Course catalogue

Master's programme

Innovation Sciences

2016-2017

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Content

4 Appendices

Preface

Welcome to the Master's programme Innovation Sciences!

The Master's programme in Innovation Sciences is part of the Graduate School of Geosciences and is organised by the Department of Innovation, Environmental and Energy Sciences. The programme aims to teach you the specialised knowledge and professional attitudes and skills you need to become a first class researcher in academic and professional organisations in the field of innovation sciences. The close link to the excellent research of the Copernicus Institute of Sustainable Development, combined with the small scale of the groups, the international setting of the Master's programme and the pleasant working atmosphere will contribute to this aim.

We hope this course catalogue will help you to find easily the relevant information you need as a student in the Master's programme. First a general description of the programme, the structure, the components and some organisational matters are presented. This is followed by a description of all courses of the two-year programme. Information about procedures, a list of staff members, and the UU-time table are also included in the catalogue. The Teaching and Examination regulations 2016-2017 (OER) can be found in Appendix II and the Regulations of the Board of Examiners will be published separately on the website.

At any time during your studies you will need two course catalogues: one of the year you started your Master's programme in Innovation Sciences (this shows the exam programme that you need to follow) and one of the most recent academic year, which shows the current Rules & Regulations.

You can find more information on the website at:
http://students.uu.nl/en/geo/innovation-sciences.

Still, if you have some (personal) questions, you can contact the Study Advisor of the programme.

On behalf of the staff we wish you an inspiring, pleasant and successful new academic year!

Dr. Frank van Rijnsoever, Programme Leader Innovation Sciences
and
Dr. Margien Bootsma, Director of Education Innovation, Environmental and Energy Sciences

1 Content of the programme

1.1 Character of the Innovation Sciences programme

The Master's programme Innovation Sciences (IS) trains students to ***analyse innovation questions that are related to the introduction or development of new technologies***. Technological innovation is often seen as a condition to ensure future economic growth and considered pivotal in addressing grand challenges, such as energy production, health care, mobility or sustainability. The question how these innovations can be realised effectively remains unsolved and requires insights in the nature of technological trajectories, the role of firms in relation to governments, knowledge institutes and other stakeholders, and the conditions of knowledge production. Typically, these innovation questions are ill-defined, complex and open ended. To address them successfully requires understanding of the technologies involved, rigorous knowledge of innovation theories and methods, as well as flexibility and creativity. Intellectually, IS draws heavily on insights from the multidisciplinary field of Innovation Studies, which is part of the social sciences. Innovation studies combine insights from management, economics and social science perspectives on technological change.

The IS programme views firms as key players in the development of new technologies. However, these firms do not innovate in isolation, they operate in a network with other firms, knowledge institutes, users and other stakeholders that are involved in the development of innovations. It emphasises that the collective efforts of stakeholders shape technological trajectories. Further, most of the technological innovations that are studied in the programme aim to make a societal contribution. Third, the programme gives special attention to disruptive innovations at the expense of incremental product changes and product development. This focus distinguishes IS from, for instance, business schools, in which innovation only appears as a means for firms to survive or to gain a competitive advantage.

The IS programme has a strong analytical orientation. Students are trained to use research as a tool to analyse innovation processes systematically. Graduates are trained in selecting and applying relevant innovation theories, to design a qualitative and/or quantitative innovation research. This allows graduates to understand innovation problems rigorously, to produce new (scientific) insights and to develop (new) solutions to innovation problems based on these insights. Thereby graduates can perform their main job tasks on an academic level in the professional field. These capabilities are important for careers in research environments, government bodies, consultancy firms (both specialised and generic) and technology driven firms.

Next to the domain of Innovation Studies, IS also pays a lot of attention to the development of skills that are required after graduation. Innovation processes often involve different parties with different backgrounds. Therefore, a prime skill is communication to different audiences using different formats and media.

The IS programme is internationally oriented. Where possible exchanges are facilitated, but only if they add to the quality of a student's programme. Finally, the programme wishes that every student can develop to his/her full potential, therefore it actively promotes excellence among students and it promotes student initiatives.

Finally, IS is not only a programme, it is part of an academic community consisting of students, teachers, researchers, support staff, professionals and alumni. The programme actively supports this community together with other (student) associations.

1.2 Relation between the Master's programme and the Copernicus Institute

The Master's programme is closely affiliated to the Copernicus Institute of Sustainable Development, which is part of Utrecht University. The research conducted at the Copernicus Institute covers a wide range of issues related to sustainable development and innovation. The starting point of all research is the source-impact chain that links economic activities with ecological values. For more information on the research programme and its clusters of the Copernicus Institute, see: http://www.uu.nl/faculty/geosciences/en/research/institutesandgroups/researchinstitutes/copernicusinstitute/Pages/default.aspx.
The IS programme is closely related to the research of the Innovation Studies Group of the Copernicus institute. This group studies innovation processes that are related to significant societal problems like climate change, non-sustainable energy provision, non-sustainable transportation system or the increasing costs of the healthcare system.

1.3 Degree qualifications

Based on the characterisation above, the Innovation Sciences programme has the following degree qualifications:

The graduate:

1. has advanced knowledge and understanding of the dynamics and challenges of Innovation Sciences in the context of both organisations and society at large;
2. is able to conduct research of the dynamics and challenges of Innovation Sciences in a creative and independent way;
3. has the ability to apply knowledge and research methods, and problem-solving abilities in broader contexts related to the dynamics and challenges of Innovation Sciences;
4. has insight into the complex interactions between science, innovative technology and society and is able to reflect critically upon the roles of science and technology in organisations and society;
5. has professional and academic skills, in particular in relation to the dynamics and challenges of Innovation Sciences;
6. is able to apply and knowledge and understanding in such a way that he or she demonstrates a professional approach to their work;
7. is able to communicate conclusions, as well as the knowledge, reasons and considerations underlying these conclusions, to an audience of specialists and non-specialists alike.

1.4 Description of the programme

To obtain these qualifications students follow four clusters of courses:

(i) courses on theory (Technology Related Venturing (GEO4-2268), Innovation Systems and Processes (GEO4-2257), Societal Challenges and Innovation Theory (GEO4-2258): 22,5 EC)
- overview of theories
- understand what theories do and how they are used
- abilities to judge and select theories for a particular research question
- how to combine theories and to improve theories
- understand how these theories can help solve a practical problem

(ii) courses on methods (Quantitative Innovation Analytics (GEO4-2270), Qualitative Innovation Analytics (GEO4-2260): 15 EC)
- quantitative methods
- qualitative methods

- writing research proposals
- understand how methods solved theoretical and practical innovation problems

(iii) courses on application and integration (Innometrics (GEO4-2259), Consultancy Project IS (GEO4-2252), MSc thesis (GEO4-2239X): 67.5 EC)
- in groups or individually
- with outside organizations for societal issues
- or with a focus on theoretical challenges

(iv) electives (15 EC)

In the first year students are trained in using theories and methods of innovation analysis, and to apply these to real innovation problems. In the second year, students follow an individual trajectory dedicated to their interests and ambitions, which includes a Master's thesis-internship project. The emphasis is put on independently applying all acquired knowledge and skills for the practical analysis of and influence on innovation processes. Further, to customise their programme, students can follow 15 EC of elective courses. This allows students to specialise in a topic or field of their interest, possibly related to their graduation topic. IS-students can also obtain an annotation of Sustainable Entrepreneurship & Innovation (see section 1.8).

Each cluster is discussed below. For further specifications of the contents, purpose, literature, and assessment criteria of the various programme components please refer to the course descriptions in this catalogue.

(i) courses on theory

The field of Innovation Studies is interdisciplinary by nature. It is the objective of the courses within Innovation Sciences that students become familiar with the most important theories of innovation, and learn how to apply these theories in the analysis of technology and innovation. More specifically,
- students will become acquainted with the classic readings in economic, management and social science perspectives on innovation in firms and in the context of the innovation system,
- students will learn to compare different theories in terms of explanatory power (the kind of problems a theory is able to tackle), and
- students will learn how a careful choice of theory improves the quality of innovation analysis.

Students entering the IS programme in September of each academic year start their studies with three obligatory courses (each 7,5 EC) focused on extending their knowledge of relevant theories for innovation studies and their skills of applying these theories to innovation problems encountered in reality, i.e. Technology Related Venturing (GEO4-2268; TRV), Innovation Systems and Processes (GEO4-2257; ISP) and Societal Challenges and Innovation Theory (GEO4-2258; SCIT). These courses will equip students with the necessary knowledge to make informed decisions about which theory to choose in order to tackle different kinds of innovation problems.

During the courses TRV and ISP students are educated in acquiring knowledge of original scientific contributions to the field of (new) technology based innovation and its management by various stakeholders involved. A number of theoretical strands are taught, ranging from evolutionary economics of technical change and the resource based view of the firm, to historical and sociological approaches of the co-evolution of technological change and networks of firms and stakeholders. In this way, students will get familiar with the intellectual 'landscape' of approaches, as well as with topics such as adoption and diffusion of innovations, dynamic capabilities, user-producer interactions and cycles of technological change. During both courses students are trained in understanding, comparing, recognising and integrating the various theoretical insights by writing reports on dedicated assignments.

During the course SCIT students reflect on what a theory is and on the role of theory in knowledge production. They discover what it means to use a theory and learn how to recognise approaches and assumptions in the broader field of innovation studies. They are trained to use the theoretical approaches taught during TRV and ISP in dedicated case studies and to generate new theoretical insights.

(ii) courses on methods

Additionally, students attend another two obligatory courses (each 7,5 EC) to extend their knowledge, skills and experience concerning methodologies relevant for innovation research: Quantitative Innovation Analytics (GEO4-2270; QuanIA) and Qualitative Innovation Analytics (GEO4-2260; QualIA). In these courses students are educated in translating theoretical insights into analytical models (= modelling) and measuring and analysing the variables in these models on the basis of data. QuanIA is focused on the use of quantitative data and appropriate methods of data analysis. Attention is paid to typical databases on firms or science and technology indicators, their analysis by means of statistical and social network methods. QualIA is focused on the use of qualitative data and appropriate methods of data analysis. Attention is paid to data collection from primary sources (interviews, documents) and their analysis by means of history event data analysis and discourse analysis. In both courses students are trained in interpreting the results of the analyses carried out and evaluating their scientific implications as well as their practical implications for management and policy. Effective communication (orally and in writing) about the research activities carried out is part of each course. Further, in both courses students are trained in how to structure a research project, how to make sensible and consistent theoretical and methodological choices and how to write this down in a research proposal.

(iii) courses on application and integration

The first year of the IS program starts with the course Innometrics (GEO4-2259). In this course students become acquainted with how practical innovation questions are translated to the scientific domain of Innovation Studies. Moreover, students are introduced to various sources of data that can be used to solve these problems. The emphasis is on typical innovation indicators, like patents and publications.

The first year of the IS programme is concluded by the course Consultancy Project – IS (GEO4-2252). The knowledge and skills acquired by the students during the previous courses are integrated and applied on a practical innovation problem. This is done in groups of students. Each group has to design and execute a limited research project concerning an innovation problem/issue in practice of their own choice. Every week there are group meetings of 3 groups together with one of the supervisors in which the groups discuss each other's work, problems encountered and progress to be made. The supervisor reflects on common issues encountered in the work of the groups present. Solutions to problems encountered by individual groups are not provided by the supervisors. They discuss only solutions to problems developed by the research groups themselves. The compositions and supervisors of the group meetings change every week in order to stimulate inter-group learning. Additional to the weekly meetings, groups may attend individual consultation meetings with a supervisor to discuss particular matters in further details. At the end of the course students deliver a scientific research report and a vocational report.

After completion of the courses on theory and methods and the course Innometrics, students may start their individual final research project for their Master's thesis (45 EC). Depending on the students' individual interests and ambitions, students focus on one of these research themes and develop their own research project. The research can (partly) take place in organisations other than the university (e.g. firms, institutes, including those abroad), depending on the data needed to answer the research question. An internship, thus, may be a useful ingredient of the graduation trajectory. The internship is optional and an integrated part of the 45 EC final research project. The

Faculty of Geosciences has its own digital internships database: http://internships.geo.uu.nl.

(iv) electives

Students can follow 15 EC of elective courses, this allows students to specialise in a field of their interest, possibly related to their graduation topic. The only restrictions on the choice of elective courses are that their relevance for the field of IS has been made clear, that they are part of a Master's programme or of a comparable level and that at least 7,5 EC of the electives is covered by a natural science elective. Selected ambitious students can design their own elective course ("Tailor-made course", GEO4-2269). The procedure for choosing electives is described in Appendix I.

Elective courses can also be followed at other universities. Please note that students with non-EEA nationalities may have to pay a steep fee in order to take elective courses at another Dutch university. This fee cannot be paid for or reimbursed by Utrecht University.

The Babel Talen Institute offers a short course in English for Academic Purposes. This course aims to practise the writing and presenting skills students need in their Master's programme. It does not offer any credits but you can take the course outside your IS programme, at your own expense. Please see http://www.babel.nl/language-courses/open-courses/english/course-english-for-academic-purposes/?lang=en for more details.

