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 2013 - 2014 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.
### Inhoudsopgave

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Expired programme components ERM

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MSc ERM, spec. Climate and Water

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MSc ERM, spec. Energy Studies

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MSc ERM, spec. Environmental Studies

Opleidingsdelen:

- optional modules
- choose at least one of these courses

optional modules

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choose at least one of these courses

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MSc ERM, compulsory courses for all themes

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Aquatic Ecology

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**Doel vak**

1. Acquire an understanding of the complexity and biotic richness of aquatic ecosystems and the importance of the medium, water, in shaping this.
2. Acquire an understanding of the links between aquatic ecology and water quality, and develop the capacity to interpret patterns from the one into those of the other field.
3. Be able to understand, summarise, and debate papers from the primary literature selected to deepen the subjects presented with help of the textbook.
4. Be able to design, carry out and report on a limited field study in the waters around Amsterdam and test a self-developed hypothesis.

**Inhoud vak**

This is an introductory course to for earth scientists interested in water that want to enrich their expertise with ecology. It can also serve to add a view on aquatic habitats for ecologists that mainly have been exposed to terrestrial habitats so far. The subject is presented at a master’s level with a focus on independent exploration in the field and primary literature. The course will be taught from a basic textbook, Dobson & Frid (2009), as starting point, with excursions to papers providing depth to the chapters.

Characterisation of the content: Commonalities versus specific features of aquatic ecosystems: lakes, rivers, estuaries, the sea. Interactions between water body and surrounding land (catchment). A systems perspective: important processes and the role of biota: marginal or crucial? Interactions among biota in the food-web (predation, competition) and otherwise (the role of engineers or keystone species, mutuality, mutualism). Aquatic biodiversity: what does it mean? Biota as indicators of water and sediment quality in rivers and lakes. Aquatic ecology for water quality and quantity management.
Onderwijsvorm
1. plenary lectures (5 x 4 = 20 hrs). Lecture format: Vermaat discusses chapter content, students give a brief presentation on deepening papers. Non-presenting students are expected to have prepared by reading these chapters and the two accompanying, deepening papers (see below) before the lecture. The lecture is concluded with debate on the accompanying paper.
2. comparative fieldwork in small groups of 2-4 students: spatial gradients among and within water bodies around Amsterdam (field 2 d, lab processing 2 d), concluded by student seminars on fieldwork (4 hrs); student groups write a report on their fieldwork subject (length 5-10 pp, 11 pt Times New Roman, Introduction, Method, Results, Discussion, References containing ~ 10 papers from the primary literature)
3. literature study for deepening presentations and field work report.

Toetsvorm
Written exam (60%), fieldwork report (30%), oral presentations (both on book and lab work, content and quality, 10%). The written exam is open book.

Literatuur
Selected deepening papers (liable to change, will be communicated at start of course):

Rivers

Estuaries

Coastal Seas

Open Ocean

Aanbevolen voorkennis
Basic statistics, introduction in hydrology

Doelgroep
MSc Earth Sciences (all tracks), MSc Hydrology, MSc Biology, MSc Ecology

Causes and Consequences of Environmental Change

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<td>dr. A.J. Gilbert</td>
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<td>dr. A. Kalfagianni, dr. A.J.A. van Teeffelen MSc</td>
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Doel vak
To develop a common base of knowledge about the causes and consequence of environmental change and about how different disciplines perceive and address environmental problems. By the end of this course, students should be able to:
1. classify and illustrate the diversity of environmental problems;
2. explain the concepts of sustainability and growth, as well as other key concepts from the natural and the social sciences;
3. explain causality for a selection of environmental problems;
4. evaluate frameworks and indicators used in analysing environmental trends;
5. explain the roles of stakeholders and policy in dealing with environmental problems;
6. analyse an environmental problem using the DPSIR framework;
7. demonstrate skills, notably: writing, framing, presenting, and reviewing.

Inhoud vak
Without economic growth, we would not enjoy our current lifestyles. Economic growth is also needed to repair the environmental damage we have already done. Consequently sustainability cannot be achieved without growth. Identification of a path to sustainability is fraught with difficulties because many environmental problems have become ‘wicked’ (cf ‘tame’). Wicked problems are typically associated with strong moral, political and professional issues, such that there may be little consensus about what the problem is, let alone how to resolve it. Climate change and biodiversity loss are but two examples of wicked environmental problems.

