried out in groups of 3-4 students. The subjects addressed in this group assignment either come from real "clients" such as governmental and non-governmental organizations, or can also be developed by the students themselves. The main objective of the assignment is to apply the skills taught in the course in a real life example. More details of the assignment are provided below.

After having participated in this module, students should be able to answer the following questions:

1. How do ecosystems produce ecosystem services and how are ecosystems changing over time and space?
2. How does biodiversity relate to ecosystem services?
3. What services do ecosystems and biodiversity provide and how can these services be measured?
4. What is the social and economic importance of the ecosystem services and biodiversity and what drives these economic and cultural values?
5. What instruments are available to mobilize payments for ecosystem services necessary for sustainable management of ecosystems and biodiversity?
6. What is the role of ecosystem services in alleviating poverty?
7. How to conduct a rapid appraisal of ecosystem services taking into account the above-mentioned issues?

Form of tuition

- A group case study presentation and a final report
- The course ends with a closed book exam
- The exam weighs 70%, the group assignment (presentation & final report) 30%
- Students must pass all (5.5 or higher)

Type of assessment

A group case study presentation and a final paper;
The course ends with a closed book exam;
The exam weighs 70%, Assignment (presentation and paper) 30%.
Students must pass all (5.5 or higher).

Course reading

The main written source is a book (i.e. Bouma and Van Beukering 2015) which is especially written for this specialization in Ecosystem Services.

Bouma, J. and P.J.H. van Beukering (2015). Ecosystem services: from concept to practice. Cambridge University Press. Cambridge.

In addition, several freely downloadable journal articles and papers are

part of the reading material.

Entry requirements

Students do not require a specific disciplinary background, although affinity with ecology and economics is useful.

Target group

Students with an interest in the link between the natural environment and society. This interest may vary widely, possibly including topics such as nature conservation, tourism, food production, poverty, international trade, education, and landscapes.

Remarks

The course is taught by Dr Pieter van Beukering and Prof Dr Peter Verburg (IVM-VU University)

Guest lectures are provided by:

- Dr Rudolf de Groot (Wageningen University)
- Dr Ben ten Brink (PBL, Netherlands)
- Dr Roel Sootweg (SEVS)
- Dr Mathew Parr (IUCN)
- Drs Emilie Reuchlin-Hugenholtz (WWF)

Water and Policy

Course code	AM_468023 ()
Period	Period 1
Credits	6.0
Language of tuition	English
Faculty	Fac. der Aard- en Levenswetenschappen
Coordinator	prof. dr. J.C.J.H. Aerts
Examinator	prof. dr. J.C.J.H. Aerts
Teaching staff	prof. dr. J.C.J.H. Aerts, dr. R. Lasage, prof. dr. D. Huitema, dr. H. de Moel
Teaching method(s)	Lecture, Computer lab
Level	400

Course objective

The objective of this course is to understand how water related processes such as floods and droughts influence our society and what role water management plays in addressing and tackling these issues. This course aims to provide students a multi-disciplinary understanding of water management, including the physical dimensions of the hydrological cycle and coastal processes, the policy, law and long term trends such as climate change and land use change. It puts emphasis on the uncertainty of future trends and how risk management methods can be helpful for water managers for dealing with these uncertainties.

Key goals for students to reach at the end of the course are:

- To understand the complexity of various water related issues (e.g. scarcity, floods, and droughts) and to assess the economic and social impacts
- To learn what kind of measures can be taken to alleviate water related problems and what kind of positive and negative effect these measures have on different users.

- To be able to systematically approach a complex and integrated water related issue and properly interpret data and information about this issue.

Course content

Water managers see themselves confronted with a continuous stream of increasingly credible scientific information on the potential magnitude of population growth, economic activities and climate change that increase the risk related to the earth hydrological system. It is expected that floods and droughts will increasingly affect societies and economies and new approaches in water management are needed to deal with these challenges. Furthermore, developing adequate water policies that can be used in practice is a difficult issue and is the result of a complex and long-lasting process from the national through to the local level. In this process, the science of the water- and socio-economic systems can play an important role by supplying policy makers with answers on e.g. the socio-economic effects of floods and droughts. Uncertainty in future trends further puts new challenges to water management and risk based techniques can be helpful in dealing with these uncertainties. Finally, water management increasingly needs to cooperate with spatial planners, especially in large cities, to address increasing risk from storm surges and sea level rise.

Form of tuition

This course consists of several sessions going into different subjects related to water management. These sessions will consist of lectures by the professors with interactive discussion; two practical assignments, and student presentations. Apart from these sessions, you will team up in pairs of two students to write papers on water related issues and adaptation in cities, which will be peer-reviewed by other students.

Activity Hours

- 1 Attending and contributing to sessions (12 times 3 hrs) 36 hours
- 2 Readings associated with lectures 28 hours
- 4 Paper: literature review (32 hours), writing (24 hours), peer review (8 hours) 64 hours
- 5 Exam preparation 40 hours
- TOTAL 168 hours

Type of assessment

Written exam (50%), essay (40%) and peer-review (10%)

Course reading

The literature for this course consists of various academic papers and chapters. These papers will be published 3 days before the lecture

Target group

MSc students Environment and Resource Management (ERM), MSc Hydrology; Earth Sciences and Economics(ESE).

Workshop in Global Environmental Governance

Course code	S_WGEG ()
Period	Period 4
Credits	12.0
Language of tuition	English
Faculty	Faculteit der Sociale Wetenschappen

Coordinator	prof. dr. P.H. Pattberg
Examinator	prof. dr. P.H. Pattberg
Teaching staff	prof. dr. P.H. Pattberg, dr. A. Mert
Teaching method(s)	Study Group
Level	600

Course objective

To train students in critically evaluating political science research, in particular in the area of global environmental governance; To guide students in the process of designing theory-guided research projects, alone or in working groups; To train students in selecting and applying the appropriate methods and techniques of data collection and analysis to carry out research projects; To enhance the abilities of students in academic writing and reporting on research for discussion; To invite critical theoretical and normative reflection on the research results; To train students to work in small research teams.

Course content

In this workshop, students will be divided in working groups that focus on different themes relating to international (environmental) relations and global environmental governance, ranging from the effectiveness of different global governance architectures to questions of accountability, legitimacy, and justice. The workshop will build on introductory lectures; joint discussion sessions on key readings in international relations and global environmental governance; individual and team research that leads to review essays and to a longer essay (in the style of a journal article) on one of the themes; and class presentations and discussions of research findings. Students will be asked to critically evaluate the research of others (looking at contrasting examples of research); to develop own theory-guided or policy-oriented research designs jointly with fellow students in the area of global environmental governance; and to carry out that research in small groups as well as individually. Students can build upon this in developing a design for their Master's Thesis.

Form of tuition

Tutorial. Students will work in small groups, and report on their work both orally and in writing.

Type of assessment

Individual assignments and group work well as in-class participation.

Course reading

Selected articles and books

Entry requirements

Participation in Selected Issues in Global Environmental Governance (S_SIGEG) is required.

Target group

MSc students in political science and international relations.