1.4.1 Academic skills

A high level of academic (vocational) skills is characteristic of innovation analysts and innovation managers. For several years, this has been put to practice by IS.
IS-students should be able to make clear and critical analyses, and – especially as potential intermediaries and consultants – communicate well with various parties and pressure groups. They can also collaborate well with group members of varied backgrounds. Therefore, IS's explicit aim is to allow its students to acquire insight into social and organisational relations, processes, and backgrounds and the technological foundation of the innovation problem studied. This is why IS-students, from the moment the programme starts, learn how to plan and perform research, to give oral presentations, to write well-structured, readable, and convincing papers, and to control quality. In addition, Master graduates are proficient at using computers and software, on a level one may expect from academics.

1.5 Course schedule IS 2016-2017

Students that start the MSc programme in 2016-17 will follow this course schedule:

Year 1 (start 2016)

Period 1	(C) Technology Related Venturing, GEO4-2268	(A) Innometrics, GEO4-2259
Period 2	(C) Quantitative Innovation Analytics, GEO4-2270	(A) Innovation Systems and Processes, GEO4-2257
Period 3	(A) Societal Challenges & Innovation Theory, GEO4-2258	(B) Qualitative Innovation Analytics, GEO4-2260
Period 4	(A+C) Consultancy project: IS, GEO4-2252 (15 EC)	

Year 2

Period 1-4	Electives (15 EC) Master Thesis, GEO4-2239X (45 EC)

Recommended electives: see website http://students.uu.nl/en/geo/innovation-sciences/academics/study-programme/electives

Of the electives, at least 7.5 EC should be a natural science course.

Recommended electives do not need to be approved by the programme leader but must still be approved *before starting* by the Board of Examiners.

1.6 Entrance requirements IS-courses

Some courses in the IS programme require prior knowledge, to be gained by passing or at least attending certain previous IS-courses. In the table below and in the course descriptions (chapter 3) you will find which courses carry which entrance requirements.

In case of a discrepancy between the entrance requirements and/or recommended pre-requisites mentioned in this course catalogue and the ones mentioned in the electronic UU course offerings database 'Osiris', the entrance requirements and/or recommended pre-requisites mentioned in the table below are leading.

Course	***Entrance requirement***
Master's Thesis IS (GEO4-2239X)	- Letter of acceptance MSc Science and Innovation Management or MSc Innovation Sciences, and Passed examinations of - Innovation and Organisations (GEO4-2229) or Technology Related Venturing (GEO4-2268), and - Mastering Theories of Technology and Innovation I or Innovation Systems and Processes (GEO4-2257), and - Mastering Theories of Technology and Innovation II or Mastering Theories of Innovation or Societal Challenges & Innovation Theory (GEO4-2258), and - Measuring and Modelling Innovation I or Innometrics (GEO4-2259) - Measuring and Modelling Innovation II or Qualitative Innovation Analytics (GEO4-2260), and - Designing Innovation Research

	(GEO4-2249) or Quantitative Innovation Analytics (GEO-2270)
Consultancy Project IS (GEO4-2252)	- Letter of acceptance MSc Science & Innovation Management or MSc Innovation Sciences & Passed examinations of - Innovation and Organisations (GEO4-2229) or Technology Related Venturing (GEO4-2268), and - Designing Innovation Research (GEO4-2249) or Quantitative Innovation Analytics (GEO4-2270) and - Mastering Theories of Technology and Innovation I or Innovation Systems and Processes (GEO4-2257), and - Measuring and Modelling Innovation I or Innometrics (GEO4-2259) Recommended pre-requisites: - Measuring and Modelling Innovation II or Qualitative Innovation Analytics (GEO4-2260) - Mastering Theories of Technology and Innovation II or Mastering Theories of Innovation or Societal Challenges & Innovation Theory (GEO4-2258)
Innovation Systems and Processes (GEO4-2257)	None
Societal Challenges & Innovation Theory (GEO4-2258)	Recommended prerequisites: - Innovation Systems and Processes (GEO4-2257), and - Technology Related Venturing (GEO4-2268)
Innometrics (GEO4-2259)	None
Qualitative Innovation Analytics (GEO4-2260)	None
Techn. Related Venturing (GEO4-2268)	None
Tailor made course IS (GEO4-2269)	- Letter of acceptance MSc Innovation Sciences - At least 45 EC passed within the programme
Quantitative Innovation Analytics (GEO4-2270)	Recommended pre-requisites: Technology Related Venturing (GEO4-2268); Innometrics (GEO4-2259)

1.7 Conversion of former courses

Please notice that some of the courses from the programme 2015-2016 and before have been replaced or renamed.

The following courses from 2015-2016 and earlier are replaced or renamed as follows:

Old course (title)	***New course 2016-2017***
Designing Innovation Research (GEO4-2249)	Quantitative Innovation Analytics (GEO4-2270)
Mastering Theories of Technology & Innovation I (GEO4-2257)	Innovation Systems and Processes (GEO4-2257)
Mastering Theories of Technology & Innovation II (GEO4-2258)	Societal Challenges & Innovation Theory (GEO4-2258)
Measuring & Modelling Innovation I (GEO4-2259)	Innometrics (GEO4-2259)
Measuring & Modelling Innovation II (GEO4-2260)	Qualitative Innovation Analytics (GEO4-2260)
Mastering Theories of Innovation (GEO4-2258)	Societal Challenges & Innovation Theory (GEO4-2258)
Advanced Topics in IS (GEO4-2269)	Tailor made course IS (GEO4-2269)

1.8 Annotation Sustainable Entrepreneurship & Innovation, Climate-KIC EIT Master Label and Young Innovators Programme

1.8.1 Annotation Sustainable Entrepreneurship & Innovation

The Master Annotation Sustainable Entrepreneurship & Innovation is a university wide Master track that aims to deliver world leading change agents in the area of sustainability. Students enrolled in the Master's programme Innovation Sciences can qualify themselves for the Annotation Sustainable Entrepreneurship & Innovation next to their Master's degree IS and will obtain an additional certificate. In order to qualify for the annotation, the following three requirements must be fulfilled:

1) having passed the examinations of one of these two elective courses:
- Technology Related Venturing (GEO4-2268; 7,5 EC) with an assignment regarding a sustainability subject;

or:
- Sustainable Entrepreneurship (ECMSE; 7,5 EC).

2) having passed the examinations of one of these elective courses, which may not be the same course as the course passed for fulfillment of requirement 1 mentioned above:
- GEO4-2521: Bio-based economy
- GEO4-2514: Energy in the Context of Sustainability
- GEO4-2312: Sustainable Energy Supply
- GEO4-2604: Organisational Change Management for SD
- GEO4-2268: Technology Related Venturing
- ECMSE: Sustainable Entrepreneurship

3) having conducted a research project of 15 EC related to the subject of Sustainable Entrepreneurship & Innovation. This can be achieved with the Master's Thesis (GEO4-2239X; 45 EC) on a subject related to Sustainable Entrepreneurship & Innovation.

The requirements for the research component are:

- It is about newly developed or to be developed sustainable production processes, products, and/or services created by firms (within established and/or new start-ups);
- These activities need to be new to the current business activities of these firms;
- It needs to include some form of data collection about these new business activities;
- This research component should be at least 15 EC of the Master's programme.

In the research proposal students have to stipulate the fit of their research proposal to these four requirements in a separate section.

If you decide to undertake the Annotation, please indicate this on the form for choosing elective courses: http://students.uu.nl/sites/default/files/geo-iees-application_form_optional_courses.pdf

In order to qualify for the third requirement, you should indicate the choice for the annotation on the Master's thesis research proposal information form. Once you have completed the Master's thesis, it will be checked whether it meets the requirements. If you have met all requirements for the annotation, you will be awarded an Annotation certificate together with your Master's degree certificate.

1.8.2 Climate-KIC EIT Master Label

For a small number of excellent students, Climate-KIC, part of the European Institute of Innovation and Technology (EIT), offers the Climate-KIC EIT Master Label. It allows selected MSc students to explore climate science and sustainable entrepreneurship alongside their regular master courses.

For IS master students, this programme consists of:

- Annotation Sustainable Entrepreneurship & Innovation (see 1.8.1)
- A five week climate innovation summer school - The Journey
- A series of thought-provoking SPARK! talks and seminars
- 12 EC complementary elective courses in related subjects
- 30 EC of your Master's programme outside of your home university, e.g. by doing an internship or thesis research (up to 6 months of financial support is available if the EC are earned abroad)
- Master thesis on a topic related to climate change and entrepreneurship

Students who complete the Climate-KIC EIT Master Label will receive the EIT Master Label certificate. *It is not possible to receive both the EIT certificate and the annotation certificate.* More information on the programme and the enrolment procedure is available at: http://www.climate-kic.nl

1.8.3 Young Innovators Programme

Utrecht University offers the Young Innovators Programme to high-achievers with leadership potential. Young Innovators Programme is a selective 15 EC honours course at graduate level, to be taken on top of any Master's programme.

The programme is focused on learning to research, design and deliver innovative and sustainable solutions to real-life societal challenges. Supported by leading researchers from the university's strategic research theme of Institutions, the programme allows you to immerse yourself in the theory and practice of innovation across the corporate, public and community sectors. It stimulates you to collaborate, produce and learn in multidisciplinary teams. It will inspire you by providing the opportunity to engage with exemplary innovators and leaders who will share their experience in masterclasses.

In the first four months of the programme, participants will learn to think about and study the art and science of innovation across a range of sectors. They will group into teams and begin to explore concrete problems and projects, for which they will seek to actively create innovative, research-driven interventions in the second semester.

The programme will focus on exploring and designing innovations in three areas:

- Sustainable innovations in health
- Sustainable innovations in the economy
- Sustainable innovations in urban living

These multifaceted themes demand the joint efforts of experts from the sciences and humanities alike. They require knowledge of energy, climate dynamics, food, technology, and health. However, insights into the dynamics of societies, law and economics, languages and cultures or history and philosophy are just as essential.

The issues transcend national and cultural borders. Therefore, the programme aims at a substantial participation of international students and is taught in English.

As a participant you will:

- become part of a community that serves as an inspiring learning environment and will provide the basis for your professional network;
- work in interdisciplinary teams on topics within the themes above;
- prepare for and participate in weekly Tuesday night sessions throughout the year (compulsory attendance), as well as two weekend and several assorted nighttime sessions;
- participate in 6 team coaching sessions where you will be encouraged to improve your collaborative potential through reflecting on your team's process and progress;
- present your team's work-in-progress at several plenary conferences; and
- enhance your international profile by taking part in a summer school of your choice at a university abroad.

Interested in this programme? Learn more about the admission requirements? http://www.uu.nl/masters/en/general-information/international-students/about-utrecht-university/young-innovators.

2. Didactics, study management and practical matters

2.1 Didactic aspects

There are various types of education within the Master's programme IS. Apart from lectures and tutorials (in groups of max. 25 students), there will be project learning. Furthermore, individual and small-scale instruction will be offered throughout the Master's programme.
Education of innovation theory uses empirical data from its own research of innovation studies and from real world innovation problems. This means there is a ***strong linking of education to research and to innovation practice*** within the relatively new section of innovation studies.
Furthermore, ***education supported by ICT*** is used to an increasing extent, for instance in a broad application of Blackboard. IS aims at supporting education as much as possible with software, such as statistical software and computer programs for project management, interactive policy analysis, scenario planning, simulation techniques, multi-criteria evaluation, and the analysis of qualitative data.

Required attendance
For various parts of the study, attendance is mandatory. The course manual for each course stipulates exactly which sessions the student is required to attend. As stated in article 4.4 of the Education and Examination regulations, exceptions to mandatory attendance can only be made if the student can prove that his absence is due to reasons beyond his control (special circumstances due to e.g. illness or family circumstances).

Report ill in time
If you cannot attend a preliminary or other exam, lecture or working group, please phone the department's secretariat *prior* to the meeting, and by 9.30 a.m. at the latest: 030 – 253 2359 or 030 – 253 1625.

Absence or illness does not relieve you of your obligation to perform to the best of your ability. In other words, if you have not been able to complete a paper or give a presentation, contact the Course Coordinator to find out if it can be rescheduled for another date.
If the quality or quantity of your attendance has been insufficient, the Course Coordinator may exclude you from the remainder or part of the course.

Testing
There are multiple points during a course in which the student is tested. Thus, the final evaluation for a course does not depend solely on a final exam. As a rule, there are opportunities for feedback and improvement, depending on how the course is designed. These opportunities are set forth in the course manual. If during the course the student satisfies all the effort requirements and does not receive a satisfactory grade but does receive a final grade of at least 4.00 before rounding, he or she will be given one opportunity to take a supplementary test. The specifics can be found in the Teaching and Examination Regulations and the course manuals.

Plagiarism, Code of Originality
IS is an analysis oriented Master's programme, which means that its students are taught how to perform scientific research. Since science is about developing new knowledge, in all phases of the Master's programme, much attention is paid to the originality of the students' achievements, for instance with the aid of advanced software. All scientific research, including that of a student, builds on the results of the work of other researchers, either in positive or in negative sense. Those other researchers deserve the credits for their work, in the form of a correct acknowledgement.
In short: quoting is allowed (and even necessary), but copying other researchers' work and presenting it as if it were one's own, is plagiarism: a huge sin in science. Students who plagiarise, run tremendous risks: in the worst case scenario they are expelled from

the programme for a year. The Teaching and Examination Regulations of the programme draws up the sanctions with which a student who is caught plagiarising, will be confronted.