Sustainable development is seen as having three main components: the environment, the economy, and the society. These three components provide the basic disciplines addressed in this course – natural, economic and social sciences – and are used to illustrate the range and diversity of environmental problems and their analysis. The course draws on an analytical tool, the 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 taming of ‘wicked’ problems, although this may be limited to identifying where
'wickedness' lies, such as inadequate scientific knowledge, uncertainty with regards to the benefits of environmental remediation (and particularly when the costs are known), reluctance of stakeholders or 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 (=DPS); and consequences of environmental change (=IR). Because I and R are covered in other ERM courses, notably environmental economics and environmental policy, this course places relatively more emphasis on causality. Topics range from fisheries, to poverty, to the setting of environmental standards, to stakeholders, to climate change. They have been selected to highlight the breadth of environmental sciences 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 management can modify or redirect the patterns of behaviour that are common, if not inherent, in a given society.

**Onderwijsvorm**

The course comprises two types of activities. The first takes place in classes, where information is presented via lectures, presentations, workshops, debates, seminars and documentaries. This involves 55-60 hours, including student presentations for their assignment. The second takes place in students' own time, and comprises reading, preparation of presentations, a critical review (not graded), and an assignment.

Class: 50 hours  
Reading and exam preparation: 40 hours  
Assignment & peer review: 30 hours  
Presentations: 30 hours  
Critical review: 10 hours

**Toetsvorm**

- 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.

**Literatuur**


Tietenberg, T.H. & L. Lewis. 2010. Environmental economics and policy. Addison-Wesley, Boston. Chapters 6 (pp 104-118), 14 (pp 301-322), and 20 (pp 458-466).

**Doelgroep**

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

**Overige informatie**

Other lecturers:  
Dr. Pieter van Beukering  
Dr. Jetske Bouma  
Dr. Matthijs Hisschemöller  
Dr. Onno Kuik  
Dr. Marja Lamoree
Guest lecturers for select topics:
Prof. Jeroen van den Bergh
Dr. Jaap Mulder
Prof. Arthur Petersen

Climate and Policy

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**Doel vak**
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.

**Inhoud vak**
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 Fourth 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.

**Onderwijsvorm**
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.

**Toetsvorm**
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.

**Literatuur**

**Reader**

**Climate Modelling**

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**Inhoud vak**

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?

Onderwijsvorm
Lectures, discussion meetings and computer exercises.

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

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

Overige informatie
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 System Transitions

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<td>Werkgroep</td>
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Doel vak
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.

Inhoud vak
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.

**Onderwijsvorm**
Lectures and workshops.

**Toetsvorm**
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.

**Literatuur**
Reader composed of scientific papers selected by the lecturers

### Environmental and Energy Policy Tools

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<td>Lesmethode(n)</td>
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**Doel vak**
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.

**Inhoud vak**
This course includes the following six classes of tools:
1. Systems analysis and simulation: use of simulation software (STELLA);
2. Scenario analysis
3. Spatial analysis: use of Geographic Information Systems (ArcGIS);
4. Stakeholder analysis
5. Multicriteria analysis (MCA): use of decision support software (DEFINITE);
6. Valuation and cost-benefit analysis (CBA); use of CBA software
Systems analysis and scenario analysis are run as parallel courses (see the time table). You will need to make a choice on the first day of the course. Spatial analysis and Stakeholder analysis are also run as parallel courses. You will need to make a choice at the beginning of the second week. Your choice in the first week is independent of your choice in the second week. Multicriteria analysis and Cost benefit analysis are obligatory for all students.

**Onderwijsvorm**
Lectures, Practicals in computer lab, Assignments, Group project
Total contact hours 120

**Toetsvorm**
The first five weeks of this course are lecture weeks. For each tool there is a separate exam. The total exam grade is calculated as the average of the four tool exams. Note that you do not have to pass each tool exam as long as your average is 5.5 or higher.
The exams of the first two tools are combined and take place at the end of the spatial analysis/stakeholder analysis lectures. The exams of the MCA and CBA tools are also combined and take place at the end of the CBA lectures.
The exams (see time table for time and place) will be closed book examinations, i.e. you will NOT be allowed to consult any course material during the examination. You can bring a simple non-programmable calculator, but no mobile phone, laptops, l-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 exam. Example exams for all tools and their answers can be found with the course documents on Blackboard.
The final mark for this course is calculated as the weighted (60% exam - 40% project) average of the total exam grade and the project report. However, students have to pass both the exam and the report (>-5.5).

**Literatuur**
Reader 'Environmental and Energy Policy Tools'

**Doelgroep**
Students must at least hold a Bachelor's degree from a university or an institute of higher vocational education (with a minimum of three years of full-time study).

**Overige informatie**
Prof dr A.C.Petersen; Prof Dr J.Gupta;

**Environmental Economics for ERM**

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Doel vak
This module aims to give an overview of economic policy instruments for managing environmental problems from an interdisciplinary perspective from the local through to the global level. Moreover, it will discuss the relevance of economic instruments in a large variety of policy contexts.
A critical cause of environmental problems is that not all costs falling on economic agents are borne by those responsible for generating them. This problem will be conceptualised in this course through the notion of externalities. There are various economic instruments and institutional arrangements for addressing such externalities. Criteria for their selection and evaluation will be discussed. Applications of environmental policies at various administrative levels (i.e. local, national, international), different economic sectors (i.e. water, waste, forestry, fisheries, biodiversity, trade) and different country contexts will be discussed. The course will also discuss international trade and investment related issues, as well as tackle major environmental problems, like climate change. The course will, furthermore, attempt to build bridges between economic policy instruments and other governance instruments.
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.

Inhoud vak
This module will present the economic approach to environmental policy, as it has been developed in the field of environmental economics. 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 is environmental regulation necessary or not (Coase theorem)?
- Which criteria should be used to select environmental policy instruments, and to what extent are such criteria complementary or conflicting (normative theory)?
- Which policy instruments are available, and what are their (dis)advantages in view of the selection criteria (in general or in particular applications) and in specific country contexts?
- What are critical and debatable assumptions of core policy insights within environmental economics?

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

Literatuur

Overige informatie
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.

Environmental Policy

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**Doel vak**

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.

**Inhoud vak**

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.

**Onderwijsvorm**

The course is worth 6 ECTS points which corresponds to 150 hours of work per student.
**Toetsvorm**
2 written assignments (20%) – a mid-term exam (40%) and a final exam (40%)

**Literatuur**
currently being revised; it will become available in September

**Doelgroep**
Master students

**Governance of Ecosystem Services**

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**Doel vak**
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.
Inhoud vak
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.

Onderwijsvorm
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.

Toetsvorm
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.

Literatuur
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).

Aanbevolen voorkennis
Students are encouraged to also take course 468024 ‘Values of ecosystem services and biodiversity’.

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

Overige informatie
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.

International Development Issues in the Context of Sustainable Development
Doel vak
This course aims to provide Master's students at Dutch universities with a broad perspective of the complexity and interrelatedness of both scholarly studies and the practical and political dimensions of international development issues in the context of sustainable development. The course is also relevant for PhD candidates in the earlier phases of their trajectory, notably for PhD candidates in the context of the CERES and SENSE Research Schools.

The course is built around the first part of the annual series of lectures by internationally renowned experts at VU University, organized by the Society for International Development (Dutch Chapter), which focus on different themes every year. These lectures will be complemented by 5 additional workshops that will provide a common academic basis. The workshops will help students to relate the basic course material with the highly topical SID lectures.

Inhoud vak
The course focuses on:
a) The evolving nature of development (economic, social and environmental) challenges;
b) Development & Development Cooperation: the history of development cooperation and lessons learnt; prognosis about the future of development cooperation;
c) The role of the state and state sovereignty;
d) Grand challenges;
e) Globalisation.