2.2 Study management and supervision

2.2.1 Introduction for new students

There will be an introduction for Master novices in the first week of their first semester, organised by IS and its study association Helix. Both social issues and general information will be presented during this introduction. Its objective is to help new students feel at home at the Master's programme IS and the faculty, as soon as possible. Focus will be on meeting your fellow students, getting to know the IS-programme itself, its professors, mutual rights and obligations, information desks and the buildings where you will spend much of your time in the next couple of years.

2.2.2 Study planning and advice

During your entire programme, you can go to the Study Advisor, Drs. Pieter Louwman, for neutral and confidential advice on everything that is related to your studies. This can be on issues that are directly study-related, for example study delay, electives, dissatisfaction with the programme, or a potential conflict with a teacher or supervisor. But you can also discuss more personal issues that might be of influence on your progress, such as illness, disability, pregnancy, family circumstances, top-class sports, motivation issues, et cetera. When necessary, the Study Advisor can refer you to a Student Counsellor, Student Psychologist, the Study Counselling Centre, or for example a study skills class.

In the unfortunate situation that you expect to suffer study delay due to personal circumstances, it is important to contact the Study Advisor as early as possible. Together you can discuss how you could deal with these circumstances and perhaps the programme could offer you a concession (e.g. extra time for an exam or paper).

The Study Advisor is located in the Koningsberger building, room 1.20E. For short questions you can drop-in without an appointment on Mondays and Wednesdays from 13.00 till 14.00. Outside these hours, or in case of more complex questions, an appointment is recommended. Feel free to take initiative to make such an appointment at the secretary's office (Van Unnik building, room 10.20) or by phone: 030 253 1625 or 030 253 2359.

The Study Advisor is a member of the Dutch National Society of Study Advisors and works according to the code of conduct of this professional society, see www.lvsa.nl for details.

The Study Advisor is in regular contact with other Study Advisors of the Faculty and University, which makes peer feedback and cooperation possible. If the Study Advisor is not available due to illness or holiday and you urgently need a confidential consult, please feel free to contact any of the other Study Advisors of the Faculty of Geosciences. You can find their contact details via the website of the Student Affairs office Geosciences (http://www.uu.nl/en/organisation/faculty-of-geosciences/contact-information/contact-information-for-students).

2.2.3 Supervision during the thesis phase

In the thesis phase you will get support from your supervisor who can help you find a suitable graduation place. You will select your supervisors on the basis of their research themes. On the IS student portal at the Geosciences website you will be informed about

these themes and possibilities for internships. For a 45 EC thesis project, you have to allocate 32 weeks of full-time work. At the beginning of the thesis phase you will first have to write a research proposal. After this has been approved by the Board of Examiners, real work can begin! Further details about the thesis phase can be found in the course manual of the thesis.

2.3 Course registration and automatic graduation

2.3.1 Semesters and blocks

Classes take place during two semesters, each of which can be divided into two blocks, or periods of 9-10 weeks. In Appendix III and IV you will find the start and end dates of each block for this academic year.

2.3.2 Timeslots

At Utrecht University a so-called timeslot model is used to schedule courses to fit into fixed parts of the week. Using this model prevents overlap in a schedule. In this way it is easy to see if two courses can be taken in the same period.

The Utrecht University timeslot model consists of five slots (A, B, C, D, E).

Timeslot A = Monday morning and Wednesday morning
Timeslot B = Tuesday morning and Thursday afternoon
Timeslot C = Monday afternoon and Thursday morning
Timeslot D = Wednesday afternoon and Friday
Timeslot E = Monday evening until Friday evening

Morning = 09.00-12.45 hours, afternoon = 13.15-19.00 hours, evening = 18.00-21.45 hours.
Periods and timeslots have been put into the course schedule (§1.5). Changes to the course schedule are still possible. The final scheduling (time and lecture room) of each course will be made public via http://students.uu.nl/en/geo/innovation-sciences/academics/schedules. Also check the Blackboard e-learning environment of your course for the latest changes in the course programme.

2.3.3 Course registration

In order to participate in a course, you need to be registered for it: if you are not, you will not have access to the course and its supporting facilities such as Blackboard; neither will results be registered. No registration = no participation = no result.

As a student, **course registration is your own responsibility**! You decide which courses (elective and mandatory) you want to take in each block. Keep in mind possible entrance requirements to a course; students that do not adhere to entrance requirements cannot register for the course and/or will be removed from the course.

Course registration is **only possible via internet**, www.uu.nl/Osirisstudent and **only within the official registration periods**, which usually fall in the beginning of the previous block (for the dates of the Faculty of Geosciences, please see Appendix IV). You can register for no more than 2 courses (15 EC) of the Faculty of Geosciences per period (code GEO4-*). Students that register on time are generally secured of a place in the course; however, courses that have a limited capacity have certain placement rules. Just before the start of the block, there are 2 days for late registration, in case you want to switch courses. Please note: this is only possible for courses that are not full yet; participation is therefore not guaranteed.

If you want to register for a course outside the Faculty of Geosciences, there could be different registration dates; at some Faculties, students register only once per semester.

Each period (or block) you can register for a maximum of two courses (15 EC) of the Faculty of Geosciences via Osiris (code GEO4-*). Any student that wants to take a third course, needs permission of the programme. If the 3rd course is a course of one of the Master's programmes of the department of Innovation, Environmental and Energy Sciences (IS, Sustainable Development, Energy Science, Sustainable Business & Innovation or Water Science and Management; codes GEO4-22**, GEO4-23**, GEO4-25**, GEO4-26** and GEO4-60**), you can fill out a digital form on: https://fd8.formdesk.com/universiteitutrecht/additionalcourseGEO.

Please note:

- This registration form needs to be submitted during the regular registration period. During the late registration ('na-inschrijving') it is no longer possible to apply for an additional course.
- You have to be enrolled for your other courses in Osiris before submitting your request for an additional course.
- The additional course should be a course from your own major programme/ department.
- Students are not allowed to participate in more than one course in the same timeslot.
- Enrolment in an additional course may be declined by the Director of Education in case of insufficient study progress and/or insufficient capacity for a course.

After the regular registration period and during late registration periods, no requests for taking a 3rd course will be dealt with and therefore they will always be denied. If the course is full, the request for a 3rd course will also be denied. Only as an exception and based on sufficiently important reasons will the programme allow a student to take three courses in one period.

A request for taking a 3rd course will need to address the criteria mentioned below and these will be checked:

- Motivation: what is the student's motivation?
- Circumstances: are there any special, personal circumstances?
- Urgency: is it, at this point in time, necessary that the student takes three courses at once?
- Feasibility: can the student handle taking three courses at the same time? The following issues will be looked at in order to check this criteria:
    - Study progress.
    - Study results so far.
    - Has the student taken three courses before and if so, were they all completed successfully?
- Is the Master's thesis one of the three courses the student wishes to take? If this is the case, the request will not be granted.
- Timeslot: if the 3rd course falls in the same timeslot as any of the other courses you will be taking, the request for a 3rd course will never be granted.

Students that do not adhere to the registration periods can only under very special circumstances be placed in a course after permission from the Board of Examiners, which can be reached via examencommissie.geo@uu.nl. Always give your student number when communicating with the Board of Examiners. The Board of Examiners (NOT the lecturer of the course) decides whether you have a valid reason for not registering during the registration periods. If the Board of Examiners decides you do not have a valid enough reason, you cannot attend a course and no course results will be registered.

In other words: register early, as early as possible, for the courses that you want to take in the next block! This also applies to obligatory courses!

2.3.4 Automatic graduation

When you are due to finish your programme, you will receive a message from the student administration about your graduation. After it has been verified that you have fulfilled all requirements of your programme, the Board of Examiners will be asked to judge your file. Please note: in order to graduate, you need to have fulfilled all requirements: all grades are known and registered in Osiris, you have paid all tuition fees, hard copies of any earlier decisions taken by the Board of Examiners have been handed in to the Student Affairs office Geosciences (if applicable), the required number of copies of your thesis have been handed in at the IEES secretary's office and you have uploaded your thesis to Igitur (https://osiris.library.uu.nl/scrol2/index.html?ou=GEO). Under certain conditions, it is possible to postpone your graduation, see article 6.1.6 of the Teaching and Examination Regulations 2016/2017.

In order to actually receive your degree certificate or to pick it up at the Student Affairs office, you need to fill out an exam-registration form. If you want to attend a graduation ceremony, strict deadlines regarding registration and handing in of any documents will be maintained.

Automatic graduation does not mean you will be de-registered automatically from the programme. You will need to take care of this yourself and this cannot be done until you have received formal confirmation of your graduation from the Board of Examiners.

2.4 Taking IS-courses as part of another Master's programme

Students who are enrolled in other Master's programmes, can also follow courses of the Master's programme IS, for instance as a separate elective course to their own Master's programme. Usually they will need to have permission of their own Board of Examiners. Each course description in this catalogue indicates whether or not courses are open for subsidiary students, who – for that matter – will have to take into account the possibility of required or recommended pre-requisite knowledge, acquired in other courses. Therefore, in order to participate successfully in a specific course, it might be necessary or useful to first follow another course.

2.5 Study abroad

Studying abroad means broadening your horizon, meeting new people, exploring different cultures, and expanding your field of study. If you are interested in going abroad there are many possibilities. You can follow courses, do an internship or conduct research. Make use of what the university in general, but the Faculty of Geosciences in particular, has to offer you.

A lot to organise?!
Don't worry, just make sure to start planning your period abroad in time. Do you want to study abroad? Start via the International Office Online: http://students.uu.nl/en/academics/study-abroad.

Answer these questions:

- Where would you like to go to?
- What do you want to do?
- Does this university have an agreement with UU?
- Which courses would you like to attend?

- When would you like to go?

Once you have found an answer to these questions, contact your Study Advisor to connect your period abroad to your study plan in Utrecht.

After you have consulted with your Study Advisor, The International Office of Geosciences is there to guide your through the process. For all your practical questions, please contact international.geo@uu.nl or visit Student Affairs / International Office on the 1st floor of the Victor J. Koningsberger building. Open daily apart from Wednesdays from 10.30-11.30 and 12.30-14.30 hrs or by appointment.

Besides, please visit our study association EGEA (Ruppert Building), or visit http://www.egea.eu/entity/utrecht. EGEA members generally have a lot of experience with studying abroad. They can help you out with a lot of practical matters (such as housing, experiences and tips & tricks).

In October and November several orientation meetings take place organised by the International Office. For more information, look at the website of your programme at study abroad.

Practical matters
Once you've decided to study abroad, you can apply through the regular procedure. Please do keep in mind the deadlines for application! More information about how to apply and which deadline to bear in mind can be found on website: http://students.uu.nl/en/exchange-destinations (all partners). Select the faculty destinations on Geosciences. For the Faculty International Office website, please look at the website of your programme and study abroad.

Good to know
- Eligible for studying abroad during their master are all students with formal permission from their programme coordinator. To obtain permission please use the 'study plan for studying abroad' (available via: http://students.uu.nl/en/academics/study-abroad/step-2-application-at-uu).
- After your programme coordinator has signed the study plan, upload it in Osiris
- Credits obtained at partner universities can quite often easily be transferred to your academic record in Utrecht: study abroad doesn't necessarily cause delay in your programme!
- If your destination is within Europe, either for courses (exchange) or an internship, you are eligible for an ERASMUS grant. Monthly financial support to make your study abroad easier than it already is.
- If your destination is outside Europe, please have a look at www.beursopener.nl and find out if you are eligible for the options mentioned.
- If you're going abroad, you'd better put your OV student chip-card on hold (public transport card for Dutch students). By doing this, you can apply for a monthly travel allowance. Forms for this allowance are to be signed by the Student Affairs office/International Office.

2.6 Student Affairs Office Geosciences and Student Services

The *Student Affairs Office Geosciences* is the primary point of contact for students in the faculty of Geosciences. It provides students with general information and answers questions about registration for courses, course timetables, examinations, grades and credits, etc.

Student Affairs Office Geosciences is situated at the Victor J. Koningsberger building, Budapestlaan 4a-b, Tel: +31-30-253 9559.
Opening hours: Monday – Friday: 10.30-11.30h and 12.30-14.30h.

During academic holidays opening hours may be limited.
Internet: http://students.uu.nl/en/geo
E-mail: studentaffairs.geo@uu.nl

You can contact *Student Services* for information on a wide range of issues relating to studying and student life. This includes admission, application and enrolment, tuition fees, financial assistance, working alongside your studies, insurance, schemes and facilities for outstanding student athletes, student housing and student organisations and information about studying with a disability or chronic illness.

If you have questions about your study programme, schedules, student progress review, examinations, exemptions, study abroad and your graduation: please contact the Student Affairs office Geosciences.

Contact details Student Services:
E-mail: studentservices@uu.nl (please mention your student number!)
Tel: + 31 30 253 7000 (Monday to Friday 10-12 am and 1-3 pm)
Fax: + 31 30 253 2627

Visitors' address: Heidelberglaan 6, De Uithof (Monday to Friday 10 am - 4 pm)

Postal address:
Student Services
Postbus 80125
3508 TC Utrecht
The Netherlands

For questions about ICT you can send an email to servicedesk@uu.nl.