Learning goals
After studying this course, students should:
• Be able to define and explain key concepts of relevance to international development in the context of sustainable development;
• Understand the causes and impacts of international development challenges;
• Be able to identify, explain and analyze the various principles, declarations and policy options for coping with international development challenges;
• Be able to understand the key political challenges that may hamper the adoption of such policy options at international level and at the North-South, North-North, South-South level;
• Be able to analyze the key challenges that may hamper the implementation of relevant policy options at multiple levels of governance;
• Be able to make links between the general theoretical issues and the
individual SID lectures and to integrate the information; and
• Be able to make a judgment about how international development issues
need to be addressed in the 21st century.

Onderwijsvorm
Lectures and debate, workshops

Dates of VU Workshops
16 September: What is development
14 October: New actors in development cooperation
4 November: Non-state actors and development
25 November: Urbanization and development
2 December: Environment and development
16 December: student presentations
20 December: final examination

Toetsvorm
The final mark of this course is composed of three parts:
1. A written exam, which counts for 50% of the course grade.

2. A paper of 2,000 words, which counts for 30% of the course grade. The students will choose one topic, to be approved by the course coordinator, for his/her paper, demonstrating the students’ progress and achievements in knowledge, understanding and personal well-founded opinion on international development, in relation to the student’s own disciplinary background, to the interrelations between the relevant academic disciplines and between academic and political perspectives on the issues.

3. A short summary in blog format of (one of) the SID lectures’ central topics which will be later discussed in class, which counts for 20% of the course grade. In collaboration with SID one or more of the best student summaries will appear on the SID blog page (see http://sid-nl.org/sidblog/).

Active participation in the workshops and attendance of the SID lectures are obligatory. In order to pass, all parts should at least be marked with a 5.0 and the final score must be higher than a 5.5.

Literatuur
Textbooks and Reference Volumes

Journals
World Development
Journal of Development Studies
Journal of International Development
Development & Change
European Journal of Development Research
Studies in Comparative International Development
Third World Quarterly
Journal of Human Development and Capabilities

Major Sources for Policy Papers on Development
World Bank
OECD Development Assistance Committee
Oxfam: http://www.oxfam.org
The Bretton Woods Project: http://www.brettonwoodsproject.org/
The Initiative for Policy Dialogue: http://www0.gsb.columbia.edu.ipd
Doelgroep
Aimed at Master's students with global, international and developmental interests. For more information please contact dr. Agni Kalfagianni (a.kalfagianni@vu.nl).

Overige informatie
Period: September-January, with one SID lecture per month on a Monday evening, 5-7 pm (see separate SID program). Accompanying VU lectures and workshops are all held as well on Monday evenings, 5.15 – 7.15 pm, room WN-M648 (except for Tuesday 4 November).

Registration until September 9 with one of the following ways:
1. VU students: registration through VUnet
2. Students from other universities: register as a "bijvak"student, after registration at the VU, the course can be booked through VUnet
3. Non students: please contact the course co-ordinator: agni.kalfagianni@vu.nl

Modern Climate Systems

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Doel vak
To understand the physical and chemical processes that control atmosphere and ocean.

Inhoud vak
This introductory course gives a (short) overview into the physical and chemical processes driving the atmosphere and the ocean. Knowledge of the modern climate processes forms the basis for understanding Climate Change today and in the past.

Knowledge to gain about:
- the basic parameters and properties of atmospheric and ocean examples
- 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

Onderwijsvorm
Lectures and workshops, literature reading.

Toetsvorm
Modern Geo-ecosystems

**Doel vak**
To understand the interactions between the geo-, bio-, hydro- and atmosphere in a selected number of modern terrestrial and marine geo-ecosystems. Special focus is given on both the natural processes and the human impact during the Anthropocene.

**Inhoud vak**
Anthropogenic changes to the Earth's climate, land, oceans and biosphere are now so huge and rapid that the concept of a new geological epoch defined by the action of humans, the Anthropocene, is widely and seriously debated.

Knowledge to gain about:
- scale, magnitude and significance of modern environmental change especially in relation to Earth's geological history.

**Onderwijsvorm**
Lectures, literature study, student presentations (45 minutes, teaching each other by lecturing) and essay writing.

**Toetsvorm**
Oral presentation, written essay

**Literatuur**
Lecture notes, selected papers.

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**Philosophy of Political Science and Research Methods**

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Doel vak
The objective of this course is to enable students to critically reflect upon the methodological choices involved in political science research and to justify their own choices, linking the levels of epistemology, methodology and techniques. More specifically, the course aims to enable students to:
- recognise and reflect upon various research traditions in the social and political sciences (positivist, hermeneutical and critical approaches) and the ideas about the relation of theory and observations that they involve;
- familiarise students with the formulation of a research design and the application of suitable political science techniques to the analysis of political phenomena;
- justify methodological choices in setting up a research design.

Inhoud vak
Led by the question ‘What is good political science?’, students are taught to identify different criteria that have been proposed to demarcate ‘good’ political science, and to reflect upon the validity of these criteria. We will be looking at the level of research techniques as well as that of methodology and of epistemology. Linking this knowledge to their research work for other courses and their thesis, students are expected to explicate their methodological positions and to be able to justify them against alternative approaches. Thus students are to develop their insight in addressing research questions and in developing appropriate research designs. The course is structured as a seminar in which students participate actively and learn how to apply research techniques while reflecting upon them in a critical way. The assignments allow the students to link the class teachings to their own research interests.

Toetsvorm
The clean sweep test is a ‘hand in assignment’. For information about the assignment contact the course coordinator. Find the hand in dates on: http://www.fsw.vu.nl/en/students/schedules/clean-sweep-tests/index.asp.

Literatuur
* Additional literature will be announced in due course via Blackboard.

Vereiste voorkennis
Admission to the MSc Political Science or to the Masters in Social Research, track; Political Science.

Doelgroep
Master students.

Overige informatie
Please note: this course is not taught during the academisch year 2011-2012. Only a clean sweep test is provided.

Political Concepts and Processes

| Vakcode       | SPCP_O (705732) |
Doel vak
The aim of this course is to familiarize students with central concepts and approaches relevant to both International Relations and Comparative Political Science research. Specifically: 1) to develop students' knowledge of the history and the foundations of Political Science in relation to the philosophy of the social sciences; 2) to provide insight in the position, role and capabilities of main political actors; 3) to place the study of domestic and international politics in a broader theoretical context; 4) to train students' ability to identify and apply core concepts of Political Science; 5) to stimulate critical theoretical and normative reflection.

Inhoud vak
We focus on whether and how central concepts used in Political Science are affected by the current (global) phenomenon of transnationalization. We try to learn from the history of Political Science as a discipline and we study the current state of the art in various fields of research, including the development of theory and of methods of (comparative) political inquiry. For example, we deal with notions of 'democracy' and 'democratisation'. What does this concept mean? How do democratic processes work? What is the role of institutions, the judicial system, of political parties and interest groups in modern societies? How is 'democracy' developed over time? How is it used in the various sub-disciplines? How is 'democracy' (national, European, global) affected by the processes of European integration and of transnationalization? Similarly, we explore how the meaning and use of other central concepts have changed over time, and how the phenomena they describe are being shaped by current forces of transnationalization and European regional integration. In addition, we use the history of Political Science to illustrate which approaches have been used in research in the past and how methods of analysis have developed and changed over time, from purely descriptive approaches to modern techniques of political inquiry and critical reflection. Finally, we will apply selected Political Science concepts to concrete contemporary issues in politics, exploring to which extent and how the structure of domestic politics is increasingly being influenced by Europeanization and globalization and how the interaction between International Relations theory and Comparative Political Science is gradually developing in the study of international politics and the EU.

Toetsvorm
The clean sweep test is a ‘hand in assignment’. For information about the assignment contact the course coordinator. Find the hand in dates on: http://www.fsw.vu.nl/en/students/schedules/clean-sweep-tests/index.asp.

Literatuur
Selection of articles from major journals (to be announced).
Vereiste voorkennis
Admission to the MSc Political Science or to the Masters in Social Research, track Political Science.

Doelgroep
Master students.

Overige informatie
Please note: this course is not taught during the academisch year 2011-2012. Only a clean sweep test is provided.

Research Project

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Doel vak
The objectives of this course are:
- To become acquainted with environmental research and policy in practice;
- To apply the theoretical frameworks elaborated in the former ERM courses in a specific context;
- To apply the disciplinary knowledge and skills, obtained in former studies and ERM courses to a real life problem;
- To write an environmental report independently.