2.7 Responsibility for the programme

Board of Studies
Within the Utrecht Graduate Division (UGD) the Master's programme Innovation Sciences is part of the Graduate School of Geosciences, to which all Master's students and PhD-students of the Faculty of Geosciences belong. The School supervises the quality of the programme and the admission of its students. All Directors of Education and Directors of Research of the Faculty of Geosciences are members of the Graduate Board of Studies, as well as a PhD student and a student from one of the MSc programmes of the Faculty. Chairman is the dean of the Faculty, prof. dr. Piet Hoekstra; the Board's secretary is mr. Diederik Gussekloo (d.gussekloo@uu.nl).

Master Education Committee
This is a joint committee of chosen students and lecturers appointed by the dean to advise on the rules on teaching and examination and its implementation and about other matters concerning the programmes of study. Its secretary is mrs. drs. Erika Dijksma (e.b.dijksma@uu.nl).

Board of Examiners
The Board of Examiners is responsible for the examination of students. The Board of Examiners will determine the examination results as soon as the student has submitted sufficient proof of the tests taken. This Board also decides about deviations (e.g. exemptions) in the programme and the approval of elective courses (see appendix I of this catalogue). Requests about exemptions, elective courses or other issues for the Board of Examiners, can be addressed to the secretary of the Board's chamber for Innovation, Environmental and Energy Sciences, mrs. drs. Erika Dijksma (examencommissie.geo@uu.nl). Always include your student number when contacting the Board of Examiners.

Teaching Institute
The Teaching Institute Innovation, Environmental and Energy Sciences is responsible for the organisation, coordination and quality assurance of the educational elements of the various courses offered by the department. The Director of Education, dr. Margien Bootsma, is the Teaching Institute's head and is assisted by a management team, which includes the programme leaders of the Bachelor's and Master's programmes. The programme's leader, dr. Frank van Rijnsoever, is responsible for the management of the programme Innovation Sciences.

2.8 Evaluation and quality assurance

The Faculty of Geosciences values the high quality of its programmes and has therefore set up a quality assurance system. Quality assurance provides information about the quality of individual courses and the programme as a whole, study climate and students' progress and performance. Its most important goals are improving education and organisation, and making the quality of the programme more visible.

One part of quality assurance which you as a student will be dealing with regularly is evaluations. Every course is evaluated afterwards and the results of this *course evaluation* are discussed in the Education committee and the Management team of the programme. It provides important information for the lecturer to improve his/her course. All Geosciences students may view the evaluation results of the Faculty of Geosciences on Blackboard. You can use this if e.g. you need to make a choice about electives.

During the running of the course, we also work on improving quality. *Course feedback groups* are active in each course in order to mend any problems early on. For each course, such a group consists of 4-5 students that meet up with the lecturer in the break and talk about the course so far.
Its purpose is to find out what is being appreciated, what is going well and what practical issues can be improved. This does not concern aspects which are already fixed, such as the choice of literature, set up of tutorials or class times. It's all about fine-tuning, e.g. are the lecture slides readable, can everyone hear the lecturer, has information been put on Blackboard on time, etc. In the study guide of the course you can find further information about the course feedback group in your course.

Finally, at the end of each academic year (May/June) a written *year evaluation* is carried out among the students. The year evaluation it is not about an individual course but about issues that transcend the course, such as coherence/set-up of the programme, electives, workload and effort, level, thesis supervision, challenge, atmosphere and lecturers.

The results of the year evaluation will be discussed in panel meetings with the education director, programme leaders and a student delegation.

2.9 Career Services

The start of your Master's programme will be the start of your career as well. Your Master's programme will prepare you very well for the labour market in the way of professional knowledge and skills. Career Services will support you by finding out which possible future is right for you.

As part of your Master's programme you will focus on labour market orientation such as company visits, guest lectures and meeting alumni. An internship will let you familiarise yourself with a company or organisation and will give you the experience of your first step on the labour market.

During your Master you can discover your talents, interests and motivation by following workshops and special training programmes, meeting with a career officer and attending career days organised by Career Services.

Check the website of your Master's programme under Career Services.
The career officer of the faculty of Geosciences is mrs. Franca Geerdes (f.geerdes@uu.nl).

2.10 MyUU App

The MyUU app contains your grades from OSIRIS and your course schedules. Apart from the full schedule it is also possible to add your own group schedule, as soon as you know which group you participate in.
The app is available for Android and iOS. Log in to the app using your Solis-id and password.

2.11 NWSV Helix: Innovation Sciences' study association

NWSV Helix is the study association of the Bachelor's programme Science & Innovation Management (NW&I) and the Master's programmes Innovation Sciences (IS) and Sustainable Business and Innovation (SBI) of the Faculty of Geosciences of Utrecht University (UU).

The study association was founded on December 20, 1991, right after the study programme started in September of that year.

Helix represents the interest of its members and promotes the contact between students of the study programmes and professors and lecturers of the programme.

Helix has approximately 500 members and is run by the board and more than 20 committees, which organise a variety of activities. This includes social activities as well as study-related events. For example, Helix prepares its students for the labour market by arranging company visits and workshops such as a training to do job interviews. In addition, workshops to improve your academic skills are held, as well as a yearly symposium about innovation.

Each year, Helix members organise the study tour. Previous destinations include Tel Aviv, Boston & New York, Reykjavik, Kuala Lumpur & Singapore, Hong Kong, Montréal, Seoul, San Francisco and Kyoto & Osaka. During the ten-day trip, the students visit several companies while also learning more about the foreign culture. This is a great opportunity to experience innovation in practice in a foreign country.

In addition to the study-related activities, Helix organises many social activities to stimulate the contact between students. Those activities include parties, receptions, and dinners. Also an Open Podium, a Popquiz, a hitchhiking weekend and other sports activities such as a sports tournament during the night, soccer and windsurfing are organised by Helix. Traditional activities include the yearly grand ball, the yearly All-In party with four other associations, and the yearly winter sports trip. Four times a year the association's own magazine '*Perpetuum Mobile*' is distributed, with interesting articles and the latest facts about innovation and our studies.

Important for Helix is the introduction into the Master's programme during the first period of the academic year. The students are shown around the University and are introduced to fellow Master's students and to the programme itself. In this first period, the students get to know Helix and each other very well.

Another Helix activity is the evaluation of the courses in so-called course evaluation panels. Every course is evaluated each period. Results are passed on to the programme committees and the Management Team of the department in order to provide feedback to improve the courses.

New at Helix is Helix Tutoring. With this concept we bring students who want help for their courses in contact with older students who want to help those students for a small fee. So if you want to earn money while doing recap from your bachelor study, you can sign up at the Helix website (www.nwsvhelix.nl).

Membership costs are € 10 for Master's students. These costs are paid one time after which you'll be a member for as long as you study. An important reason to become a Helix member is our books sale. Each term, members have the possibility to order their books on the Helix website. Helix gives interesting discounts on course materials, so the membership costs are easily recovered. Apart from that, it is easy to pick up your books at Helix!

You can find Helix in the Ruppert building, room 0.02. Helix is opened on working days from 9:45 AM to 4:00 PM. You can always come in for a free cup of coffee or tea, to have a chat or to relax.

See you soon in the Helix room!

Visiting address:
Marinus Ruppertgebouw, room 0.02
Leuvenlaan 21
3584 CE Utrecht

Mailing address:
NWSV Helix
Willem C. van Unnikgebouw
Heidelberglaan 2
3584 CS Utrecht

Telephone number: 030-2538345
E-mail: helix@uu.nl
Website: www.nwsvhelix.nl

3 Course descriptions

Note: in case of a discrepancy between the entrance requirements and/or recommended pre-requisites mentioned in this course catalogue and the ones mentioned in the electronic UU course offerings database 'Osiris', the entrance requirements and/or recommended pre-requisites mentioned in the table in § 1.6 are leading.

IS-Master's thesis Innovation Sciences		
Code: GEO4-2239X	**Credits: 45 EC**	**Level: M**
Programme	IS	
Status	Obligatory	
Period/Timeslot	N/A	
Language	English	
Coordinator	dr. F.R. van Rijnsoever	
Instructor(s)	Various lecturers	
Open to other students	No	
Entry requirements		
Entry requirements	Students must be registered for the following degree programme: Innovation Sciences. One of the following courses must be completed: - IS-Technology related venturing (GEO4-2268) - SIM-Technology related venturing (GEO4-2229) and the following courses must be completed: - IS-Qualitative Innovation Analytics (GEO4-2260) - IS-Innometrics (GEO4-2259) - IS-Mastering Theories of Innovation (GEO4-2258) - IS-Innovation Systems and Processes (GEO4-2257) and one of the following courses must be completed: - IS-Quantitative Innovation Analytics (GEO4-2270) - SIM-Designing innovation research (GEO4-2249)	
Course content		
Objectives	The Master's thesis aims at training students to perform research independently as an innovation analyst, and to specialize in a particular innovation theme. After the course the student is able to: • Independently acquire theoretical and methodological knowledge that is used to gain an advanced understanding of domain of Science and Innovation Management in the context of both organizations and society at large. • Independently plan and conduct an academic research within domain of Science and Innovation Management in a creative way • Independently apply knowledge, research methods, and problem-solving abilities with the aim of making both a scientific and professional contribution to the domain of Science and Innovation Management • Demonstrate to have insight into the complex interactions between science, innovative technology and society and to to be able to reflect critically upon the roles of science and technology in organizations and	

	society • Demonstrate the academic and professional skills related to Science and Innovation Management in an empirical academic research project. • Apply knowledge and understanding in such a way that he or she demonstrates a professional approach to the research project • To communicate the conclusions of the research as well as the knowledge, reasons and considerations underlying these conclusions, to an audience of specialists (mandatory) and non-specialists (optional).
Content	During the Master's thesis, students will specialize in a subject that fits with current research themes within Innovation Studies, these are posted on the IS-website. Depending on their ambition and interests, students focus on one of these research themes and develop their own research question, with support from their supervisor. The student draws on the content of the courses in the IS program. The research can (partly) take place in an organisation other than the university, depending on the data needed to answer the research question In general, a wide range of firms and institutions are possible locations to perform parts of your MSc thesis, including those in other countries. The first step, however, is to select a research theme and the concomitant supervisor.
Entry requirement for	This course is an entry requirement for: N/A
Instructional modes	
Instructional modes	Individual (Required)
General remarks	Individual instruction
Assessment	
Explanation	Research proposal, Thesis content (70%), Presentation (10%), Process (20%), attending at least ten other students' presentations. The grade for the thesis content must be at least 5.50.
Study materials	
Literature	Required: course manual

IS-Consultancy Project Innovation Sciences		
Code: GEO4-2252	**Credits: 15 EC**	**Level: M**
Programme	IS	
Status	Obligatory	
Period/Timeslot	4 A+C	
Language	English	
Coordinator	dr. W.P.C. Boon	
Instructor(s)	dr. W.P.C. Boon and others	
Open to other students	No	
Entry requirements		
Entry requirements	Students must be registered for the following degree programme: Innovation Sciences. The following courses must be completed: - SIM-Measuring & modelling innovation I (GEO4-2259) - SIM-Theories of technology & innovation I (GEO4-2257) and one of the following courses must be completed: - SIM-Technology related venturing (GEO4-2268) - SIM-Innovation and Organisations (GEO4-2229) and one of the following courses must be completed: - IS-Quantitative Innovation Analytics (GEO4-2270) - SIM-Designing innovation research (GEO4-2249)	
Assumed previous knowledge	-Measuring and Modelling Innovation II or Qualitative Innovation Analytics (GEO4-2260) -Mastering Theories of Technology and Innovation II or Mastering Theories of Innovation or Societal Changes & Innovation Theory (GEO4-2258)	
Course content		
Objectives	The objective of this course is that students learn to set up and conduct independent scientific research based on theories studied in the previous courses of the IS master. This leads to the analysis of innovation management in practice at the level of the Master's thesis. This implies that after completing the course the student: • is able to conduct research of the dynamics and challenges of Science and Innovation in a creative and independent way; • has the ability to apply knowledge and research methods, and problem-solving abilities in broader contexts related to the dynamics and challenges of Science and Innovation; • has insight into the complex interactions between science, innovative technology and society and is able to reflect critically upon the roles of science and technology in society; • has professional and academic skills, in particular in relation to the dynamics and challenges of Science and Innovation; • is able to apply and knowledge and understanding in such a way that he or she demonstrates a professional approach to their work; • is able to communicate conclusions, as well as the knowledge, reasons and considerations underlying these conclusions, to an audience of specialists and non-specialists alike.	