Inhoud vak
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.

Onderwijsvorm
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.
**Toetsvorm**
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%.

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

**Vereiste voorkennis**
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).

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

**Overige informatie**
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.

**Sedimentary Environments and Climate Archives**

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<td>dr. F.J.C. Peeters</td>
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**Doel vak**
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.

**Inhoud vak**
The course deals with the sedimentology, geochemistry and stratigraphy of marine, coastal, fluvial, lacustrine, eolian, and periglacial 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
Onderwijsvorm
Lectures, literature study, group discussions.

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

Literatuur
Lecture notes, selected papers.

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

Doelgroep
Master students Earth and Environmental Geosciences
Master students in Paleoclimatology

Sustainability and Growth

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Doel vak
Sustainability & Growth uses the DPSIR analytical framework to present the breadth of environmental problems, and the different disciplines employed in the analysis of their causes, effects and possible solutions. It is the first course in the Environmental and Resource Management (ERM) programme and is followed by all students from all specialisations. It serves to develop a common base of knowledge that subsequent courses will develop further.

By the end of this course, students should be able to:
• classify and illustrate the diversity of environmental problems;
• explain the concepts of sustainability and growth, as well as other key concepts from the natural and the social sciences;
• explain causality for a selection of environmental problems;
• evaluate frameworks and indicators used in analysing environmental trends;
• explain the roles of stakeholders and policy in dealing with environmental problems;
• analyse an environmental problem using the DPSIR framework;
• demonstrate skills, notably writing, framing, presenting, and reviewing.

Inhoud vak
Without economic growth, we would not enjoy our current lifestyles. Economic growth is also needed to repair the environmental damage we have already done. Consequently sustainability cannot be achieved without growth. Identification of a path to sustainability is fraught with difficulties because many environmental problems have become ‘wicked’. Wicked problems are typically associated with strong moral, political and professional issues, such that there may be little consensus about what the problem is, let alone how to resolve it. Sustainable development is seen as having three main components: the environment, the economy, and the society. These three components provide the basic disciplines addressed in this course – natural, economic and social sciences. The course draws on an analytical tool, the 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 taming of ‘wicked’ problems, even if this is limited to identifying where ‘wickedness’ lies such as inadequate scientific knowledge or uncertainty with regards to the benefits of environmental remediation.

DPSIR may be seen to comprise two ‘arms’: causality of environmental problems (=DPS); and consequences of environmental problems (=IR). Because I and R are covered in other ERM courses, Sustainability and Growth emphasises causality. Topics range from fisheries, to poverty, to the setting of environmental standards, to the inclusion of stakeholders, to climate change.

Onderwijsvorm
The course involves lectures, student presentations, student reviews, workshops, debates, seminars and a documentary

Toetsvorm
The final grade for Sustainability & Growth is derived from:
1) group activities worth 30% of the final grade
2) an assignment and peer review worth 30% of the final grade
3) an exam worth 40% of the final grade.
To pass the course, students must receive a grade exceeding 5.0 (out of 10) for the exam and their overall grade must exceed 5.5. There is one re-sit of the exam. Students who are graded 5.5 or lower for the assignment have one opportunity to revise it.

Literatuur
Available via the online reader on Blackboard:
Required text for Environmental Economics.
Tietenberg, T.H. & L. Lewis. 2010. Environmental economics and policy. Addison-Wesley, Boston. Chapters 6 (pp 104-118), 14 (pp 301-322), and 20 (pp 458-466).

Vereiste voorkennis
Admittance to ERM

Doelgroep
Students interested in a broad understanding of the environmental sciences.

Sustainable Energy Analysis
After following this course the students are able to:
- Make use of scientific information about major energy resources and conversion processes to assess the economic and environmental impacts of existing and new technologies in the energy sector;
- Apply this scientific information in the widely different contexts of industrialised, emerging and least developed nations;
- Assess the potential; and implications of using wind, solar and biomass; technologies in both rich and poor nations;
- Evaluate the sustainability implications of different; fossil fuel; technology choices in a comprehensive and balanced way;
- Explain the environmental risks and supply potential of nuclear energy.