Content	The course starts with two weeks of orientation. Orientation on the objects and subjects of research, the theoretical models taught, recruiting policy agencies and/or firms for cooperation, formulating the central research question as well as a research plan and planning. The research question should be aligned with the innovation problem in practice experienced by one of the participating organisations that act as commissioning organizations. After that, three weeks are spent on developing a theoretical framework for the analysis of innovation management by the cooperating organisations from a system perspective addressing the various more detailed 'what', 'how' and 'who' questions and hypotheses on them. Subsequently, during the next two weeks methods and instruments of data collection, measurement and analysis will be investigated and developed. During the two weeks thereafter actual data collection is carried out and the innovation analysis can take off and a concept research report is prepared. During the last week an individual oral examination of inconclusive subjects in the concept report takes place, after which the research report is finished including the management advice for the commissioning organisation derived from the results obtained. Academic skills: *Concise writing, Valuing literature, Argumentation and reasoning, Reflection on science and society, Selection of theories and methods, Reflection on the validity and reliability of data and measurement, Data analysis, Critical interpretation of results, Writing a research proposal and a scientific report, Oral research presentation & Learning to work independently, Learning to collaborate, Giving feedback, Giving advice, Write a vocational publication.*
Entry requirement for	This course is an entry requirement for: N/A
Instructional modes	
Instructional modes	Lectures (Required) Tutorials (Required)
General remarks	Lectures: See course manual
Class session preparation	Lectures: See course manual
Assessment	
Explanation	See course manual
Study materials	
Literature	Required literature: See course manual

IS-Innovation Systems and Processes		
Code: GEO4-2257	**Credits: 7,5 EC**	**Level: M**
Programme	IS	
Status	Obligatory	
Period/Timeslot	2 A	
Language	English	
Coordinator	dr. ir. A. Peine	
Instructor(s)	dr. ir. A. Peine	
Open to other students	Yes	
Entry requirements		
Entry requirements	None	
Course content		
Objectives	It is the objective of this course that students become familiar with the most important theories of innovation, and learn how to apply these theories in the analysis of technology and innovation. After completing this course, the student: • has advanced knowledge and understanding of the dynamics and challenges of Science and Innovation Management in the context of both organizations and society at large; • has insight in the complex interactions between science, innovative technology and society and are able to reflect critically upon roles of science and technology in organizations and society; • is able to communicate conclusions, as well as the knowledge, reasons and considerations underlying these conclusions, to an audience of specialists and non-specialists.	
Content	This course will equip students with the necessary knowledge to make informed decisions about which theory to choose in order to tackle different kinds of innovation problems. We will systematically present and use the 10 most important approaches in innovation studies. In this course: • students will become acquainted with the classic readings in economic, institutional, management and social science perspectives on technological change (the canon of innovation literature) • students will learn to compare different theories in terms of their explanatory power and the kind of innovation problems a theory is able to tackle; • students will learn how a careful choice of theory improves the quality of an innovation analysis. This course, together with GEO4-2258, provides an important preparation for performing independent research on innovation questions in the second year of IS. Academic skills: *Critical reading, argumentation, academic writing*	
Entry requirement for	This course is an entry requirement for: Master's Thesis IS (GEO4-2239X) and Consultancy Project IS (GEO4-2252)	

Instructional modes	
Instructional modes	Lectures (Required) Tutorials (Required)
General remarks	A normal week in this course contains a lecture of 1,5 hours. Each lecture will cover the course literature relating to one classic theory of technology and innovation. A normal week also contains a seminar. During the seminars, different forms of work will be used to apply each theory to timely and relevant innovation problems and thus deepen knowledge about the respective theories.
Class session preparation	For each week, a number of articles need to be studied. In order to profit the most from lectures and seminars, these articles need to be studies before the lecture in each week.
Contribution to group work	Students will participate in a group assignment. Students are expected to contribute equally to the group work.
Assessment	
Explanation	Students will work on three individual and one group assignment. Also, they will have to pass a final written examination. The assessments are weighted as follows: - Average of individual assignments: 20% - Group assignment: 20% - Individual exam: 60%
Study materials	
Literature	Required: Reader with selected articles

IS-Societal Challenges & Innovation Theory		
Code: GEO4-2258	**Credits: 7,5 EC**	**Level: M**
Programme	IS	
Status	Obligatory	
Period/Timeslot	3 A	
Language	English	
Coordinator	prof. dr. M.P. Hekkert	
Instructor(s)	prof. dr. M.P. Hekkert, dr. F.R. van Rijnsoever	
Open to other students	Yes	
Entry requirements		
Entry requirements	None	
Assumed previous knowledge	Innovation Systems and Processes (GEO4-2257), and Technology Related Venturing (GEO4-2268)	
Course content		
Objectives	After completion of the course the student 1. 1.has advanced knowledge and understanding of theories of technical change and innovation in the context of societal challenges (IS degree qualification 1); 2. has the ability to apply knowledge, and problem-solving abilities related to societal challenges and innovation (IS degree qualification 3) 3. has insight into the complex interactions between science, innovative technology and society and is able to reflect critically upon the roles of science and technology in organizations and society; (IS degree qualification 4) 4. has professional and academic skills (Concise writing, Valuing literature, Argumentation and reasoning, Reflection on science and society, Selection of theories and presentation skills), in particular in relation to societal challenges and innovation; (IS degree qualification 5) 5. is able to apply knowledge to concrete societal problems (IS degree qualification 6) 6. is able to communicate conclusions, as well as the knowledge, reasons and considerations underlying these conclusions, to an audience of specialists and non-specialists alike. (IS degree qualification 7)	
Content	The analysis of innovation processes is much more powerful when using theories of technical change and innovation. Theories of technical change and innovation can be a powerful tool to understand and help solve some of the grand challenges that our society faces, like climate change or the development of new medication. This course teaches students to apply theories in a sensible, logical and practical way. During this course we will reflect on what it means to use and apply theories in a research and policy context. We will do so by first by reflecting on what theories are and how solid theoretical models are built . Next, we reviewing the main strands of theorizing in innovation studies and their role in innovation and transition policy. We then turn to various key topics in innovation research that are reflected in policy debates. After having reflected on the usefulness of applying theories in a research setting students practice with choosing and applying theories to a practical research question in the area of sustainable innovation or life sciences. Different theories that build on the content of Technology Related Venturing and Innovation Systems and Processes are central in this. After thoroughly reflecting on the usefulness, the applicability, the basic assumptions and the effects on outcomes of these theories,	

	students need to use these theories to solve a concrete research problem. Academic skills: *Concise writing, Valuing literature, Argumentation and reasoning, Reflection on science and society, Select theories, Presentations*
Entry requirement for	This course is an entry requirement for: Master's Thesis IS (GEO4-2239X)
Instructional modes	
Instructional modes	Lectures (Required); Tutorials (Required)
Class session preparation	Tutorials: Preparation of each tutorial.
Assessment	
Explanation	An individual assignment (70%), proposal for advisory plan (15%) and pitches during tutorial sessions (15%) will account for the final grade.
Study materials	
Literature	Required: Study guide: Relevant scientific articles will be specified in the course manual.

IS-Innometrics		
Code: GEO4-2259	**Credits: 7,5 EC**	**Level: M**
Programme	IS	
Status	Obligatory	
Period/Timeslot	1 A	
Language	English	
Coordinator	dr. F.J. van Rijnsoever	
Instructor(s)	t.b.a.	
Open to other students	Yes	
Entry requirements		
Entry requirements	None	
Course content		
Objectives	The objective of this course is that students acquire knowledge and skills concerning • approaches to measuring and modelling innovation • the translating of theories of innovation and technological change into models • the data acquisition necessary to use these models • the interpretation of these models The course aids student in choosing, using and reporting on an appropriate research design and methods, with a specific emphases on empirical (quantitative) data and on innovation measurements. It furthermore helps students to acquire the appropriate skills for preparing a Master's Thesis which includes original or secondary data, and is also essential for those that have the ambition to get further involved in research in this area. After completion of the course, the student is able to: 1. describe and discuss different models of innovation; 2. apply these theoretical approaches to empirical material of innovation processes; 3. translate these theoretical models into suitable indicators and measures of innovation; 4. know about the most important sources of data (such as the EC, OECD, Eurostat, Scopus and patent data sources), their strengths and their limitations; 5. use these indicators and measurements to analyse the innovative performance of nations, sectors, industries, clusters, researchers and firms.	
Content	This course approaches "Measuring and Modeling Innovation" through different perspectives. The science-technology-innovation system is one that is continuously and rapidly evolving. The dramatic growth over the last 20 years in the use of science, technology and innovation (STI) models and indicators is the result of a combination of the ease of computerized access to an increasing number of measures of STI and, on the other hand, the interest in a growing number of public policy and private business circles in such models and measurements. As such the students obtain insight in the complex interactions between science, innovative technology and society and are able to reflect critically upon roles of	

	science and technology in organizations and society; The course Innometrics teaches students how to translate theories into models and use these models to analyze innovation at different levels of aggregation. As such, the students have to conduct research of the dynamics and challenges of Innovation Sciences in a creative and independent way. Several influential models of science and innovation are introduced (Functions of Innovation, Triple Helix, Evolutionary models, etc). Furthermore, different approaches of quantitatively measuring the development of science and innovation are introduced using different sources of information such as scientometric data, webdata, patents, etc. The students are asked to show professional and academic skills, in particular in relation with the dynamics and challenges of Innovation Sciences. The course is organized around the following broad themes: • Science and technology (S&T) indicators • Scientometrics • Exploration of patent databases • (Social) Network Analysis • Evolutionary Models of Science and Innovation • The Geography of Science and Innovation • Innovation Systems The assignments in the form of presentations and (web based) reports contribute to the ability to communicate conclusions, as well as the knowledge, reasons and considerations underlying these conclusions, to an audience of specialists and non-specialists.
Entry requirement for	This course is an entry requirement for: Master's Thesis IS (GEO4-2239X) and Consultancy Project IS (GEO4-2252).
Instructional modes	
Instructional modes	Lectures (Required); Tutorials (Required)
Class session preparation	Study the literature and prepare assignments.
Contribution to group work	The final assignment is based on group work.
Assessment	
Explanation	7 assignments
Study materials	
Literature	Required: See course manual

IS-Qualitative Innovation Analytics		
Code: GEO4-2260	**Credits: 7,5 EC**	**Level: M**
Programme	IS	
Status	Obligatory	
Period/Timeslot	3 B	
Language	English	
Coordinator	dr. A.M. Herrmann	
Instructor(s)	dr. A.M. Herrmann	
Open to other students	Yes; Priority will be given to IS students.	
Remarks	**Maximum of 35 students. Priority will be given to IS students.**	
Entry requirements		
Entry requirements	None	
Course content		
Objectives	The major aims of the course are twofold: One, to introduce students to a systematic approach of starting, pursuing and completing a research project; two, to offer thorough guidelines for completing qualitative research projects of both an inductive and a deductive nature. More concretely, students completing this course will have learned: • to clearly identify the epistemological foundations underlying their research approach; • to identify a relevant research question; • to embed this question in the appropriate literature; • to define the most important concepts of their research project; • to select the most insightful cases; • to discern the most appropriate empirical material to collect; • to choose appropriate - inductive or deductive - analytical methods • to assess the quality of qualitative research • to design consistent questionnaires for inductive and deductive qualitative research projects; • to interpret the results in the light of the existing literature in sum: to consistently pursue inductive and deductive qualitative approaches.	
Content	Most real-world innovation problems require a systematic analytical approach in order to arrive at efficient solutions. Seeking to provide students with such approaches from a qualitative perspective, the course is divided into three parts: The first part provides an overview of the epistemological basis underlying inductive and deductive research approaches. It furthermore advises students on how to write a (qualitative) research proposal: When beginning their MSc research project, students often come to a point where they feel 'lost in the literature jungle' because they find it hard to identify an appropriate research question and a useful research design. It is therefore the first major objective of this course to show the participants how to avoid such situations of deadlock by introducing them to a systematic approach of starting, pursuing and completing a qualitative research project. The second part of the course focuses on inductive qualitative research in general and on grounded theory in particular. Students will become familiar with the acquisition and interpretation of qualitative data whenever open-ended research question are asked that require the formulation of propositions rather than clear-cut hypothesis testing. In particular, the quality criteria of inductive qualitative research will be discussed.	