The role of conventional and renewable energy on the road towards sustainability forms the main topic of this module. Energy use drives economic development while at the same time 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. Moreover, the potential role of energy technologies is strongly dependent on the stage of economic development of the region and sector where it will be applied. The following subjects will be dealt with in more detail:
- Introduction to energy technology assessment and global energy use patterns;
- Biomass technology applications in developed and developing nations
- Wind and solar technology applications in developed and developing nations
- Fossil fuel resources and sustainability;
- Nuclear energy resources and sustainability.

Lectures, team assignment and workshop
25 hs for the Dragon’s Den assignment and 195 hs for lectures.

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

Reader with open source literature

Sustainable Land Management
Doel vak
What are the enabling and limiting factors to sustainable land management? How can smallholder farmers in the developing world adapt to climate change? What can farmers in developing countries – and especially Africa – do to improve their food security? Can organic agriculture help feeding the world? Are biofuels the solution for our energy needs of tomorrow? These and many other questions will be discussed during this interdisciplinary course. Its main focus is on what can be done about the problems of soil erosion and land degradation, and their relevance to climate change and poverty reduction. "Sustainable Land Management" is a new approach that involves both people and technical issues. The course spans a wide range of topics, including environmental problems, history of approaches, conservation technologies in the field, indigenous knowledge, working with local people, and skills in research and development in the tropics. There is a combination of theory and practice, with a strong emphasis on illustrated case studies from over 20 countries.

Inhoud vak

Onderwijsvorm
Interactive lectures (about 38 hours in total) with illustrated case studies supplemented by group work activities; conducted and examined in English.

Toetsvorm
One topic will be chosen by each student for a paper of 3.000 words based on further reading (50% mark). There will also be a final examination (50% mark).

Literatuur
"Where the land is greener" WOCAT, Eds Liniger and Critchley, plus additional supporting literature.
**Doelgroep**
Aimed at Master’s students with environmental and developmental interests: especially those with some geography/earth science/hydrological/biological/ecological/environmental background, but social scientists can also benefit from this course.

**Overige informatie**
Comments from former students:
"I think this course gives a good overview and helps students with a non environmental background to understand essential issues."
"Good job, keep on going! Continue to be part of the ERM programme."
"Whereas other courses focus on scientific dimension of environmental problems SLM is also about the human dimension of environmental solutions. It is one of the few courses that gives a positive perspective for practical solutions. Whereas other courses try to inject "knowledge" theoretical problems and solutions."
"The course was a great launch pad for my thesis research."
"This should be a specialization track! Sustainable Land Management 2 would be very interesting and give students more time to learn about the topics."

For more information please contact Wendelien Tuyp (w.a.m.tuijp@vu.nl)

Theories and Approaches in International Relations

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**Doel vak**
This course provides students with an encyclopaedic overview of the traditions, approaches, (meta-) theories and key concepts in the field of International Relations (IR) broadly conceived. Its principal aim is to provide the students with a common basis with regard to the theoretical foundations of IR.
More concretely it aims:
- to provide students with an encyclopaedic 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 and thus to develop students' knowledge of the history and the foundations of the philosophy of social sciences (increasing their reflexive knowledge of both the main traditions and of paradigmatic change);
- to advance students' understanding of the epistemological issues involved doing political research and thereby rendering them capable of developing coherent research designs
- 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;
**Inhoud vak**
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.

**Onderwijsvorm**
Tutorial. 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. For each session students must prepare one page in which they answer one or several critical questions pertaining the prescribed literature. The total amount of reading will be about a 100 pages per session.

**Toetsvorm**
Testamur based on participation; (30 %) and three essays (70 %).

**Literatuur**
* Reading list (will be available during first class).
**Vereiste voorkennis**
Admission to the MSc Political Science or to the Masters in Social Research, track; Political Science.

**Doelgroep**
Master students of the specialized tracks International Relations & Transnational Governance and Global Environmental Governance.

**Intekenprocedure**
It is obligatory to sign up for a course, for more information on dates to sign up, go to www.fsw.vu.nl/schedules.