	The third part of the course focuses on deductive qualitative research, in particular on the selection and assessment of comparative case studies. The various approaches to case selection discussed will illustrate how systematic case comparisons enable the identification of causalities through systematic controls of potential rival explanations. Consequently, it is the second overarching objective of this course to offer thorough guidelines for completing qualitative research projects of both an inductive and a deductive nature. Using real-world examples, it will be illustrated how such research projects can be translated into theoretical contributions, as well as practical recommendations for managers and policy-makers. Academic skills: *Academic writing; appropriate citation of literature sources; critical assessments of scientific texts; peer-feedback.*
Entry requirement for	This course is an entry requirement for: Master's Thesis IS (GEO4-2239X)
Instructional modes	
Instructional modes	Lectures (Required);Tutorials (Required)
General remarks	Lecture, Tutorial, Individual and group feedback on assignments, Extended office hours
Assessment	
Explanation	2 Written Assignments (50% each)
Study materials	
Literature	Required: Book: Bryman, Alan (2012), Social Research Methods (Oxford: Oxford University Press) Book: Oost, Heinze (2006), Circling around a Question: Defining your research problem (COLUU). Note: The book is made available as an online reader on Blackboard. Book: Hancké, Bob (2009), Intelligent Research Design (Oxford: Oxford University Press). Book: Ragin, Charles (1987), The Comparative Method (Berkeley: University of California Press). Miscellaneous: Additional readings are made available during the course

IS-Technology Related Venturing		
Code: GEO4-2268	**Credits: 7,5 EC**	**Level: M**
Programme	IS/SBI	
Status	Obligatory for IS and SBI; Elective for other programmes Required for the university wide Annotation 'Sustainable Entrepreneurship & Innovation'	
Period/Timeslot	1 C	
Language	English	
Coordinator	dr. J. Faber	
Instructor(s)	dr. J. Faber (j.faber1@uu.nl), dr. W.P.C. Boon (W.P.C.Boon@uu.nl)	
Open to other students	Yes	
Entry requirements		
Entry requirements	None	
Assumed previous knowledge	Organisation Theories (GEO2-2218), Management of Innovation Processes (GEO3-2221)	
Previous knowledge can be gained by	Reading the literature prescribed for Organisation Theories and Management of Innovation Processes.	
Course content		
Objectives	The objectives of this course are to make students aware of the opportunities and threats of developing innovations within established and entrepreneurial companies, to make them acquainted with theoretical concepts and models relevant for these subjects and to train their academic skills necessary for recognizing, analysing and managing innovation problems that emerge in practice from a theoretical perspective. After completion of the course, the student: • has advanced knowledge and understanding of the dynamics and challenges of Science and Innovation in the context of both organizations and society at large, • has insight into the complex interactions between science, innovative technology and society and is able to reflect critically upon the roles of science and technology in society; • is able to communicate conclusions, as well as the knowledge, reasons and considerations underlying these conclusions, to an audience of specialists and non-specialists.	
Content	Technology related venturing comprises activities of organizational entities (within established firms or as new enterprises), which are focused on developing and launching new, better and/or cheaper products, services or processes based on new technological insights into and knowledge of emerging technologies like biotechnology, clean technology (including sustainable energy and transportation technologies) and information technology. Ventures engaged in innovation will, however, face many problems arising in practice, which they have to deal with: lacking resources and complementary assets; lacking dynamic capabilities; the prevailing appropriation regime; the emergence of a dominant design and standardization; assessment of user needs and customer value; and competition. In this course, these problems are studied in further details with respect to their	

	causes, possible solutions and management. Additionally, empirical cases from technological fields like biotechnology, clean technology and information technology will be analysed in order to provide students with the academic skills to apply theoretical knowledge for the solution of innovation problems encountered in practice by established as well as entrepreneurial firms. Academic and professional skills: *Concise writing, valuing literature, argumentation and reasoning, and reflection on science and society & Giving feedback and learning to work independently*.
Entry requirement for	This course is an entry requirement for: • Master's Thesis IS (GEO4-2239X) • Master's Thesis Internship SBI (GEO4-2606) • Consultancy Project IS (GEO4-2252) • Consultancy Project SBI (GEO4-2605)
Instructional modes	
Instructional modes	Lectures (Required); Group meetings (Required)
Class session preparation	See course manual
Contribution to group work	See course manual
Assessment	
Explanation	Written exam (50%), paper on the group assignment (40%) and participation in group meetings (10%)
Study materials	
Literature	List of scientific articles (see course manual)

IS-Tailor-made course Innovation Sciences		
Code: GEO4-2269	**Credits: 7,5 EC or 15 EC**	**Level: M**
Programme	IS	
Status	Elective	
Period/Timeslot	N/A	
Language	English	
Coordinator	dr. F.R. van Rijnsoever	
Instructor(s)	Various lecturers	
Open to other students	No	
Entry requirements		
Entry requirements	Students must be registered for the following degree programme: Innovation Sciences. Number of credits achieved: 45 EC of the Master's programme.	
Course content		
Objectives	Build on competences of the student in relation to the degree requirements of the master programme.	
Content	In the IEES Master's programmes, there is room for electives, depending on the programme and the number of EC for the Master's thesis. The Master electives may be extra courses or any other type of activity that aids to the competences of the student in relation to the degree requirements of the Master's programme. Examples are research projects, workshops, summer schools, etc. These Master activities may be incorporated in a Tailor-made course. The student takes the initiative to formulate a proposal for a Tailor-made course (GEO4-2269) and must find a staff member willing to provide guidance and grading during the course. The proposal must be approved by the Board of Examiners and should contain at least the following elements: 1. start with "*Proposal for a Tailor-made course within the master programme Innovation Sciences*; 2. Name and studentnumber; 3. Date; 4. Supervisor (staff member); 5. Title for your course; 6. Requested EC (7,5 or 15); 7. Intended learning outcomes; 8. Relation of learning outcomes to Master's programme degree requirements; 9. Short description of activities; 10. End products; 11. Mode of assessment; 12. Time planning. After the proposal has been written, it must be signed by the staff member who is supervising and grading the course, and then be sent to the Board of Examiners. Please note that these procedures take time, so *start with organising your Tailor-made course well ahead of the start date.* The course will not start until the Board of Examiners has approved your proposal. The Board of Examiners may take a maximum of 6 weeks to assess your proposal. If you have any questions regarding the possible content of your Tailor-made course please contact your Master programme leader.	

Entry requirement for	This course is an entry requirement for: N/A
Instructional modes	
Instructional modes	Individual (Required)
General remarks	Dependent on the content of the proposed Tailor-made course.
Assessment	
Explanation	Dependent on the identified ways of assessment in the proposed Tailor-made course.
Study materials	
Literature	Dependent on the content of the proposed Tailor-made course.

IS-Quantitative Innovation Analytics		
Code: GEO4-2270	**Credits: 7,5 EC**	**Level: M**
Programme	IS	
Status	Obligatory	
Period/Timeslot	2 C	
Language	English	
Coordinator	dr. M.M.H. Chappin	
Instructor(s)	dr. M.M.H. Chappin; dr. J. Hoekman	
Open to other students	Yes	
Entry requirements		
Entry requirements	None	
Assumed previous knowledge	Technology Related Venturing (GEO4-2268) and Innometrics (GEO4-2259)	
Course content		

Objectives	The general aim of this course is twofold. The first aim is to learn how to write a research proposal for a quantitative study. The second aim is to learn about different quantitative analyses that are frequently used in innovation studies.
	
	After completion of the course, the student is able to:
	
	• Write a research proposal for a quantitative study
	• Assess a research proposal for a quantitative study
	• Characterize innovation as an output measure
	• Characterize networks as an input measure
	• Explain and apply several analysis techniques, e.g.:
	  ○ Social network analysis
	  ○ General linear models
	  ○ Multinomial models, logistic models, ordinal models
	  ○ Poisson and negative binomial models
	• Interpret and evaluate findings of different analyses
	• Write a full report and a summary web report based on the findings of research by a group of students.	

Content	In this course we make use of *lectures* and *practicals*. In the *lectures* the subject(s) for that specific week is/are explained. In the *practicals* you will mainly apply the knowledge and practice in R by means of assignments. One of the aims is to learn how to write a research proposal for a quantitative study. You will first practice this and then you will write a research proposal that will be graded. The grade will count for 25% of your grade. You are also expected to assess the proposals of other students. Each week students hand in a "small assignment". Together these assignments count for 35% of your grade. At the end you need to hand in a final assignment, which counts for 40% of your grade.	
Entry requirement for	This course is an entry requirement for: Master's Thesis IS (GEO4-2239X) and Consultancy Project IS (GEO4-2252).	

Instructional modes	
Instructional modes	Computer practicals; Lectures; Tutorials
General remarks	Lecture: In the lectures the subject(s) for that specific week is/are explained. Tutorial: In the tutorials and practicals you will mainly apply the knowledge and practice in R by means of assignments.
Contribution to group work	During the course you will work in teams on your research proposal, on the weekly assignments and on the final assignments
Assessment	
Explanation	Research proposal (25%); Assessment of research proposals of other students (compulsory); Weekly assignments (35%); Final assignment (40%)
Study materials	
Literature	Required: To be announced

SUSD-Policy Analysis		
Code: GEO4-2306	**Credits: 7,5 EC**	**Level: M**
Programme	SD/IS/SBI/ES	
Status	Obligatory for SUSD track ESG; elective for IS, SBI and ES	
Period/Timeslot	1 D	
Language	English	
Coordinator	dr. H.L.P. Mees	
Instructor(s)	Dr. C. Dieperink, dr. H.L.P. Mees, dr. H.A.C. Runhaar	
Open to other students	Yes, however: **Maximum 60 participants. Students for whom this course is obligatory have priority.**	
Entry requirements		
Entry requirements	Students must be registered for one of the following degree programmes: Innovation Sciences, Sustainable Development, Energy Science, Sustainable Business and Innovation	
Course content		
Objectives	After completion of the course, students should: • Be able to characterise various methods of policy analysis; • Be able to combine and apply concepts, methods, and criteria from policy analysis theory in specific policy situations; • Have insight into the role of the policy analyst in the policy process. The emphasis will be on the second course objective. **Maximum 60 participants. Students for whom this course is obligatory have priority**	
Content	Policy analysis involves a wide variety of activities related to the study of public policy, which can be defined as "political agreement on a course of action (or inaction) designed to resolve or mitigate problems on the political agenda – economic, social, environmental and so on". Within the field of policy analysis uusally distinction is made between analysis of policy and analysis for policy. The primary goal of research in the field of analysis of policy is to develop a better understanding of public policy and the policy-making process. Analysis for policy is usually defined as "the use of analytical techniques and knowledge for and in policy-making". The aim of policy analysis in this meaning is to support policy-makers, by producing and transforming 'policy-relevant information'. This course will focus on analysis of policy. Students will acquire both theoretical knowledge and practical skills concerning several methods of policy analysis, including: • Reconstruction of policy theory • Impact Assessment • Cost-Benefit Analysis and Cost Effectiveness Analysis • Discourse analysis	
Entry requirement for	Students must have actively participated in this course in order to take Research Methods ESG (GEO4-2304) and International Governance for SD (GEO4-2305) and Analysing Governance Practices (GEO4-2328).	
Instructional modes		
Instructional	Lecture	

modes	Tutorial (Required)
General remarks	Lecture: Guest lectures and tutorials are compulsory.
Assessment	
Explanation	The final mark will be based on the average of several assignments.
Study materials	
Literature	Required: Study guide: Course manual Literature: Supplementary literature (articles etc.)

SUSD-Policies for Energy & Materials Transitions		
Code: GEO4-2311	**Credits: 7,5 EC**	**Level: M**
Programme	SD/IS/SBI/ES/Earth Science	
Status	Obligatory for SUSD track E&M; Elective for IS, SBI, Energy Science and Earth Science	
Period/Timeslot	4 B	
Language	English	
Coordinator	dr. R. Harmsen	
Instructor(s)	dr. J.C.M. Farla, dr. R. Harmsen	
Open to other students	Yes	
Entry requirements		
Entry requirements	Students must be registered for one of the following degree programmes: Earth, Life and Climate, Energy Science, Earth Structure and Dynamics, Earth Surface and Water, Innovation Sciences, Sustainable Business and Innovation, Sustainable Development	
Assumed previous knowledge	Basic quantitative skills for analyzing the energy and materials system.	
Previous knowledge can be gained by	Following the course GEO4-2326 (Tools for Energy & Materials Analysis) or equivalent	
Course content		
Objectives	After completion of this course, the student is able to: • apply and synthesize theoretical models on the dynamics of energy & material transition processes; • analyze and evaluate current policy practices related to the transformation of the energy & materials system; • analyze barriers & drivers for innovative and sustainable energy technology deployment; • analyze the various steps of the policy cycle • analyze and evaluate current energy & materials policy targets & instruments in terms of effectiveness (environmental impact) and coherency (accounting for policy interaction); • apply and analyze the three building blocks of policy/program theory: impact theory, service utilization plan and organizational plan.	
Content	In this course we make a distinction between two policy perspectives on the energy system. Both perspectives share the underlying notion that the energy system needs to change in order to become more sustainable. The first perspective (part 1 of the course) focuses on the dynamics of these systemic change processes. This involves insight in sustainable energy innovation processes and factors that influence the transformation of the energy system. We label this view as the "Energy Transition Perspective". The second perspective (part 2 of the course) is concerned with the impact of the energy system on issues like climate change, energy security, employment, local air quality and national interests of governments (e.g. regarding national energy and material reserves) and industry, and aims to design policy instruments that push or pull the energy system in the desired direction.	

	Both views are strongly related and should be well aligned for optimal policy outcomes, however in reality they are quite far apart. The challenge for policy makers is to develop consistent and well aligned policy instruments that contribute to meeting targets, ambitions and agreements embedded in the policies. The challenge for firms and entrepreneurs in the energy system is to develop smart strategies in response to these policies. Academic skills: • *Communicative skills (writing, presentation, discussions and argumentation).* • *Social and organizational skills (working together, functioning in a team and planning your own work and time).* • *Literature research (analyzing and using literature).* • *Self-reviewing (reflect on your own knowledge and skills).*
Entry requirement for	This course is an entry requirement for: N/A
Instructional modes	
Instructional modes	Lecture (Required) Presentation (Required) Tutorial (Required)
General remarks	Lecture: The course setup of part 1 includes two tutorials per week (2 hours each). In part 2 of the course one (guest)lecture + one tutorial per week are provided. Tutorial: Both in part 1 and part 2 of the course students need to work on assignments, both individually and in groups.
Class session preparation	Tutorial: Part 1 tutorials need to be prepared in advance. Preparation includes the reading of scientific literature and the answering of assignment questions.
Contribution to group work	Tutorial: Students are expected to make a balanced contribution to group work. Free-riding is not accepted.
Assessment	
Explanation	Assignments, presentation
Study materials	
Literature	Required: Items: Journal articles, book chapters and lecture slides as indicated in the course manual or assignments

SUSD-Environmental Ethics and Sustainable Development		
Code: GEO4-2323	**Credits: 7,5 EC**	**Level: M**
Programme	SD/IS/WSM/ES/SBI	
Status	Elective	
Period/Timeslot	1 A	
Language	English	
Coordinator	dr. F. van den Berg	
Instructor(s)	dr. F. van den Berg	
Open to other students	Yes	
Entry requirements		
Entry requirements	None	
Course content		
Objectives	After completion of the course, the student is able to: • describe the philosophical dimensions of sustainable development; • perform an in-depth analysis of the concepts 'sustainability' and 'development'; • give an overview of contemporary environmental ethics; • perform an integral and critical assessment of moral stances on environmental problems and sustainable development; • write an article for a general audience on environmental issues, using philosophical tools & knowledge.	
Content	The present-day political and economic systems are not sustainable and we are heading for global environmental disasters (ecocide). The notions 'sustainability', 'development' and 'sustainable development' have gradually entered political and social debates, and scientific and philosophical investigations. It is rooted in concern about environmental degradation of our planet. Philosophical reflection about sustainable development and the human-nature relationship starts with clarifying key concepts of environmental science. Sustainable development should at least encompass three dimensions: (1) the environment (conservation and preservation), (2) economy (growth vs. steady state), and (3) the social structure (equity, welfare). These dimensions form the pillars of sustainable development and will be studied from a philosophical viewpoint.. This course aims at providing philosophical reflection on sustainable development-related issues as part of environmental philosophy. We start with reflection on three kinds of relationships from the perspective of sustainability: humans-humans, humans-animals, and humans-nature. During the course key concepts and methods of environmental philosophy are dealt with. We will explore concepts such as biodiversity and vulnerability, demographic transition and inter- and intragenerational (environmental) justice. The emphasis of the course is normative deliberation on the environmental crises and sustainable development. What insights can science and environmental philosophy give to sustain life, future generations and a healthy ecosystem of planet Earth?	
Entry requirement for	This course is the entry requirement for: N/A	

Instructional modes	
Instructional modes	Lectures (Required) Seminars (Required) Excursion, a walk in the woods (Required)
Assessment	
Explanation	4 columns (500-600 words), 4 newspaper comments (200-300 words), , 1 paper (2500-3000 words)
Study materials	
Literature	Required: Book: Curry, Patrick, *Ecological Ethics* Book: Berg, Floris van den, *Philosophy for a Better World*. Book: Oreskes, Naomi; Conway, Erik, *The Collapse of Western Civilization* Book: Callenbach, Ernest, *Ecotopia*.

SUSD-Tools for Energy and Materials Analysis		
Code: GEO4-2326	**Credits: 7,5 EC**	**Level: M**
Programme	SD	
Status	Obligatory for track E&M	
Period/Timeslot	1 C	
Language	English	
Coordinator	dr. R. Harmsen	
Instructor(s)	dr. R. Harmsen	
Open to other students	Yes, but not for Energy Science students	
Remarks	***This course is not available to Energy Science students.***	
Entry requirements		
Entry requirements	None	
Assumed previous knowledge	Energy Analysis (GEO3-2223) or similar course	
Resources for self study	Read the relevant chapters of the book "Introduction to Energy Analysis" by K. Blok, and do the exercises	
Course content		
Objectives	After completion of this course, students have deepened their knowledge and understanding of widely applied tools for energy and material analysis.	
Content	The course will put the developments of the energy and materials system in the context of sustainable development. Focusing on the interaction between the energy and material nexus, it will elaborate on various tools and methods to analyze the energy and material system (scenarios, potentials, marginal abatement cost curves, cost analysis & learning curves, energy life cycle analysis, decomposition analysis). Next to a series of lectures and tutorials, assignments will be worked on in which the methodological skills acquired in the course will be applied. Academic skills: • Communicative skills (writing, discussions and argumentation). • Social and organisational skills (working together, functioning in a team and planning your own work and time). • Literature research (finding relevant literature, analysing and using it). • Application of tools	
Entry requirement for	This course is the entry requirement for: N/A	
Instructional modes		
Instructional modes	Lecture (Required) Tutorial (Required)	
General remarks	Lecture: The course setup includes 2-4 hours of lecture per week, 2-4 hours of tutorials, and one or more assignments.	

Class session preparation	Lecture: For lecture topics, students are expected to have the required knowledge level. Students that need to catch up should do that in advance. Relevant reading material will be provided. Tutorial: Tutorial exercises need to be prepared at home. Some of the tutorial exercises will be discussed during class. All students are expected to actively contribute to these discussions.
Contribution to group work	Tutorial: Assignments will be worked on in groups. Students are expected to make a balanced contribution to the assignments. Free-riding is not accepted.
Assessment	
Explanation	Exam, assignment(s)
Study materials	
Literature	Required: Reader: Journal articles (part of tutorials) Recommended: Literature: Reference/background reading (required knowledge level): K. Blok, Introduction to Energy Analysis, TechnePress

SUSD-Climate System and Adaptation		
Code: GEO4-2327	**Credits: 7,5 EC**	**Level: M**
Programme	SD/IS/ES/SBI/Earth Sciences (MSc Science Communication on request)	
Status	Elective	
Period/Timeslot	2 B	
Language	English	
Coordinator	prof. dr. H. Middelkoop	
Instructor(s)	prof. dr. H. Middelkoop	
Open to other students	Yes	
Remarks	**Students who are registered for the programme Science Education and Communication please contact the Board of Examiners before enrolment in Osiris (examencommissie.geo@uu.nl).** **The course is not recommended for Earth Sciences MSc students who have done similar courses in the ESW programme.**	
Entry requirements		
Entry requirements	Students must be registered for one of the following degree programmes: Earth, Life and Climate, Energy Science, Earth Structure and Dynamics, Earth Surface and Water, Innovation Sciences, Sustainable Business and Innovation, Sustainable Development, Science Education and Communication	
Resources for self study	IPCC AR5 reports 2013-2014	
Course content		
Objectives	Effective adaptation to climate change requires an in depth knowledge of the climate system itself as well as its detrimental effects on our living environment. This course thus focuses on climate adaptation strategies, after treatment of the various components of the climate system, important feedbacks and impacts. After completion of the course the student: • has knowledge and understanding of the climate system, climate forcings and important feedback mechanisms, over a range of time scales from glacial cycles to the past century; • has knowledge and understanding of the mechanisms and drivers of the future climate, the role of humans and climate scenarios for impacts studies; • understands why and how climate has impact on the functioning of rivers, coasts, agriculture, and urban environments; • has understanding of the types and causes of uncertainty associated with climate adaptation; • knows main principles of prevention, mitigation and adaptation strategies; • understands currently available options for adaptation and can apply these to various different domains.	
Content	***Understanding the climate system (4 weeks)*** • Components of the climate system • Climate forcings over different time scales • Future climate and climate scenarios • Feedbacks: water and carbon	

	• Feedbacks: carbon and nutrients. ***Climate impacts (2 weeks)*** • Rivers • Coastal zone, including the coastal lowlands • Urban environment • Dryland agriculture. ***Adaptation Strategies (2 weeks)*** • Uncertainties • Resilience and resistance • Adaptation strategies • Policy options and perspectives Academic skills: *Literature analysis; presenting; writing; evaluation and application of climate adaptation options and strategies*
Entry requirement for	This course is an entry requirement for: N/A
Instructional modes	
Instructional modes	Computer practical (Required) Lecture (Required) Presentation (Required)
General remarks	Lectures, Practicals (scenarios, management strategies), Paper peer-review, Presentations, Short paper writing. Lectures and practicals are mandatory.
Assessment	
Explanation	Grading based on hand-in practical assignments, presentations and short paper, mid-term test on the climate system, and final exam.
Study materials	
Literature	Required: Literature: Lecture handouts plus papers, distributed through blackboard system. Literature: Houghton, J.T. (2015) Global Warming – The complete briefing. 5th Edition. Cambridge University press.

ENSM- Photovoltaic Solar Energy Physics and Technology		
Code: GEO4-2513	**Credits: 7,5 EC**	**Level: M**
Programme	ES	
Status	Elective	
Period/Timeslot	4 A	
Language	English	
Coordinator	dr. W.G.J.H.M. van Sark	
Instructor(s)	dr. W.G.J.H.M. van Sark, A. Louwen, MSc	
Open to other students	Yes	
Entry requirements		
Entry requirements	None	
Assumed previous knowledge	Basic knowledge of solid state physics or condensed matter physics	
Course content		
Objectives	Students will gain knowledge about solar cell physics, technology and applications and will thus be able to better appreciate the rapid developments in photovoltaic solar energy. The course offers insight in solar cell physics and technology by addressing semiconductor physics and operation of basic p-n solar cell devices, as well as frequently used processing methods, preparation and operation of wafer based and thin film solar cells. It also offers new developments in this field focusing on the application of nanotechnology.	
Content	The following topics will be covered: 1. Basic physics of semiconductors 2. Metal-semiconductor interfaces (Schottky barriers and ohmic contacts) 3. p-n junctions (including applications in devices such as solar cells and LEDs) 4. Semiconductor processing (chemical and physical deposition, etching, oxidation) 5. Thin film solar cells, including tandem cells 6. Selected other semiconductor materials and devices and new development 7. Solar cell performance 8. Experience solar cell research in practice by laboratory visit Academic skills: *writing a paper, presentation*	
Entry requirement for	This course is an entry requirement for: • Natural Science Research NS (GEO4-2511) • Energy Science Research NS (GEO4-2512)	
Instructional modes		
Instructional modes	Excercise class (Required) Lecture (Required)	
Assessment		
Explanation	Attendance required at least 75% of all contact hours. Final result:20% exercise solving task, 40% short midterm paper, 40% final	

	presentation
Study materials	
Literature	Required: The book: J. Nelson, The physics of solar cells", Cambridge University Press. ISBN: 978-1-86094-349-2 (soft cover) will be replaced, please contact the coordinator. Sheets: Lecture slides Reader: Other material on topics not covered in the book will be provided in reader.

ENSM-Energy in the Context of Sustainability		
Code: GEO4-2514	**Credits: 7,5 EC**	**Level: M**
Programme	ES	
Status	Obligatory	
Period/Timeslot	1 A	
Language	English	
Coordinator	dr. C.A. Ramirez and dr. W. Liu	
Instructor(s)	dr. C.A. Ramirez, dr. W. Liu, dr. M. van den Broek, dr. F.van der Hilst, dr. R. Harmsen	
Open to other students	Yes, but only for Innovation Sciences students	
Entry requirements		
Entry requirements	Students must be registered in one of the following degree programmes: Energy Science, Innovation Sciences	
Assumed previous knowledge	Basic knowledge on energy	
Course content		
Objectives	The course aims to provide insights into the central role that energy plays in the sustainability debate. The course addresses key challenges of energy use as well as the policies that have been developed to address them. Upon completion of the course, the participants will be able to: • Describe the main trends in energy supply and energy demand • Understand the key mechanism underlying climate change • Understand the main policy responses to climate change • Understand the influence of anthropogenic and natural emissions in the climate system as well as identify the main uncertainties and knowledge gaps • Understand the impacts of energy use in the environment (e.g., air emissions, water acidification, toxicity) • Specify the requirements of energy systems from a sustainability point of view (e.g, environment, reliability, security, accessibility) at different scales (local, national, regional and global) • Understand the role of policies aimed at improving energy efficiency, stimulating the application of renewable energy, and reducing greenhouse gas emissions • Explain the main mechanisms underlying policy instruments and identify their main strengths and weaknesses	
Content	Energy is a strategic commodity, which is fundamental to all (economic) activities. The costs, availability and the clean and efficient utilization of energy are increasingly strong focal points in the strategies and policies of governments worldwide. Therefore, it is essential for energy experts to understand key energy trends, the consequences of energy use and the effectiveness of policies to optimize energy systems. Energy is and will remain a major challenge both for developing and developed countries for the following reasons: • Lack of access to diverse and affordable energy services means that the basic needs of millions of people are not being met; • Energy services are needed to create jobs, develop industries, enhance	

	value added activities and support income-earnings activities; • The environmental effects of energy use can occur at many levels, from local to global and include consequences such as desertification, acidification, air pollution and climate change. The course will offer a strong combination of the latest energy developments, detailed insights into the main challenges of energy use and the key principles of policy formulation. The course uses a combination of lectures and tutorials to provide students with balanced and integrated knowledge that will allow them to develop critical understanding of the aspects involved on promoting sustainable production and use of energy. The course covers the following topics: • Trends in energy production and use • Environmental impacts of energy use • Physics of climate change • Basics of policy evaluation • Policy responses to climate change • Energy access and energy security • Trends, potentials, bottlenecks and policies for renewable energy (biomass, wind), geothermal and energy efficiency • Sustainability paradigms
Entry requirement for	This course is an entry requirement for: • Master's thesis (GEO4-2510) • Natural Science Research Project (GEO4-2518) • Internship Energy Science (GEO4-2520)
Instructional modes	
Instructional modes	Lectures (Required) Tutorials (Required)
General remarks	Lectures: This course is based on lectures (twice a week) and tutorials.
Class session preparation	In order to successfully participate in class, assigned literature should be read before lectures and tutorials.
Contribution to group work	A presentation and a working paper are conducted in small groups (4 and 2 respectively). Each member of the group is expected to equally contribute to the assignments.
Assessment	
Explanation	Exam, group assignment (presentation + short report) and a working paper
Study materials	
Literature	Required: Reader: Course reader (available in Blackboard), articles and report (available in blackboard) lecture notes