**Value of Ecosystem Services**

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**Doel vak**
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. Quantification and apportionment are major challenges. 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. Biodiversity, or the variety of life forms that populates and modifies our earth, can be seen as the main underlying asset from which all ecosystem services are produced. 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. This course aims to assess the importance of ecosystem services and biodiversity for nature, the economy and people in both developed and developing countries.

**Inhoud vak**
The course focuses on an understanding of what specific services are provided by which component of ecosystems, how these are linked to specific elements of biodiversity and the problems arising from scaling and multiple roles. It attempts to remain close to the practicality of specific 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 is covered (e.g. wildlife, flora). Next to lectures and debate, the course contains a two-week case study carried out in groups of 3-4 students. Task is to quantify all services in a specific ecosystem by means of a rapid appraisal method. During the previous lectures, students have developed their research protocol, which then will be ready for application in the case study.

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

What is an ecosystem and how are ecosystems changing over time and space?

What services do ecosystems and biodiversity provide and how can these services be measured?

What is the economic importance of the ecosystem services and biodiversity and what drives these economic and cultural values?

What instruments are available to mobilise payments for ecosystem services necessary for sustainable management of ecosystems and biodiversity?

How to conduct a rapid appraisal of ecosystem services taking into account the above-mentioned issues?

Onderwijsvorm
- 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).

Toetsvorm
A group case study presentation and a final report;
The course ends with a closed book exam;
The exam weighs 70%, the presentation 10% and the final report 20%.
Students must pass all (5.5 or higher).

Literatuur
To be announced by August 2013

Overige informatie
Prof Dr Peter Verburg (IVM-VU University)
Dr Mathew Parr (IUCN)
Dr Rudolf de Groot (Wageningen University)
Dr Ben ten Brink (PBL, Netherlands)

Water and Policy

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Doel vak
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 problem, 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) with its interaction of natural and socio-economic dynamics.
- 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.

Inhoud vak

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.

Onderwijsvorm

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; some 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

Toetsvorm

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

Literatuur

The literature for this course consists of various academic papers and chapters. This list is subject to possible changes.

- USGS hydrological cycle education website (PDF on blackboard)
- Water balance components (PDF on blackboard)

6v1h8eHm5fZ0ge1R0Az4h/QUHRUVTaDd6M0ZXRFOzUwpvNYJuX0tvCd1QWDBMMIL9RaWhDeloyYWLOTFdMnhm3QzLZC1UNTFCtTLBS0dTOUdDZVXzdUkzck85UFNaTTFpcUTXVEZBUHU1RmJiQmxnN01DdVoYtJkJWmlsaGx4xWkg5dlmjbeEnkMIIFncWVBckRmQ0NOObmQwNmhzZ1k=/?docid=fdba3f0f3f1752a195e3c521b3d1e4&chain=EGAAALA82VBJ%2B8CQRI1OM4zPMTpZbm7VQuf0gR2T77AXafcB&sec=AHSqidxbSk5HEP2IBE3Pf-SXZEmCg_dcbQL1gpXtjebj1dKooq0J8gaKoljylnQRodr5R53hMBSm&ag=gp&filename=193-214_778_Pechlivanidis_13-3.pdf&nonce=nd6mu04m24p8g&user=AGZ5hq_6v1h8eHm5fZ0ge1R0Az4h&hash=fanf4gbjr0mmj2aabfvgkuohlt8e001u


• Daniel P. Loucke and Eelco van Beek, 2005. Water Resources Systems Planning and Management – an introduction to Methods, Models and applications. UNESCO, France and WLDelft Hydraulics, Netherlands: Appendix C: p. 581-590 (sections 1,2,3,4)

http://ecommons.library.cornell.edu/handle/1813/2804


http://www.sciencemag.org/content/313/5790/1068.full.pdf?sid=8b7e546f-0ac7-4c38-9599-779ec23eb9b


http://www.sciencedirect.com/science/article/pii/S0022169409003576#


http://reep.oxfordjournals.org/content/4/2/179.full.pdf+html


http://reep.oxfordjournals.org/content/4/1/44.full.pdf+html
Doelgroep
MSc students Environment and Resource Management (ERM) and Earth Sciences and Economics (ESE).

Workshop Governance for Sustainable Development

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