ENSM-Bio-based Economy		
Code: GEO4-2521	**Credits: 7.5 EC**	**Level: M**
Programme	ES	
Status	Elective for ES, SUSD, SBI, IS and Chemistry	
Period/Timeslot	3 B	
Language	English	
Coordinator	Prof. Dr. H. M. Junginger	
Instructor(s)	Dr. V. Daioglou Dr. F. van der Hilst Dr. R. Hoefnagels Prof. Dr. H. M. Junginger Dr. M. Londo Dr. A. Ramirez Dr. Li Shen Dr. B. Wicke and others	
Open to other students	Yes	
Remarks	**This course is especially recommended for students that want to write their MSc thesis on BBE-related topics.**	
Entry requirements		
Entry requirements	Students must be registered for one of the following degree programmes: Energy Science, Innovation Sciences, Sustainable Business and Innovation, Sustainable Development, Chemistry.	
Assumed previous knowledge	It is strongly recommended (but not required) that students should have followed at least one of the following courses • Advanced energy analysis (GEO-2508) • Life Cycle Analysis (GEO3-2124; BSc course) • Toolbox 1 (GEO4-2602) • Science and technology for Sustainable development (SK-BCHDO; BSc course)	
Course content		
Objectives	The objective of this course is to provide students with the knowledge and insights needed to understand the potential future role of a biobased economy (BBE) in a sustainable world, including its possibilities and limitations. After completion of the course, the students should be able to: • understand the technical and economic possibilities and limitations of biomass to substitute fossil fuels for the production of energy, chemicals and materials, including the complexity of determining the ideal use/cascade of biomass for materials and energy • explain the main sustainability challenges that are linked to the production and use of biomass, including the possible contribution that biomass use for energy, chemicals and materials can make to mitigate climate change • discuss the main uncertainties concerning the opportunities and risks of BBE, and the related issues to concerning economic and/or environmental policy strategies	
Content	Biomass is an important feedstock to produce food, fodder, materials and energy. Given the environmental concerns of fossil fuel use for the production of materials and as energy carrier, the use of biomass is expected to strongly increase in the coming decades as a feedstock for the bio-based economy. However, developing the bio-based economy is not straightforward: (1) there are limited amounts of feedstock and potential (environmental and other) impacts of feedstock production	

	and biomass use; (2) there are a large-number of possible applications and end-uses; and (3) the (currently often unfavorable) economics compared to fossil fuels make deployment difficult. The course examines the potential deployment of biomass (for a biobased economy) from a system perspective, from feedstock production until final use. The course takes an interdisciplinary approach thereby looking at the physical, technical, economic, environmental and policy aspects involved on the deployment / transition towards a biobased economy. Topics that will be treated during the course include: • Definition and overview of the historic and current biobased economy in the Netherlands, Europe and the world, including traditional and new uses of biomass for energy and materials. • EU and global biomass potentials (current – 2100) and key factors determining this potential (including overall land-use patterns and agricultural productivity) • The role of biomass logistic chains (including pretreatment & storage strategies) and international trade • Current and future biochemical and thermochemical conversion routes from various biomass feedstocks to energy carriers and materials and the related types of biorefineries (including integrated bio-refinery concepts) • Overview of possible end uses of biomass for energy (electricity; heat; road, aviation and marine transport fuels) and materials (including biobased plastics, bulk and fine chemicals, advanced fibers and building materials etc.) • GHG performance of biomass use for energy and materials, including life-cycle chain emissions (including recycling), land-use change effects and temporal effects • Sense and non-sense of cascading and links with the circular economy concept • Other potential environmental benefits and impacts of biomass use for energy and materials • Overview of past and current policy strategies to promote and govern sustainable biomass production and use • Macro-economic perspectives and socio-economic aspects of a biobased economy *Academic skills: Writing a paper*
Entry requirement for	This course is an entry requirement for: N/A
Instructional modes	
Instructional modes	Lecture (Required) Exercise class (voluntary) Excursion (Voluntary)
Assessment	
Explanation	Individual final paper, topics will be announced at the beginning of the course Individual written exam.
Study materials	
Literature	Required: Course reader (available on blackboard), lecture notes, scientific articles (available on blackboard)

SBI-Toolbox 1: Environmental assessment and management approaches		
Code: GEO4-2602	**Credits: 7,5 EC**	**Level: M**
Programme	SBI/SD/ES/WSM/IS/Chemistry	
Status	Obligatory for SBI; Elective for other programmes	
Period/Timeslot	2 D	
Language	English	
Coordinator	dr. H.M. Junginger	
Instructor(s)	dr. H.M. Junginger	
Open to other students	Yes	
Entry requirements		
Entry requirements	Students must be registered for one of the following degree programmes: Energy Science, Water Science and Management, Innovation Sciences, Sustainable Business and Innovation, Sustainable Development, Chemistry	
Assumed previous knowledge	Basic background of natural science, e.g. knowing the difference between a kW and a kWh.	
Previous knowledge can be gained by	Following the Bachelor course on Life Cycle Assessment (GEO3-2124)	
Resources for self study	Scientific literature provided on blackboard (mandatory). Recommended (but not obligatory): Henrikke Bauman. Anne-Marie Tillman, The Hitch Hikers guide to LCA. Gazelle Book Services, 2004. ISBN 9144023642, 9789144023649	
Course content		
Objectives	The objectives of this course are to introduce students to a variety of tools and approaches to assess, manage and improve the environmental impact of products and production processes. After completion of the course, the students: • have insight in the most important (research) methods and tools to assess and manage the environmental impact of products, production processes and services; • know strong and weak points of each tool and understand the level of uncertainty in using them; • can critically interpret studies that are carried out using these tools and are able to carry out basic calculations themselves.	
Content	The course will focus on the sustainability of products and production processes of firms. About two thirds of the course will focus on tools to assess the environmental (and to a limited extent social and economic) impact of products and production processes, and will be based (mainly) life cycle assessment (LCA), including carbon footprinting. In 3-4 lectures, a general introduction and explanation of concepts such functional unit, different ways of allocation and the difference between attributional & consequential LCA will be provided. Also one or two concrete case studies on how LCA's are carried out, interpreted and used by firms will be presented. Next to two assignments, also, two half-day LCA computer practical will be held introducing the students to SimaPro. Other approaches covered during lectures will include an introduction to environmental impact assessment (EIA) to evaluate the impacts of location & time specific projects, and to environment risk assessment (ERA) to assess uncertainty and long-term risks of products and	

	production processes. In the remaining third of the course, the students will gain knowledge on concepts how products and production processes can be improved and last but not least how the economic implications of these changes can be assessed. This will include an introduction to concepts such as circular economy (CE). cradle-to-cradle (C2C), eco-design, cleaner production, and to economic concepts such as net present value (NPV), internal rate of return (IRR) and Life Cycle Costing (LCC). The course mainly aims to provide an overview of the state of the art of current tools in use. A secondary aim is to highlight on-going trends in academia and the further development and expansion of existing concepts, such as the development of social and socio-economic LCA. Academic skills: • Comprehending (and to a limited extent applying) the scientific concepts and tools taught in the course; • Understanding and critically reviewing scientific articles, including a review of an existing LCA study and writing a concise review paper; • Making and presenting a scientific poster.
Entry requirement for	This course is an entry requirement for: Consultancy Project SBI (GEO4-2605) and Master's Thesis Internship (GEO4-2606).
Instructional modes	
Instructional modes	Lectures by UU staff members and guest speakers Poster presentation (Required) Tutorials & practicals 1-day Excursion
General remarks	Lectures will be both by UU staff and guest lecturers from companies (previously we had e.g. Philips, Shell, Royal Haskoning, CO_2 performance ladder, Desso and Interface)..
Class session preparation	You should prepare for lectures by reading the literature provided on Blackboard in advance
Contribution to group work	You will perform a critical review of an existing LCA study (see assessment) in groups of 3-4 persons. You are expected to meet with your group on your own to discuss the assignment and prepare the paper. All group members are expected to contribute equally to the assignment.
Assessment	
Explanation	The assessment will be carried out by means of a written, closed-book exam (50% of the final grade). The other 50% will be covered by a group assignment to analyse and critically review an existing LCA study. The deliverables that will be assessed are a paper with your critical review (40%) and a poster presentation where you present the LCA study and your review to your peers (10%).
Study materials	
Literature	Required: Reader: will be available digitally on blackboard. No hardcopy will be provided. Items: List of scientific articles on Blackboard

SBI-Toolbox 2: Socio-organizational Methods for Corporate Sustainability		
Code: GEO4-2603	**Credits: 7,5 EC**	**Level: M**
Programme	SBI/ES/IS/SD/WSM	
Status	Obligatory for SBI; Elective for other programmes	
Period/Timeslot	3 C	
Language	English	
Coordinator	dr. W.J.V. Vermeulen	
Instructor(s)	dr. W.J.V. Vermeulen, ir. S. Witjes	
Open to other students	Yes	
Entry requirements		
Entry requirements	Students must be registered for one of the following degree programmes: Energy Science, Water Science and Management, Innovation Sciences, Sustainable Business and Innovation, Sustainable Development.	
Assumed previous knowledge	Business and Sustainability Challenges (GEO4-2601) and Technology Related Venturing (GEO4-2268)	
Course content		
Objectives	The objectives of this course are: • Make students aware of the theoretical background and methods applied in practice of the tools which companies apply in order to be able to manage sustainability internally and externally. • Make students acquainted with theoretical concepts and models relevant for these tools. • Give the students the possibility in group work and in individual work to analyse and reflect upon case studies. After completion of the course, the student: • Has advanced knowledge and understanding of the organisational and management processes related to the contribution to corporate sustainability; • Has advanced knowledge and understanding of various tools and methodologies related to corporate sustainability and is able to compare and relate them to each other and assess them form a comprehensive synthesis perspective; • Can recognise organisational structures and its elements assuring the compliance with corporate sustainability;	
Content	In this course 4 elements will be addressed: • *Stakeholder relations*: Who are they, why are they relevant, how can they influence the sustainability of a company and how can companies engage with them? • *Management systems and standards*: How do companies assure that the whole organization is working towards the set goal for sustainability? • *Selling your corporate and product sustainability*: Who are the customers and what are companies doing to sell the fact that they are sustainable of that they have sustainable products? • *Value chain management*: What is the value chain in the sustainability of a company and how can companies collaborate with value chain partners,	

	ensuring sustainable production practices in the entire value chain? For every element there is a mixture of theoretical knowledge, contact with practice and the possibility for the students to explore themselves these elements by means of assignments. Academic skills: *after completion of the course, the student:* • is able to connect with companies and communicate with them about integrating Corporate Sustainability; • is able to understand organisations, their internal and external stakeholders, and how they influence and contribute to sustainability; • critically reflect on and analyse organisations and their context, in order to be able to understand the playing field of corporate sustain*ability.*
Entry requirement for	This course is an entry requirement for: Master's Thesis Internship (GEO4-2606)
Instructional modes	
Instructional modes	Lectures (Required); Seminars (Required)
General remarks	Lectures, group papers, presentation and debate.
Class session preparation	Readings for lectures; readings for group assignment
Contribution to group work	Prepare presentations and paper in small groups (3-5 students)
Assessment	
Explanation	• Exam (40%) • Group work (18%) • Presentation of assignments (12%) • Final group paper (30%)
Study materials	
Literature	Reader with online resources and list of scientific articles

SBI-Organizational Change Management for Sustainability		
Code: GEO4-2604	**Credits: 7,5 EC**	**Level: M**
Programme	SBI/IS/SD/ES/WSM	
Status	Obligatory for SBI; Elective for IS, SD, ES and WSM	
Period/Timeslot	2 A	
Language	English	
Coordinator	dr. A. Kalfagianni	
Instructor(s)	dr. A. Kalfagianni, D. Reike, MSc	
Open to other students	Yes	
Entry requirements		
Entry requirements	Students must be registered for one of the following degree programmes: Energy Science, Water Science and Management, Innovation Sciences, Sustainable Business and Innovation, Sustainable Development	
Assumed previous knowledge	Business, Sustainability and Innovation (GEO3-2122) or equivalent	
Course content		
Objectives	The course provides the students the skills and knowledge to engage with organisational change management for sustainability. The course content is designed to address the nature of change, what drives it, what are the barriers to change, and how can these be overcome. This is aimed at providing students with skills in change management, which should improve their employability in organisations that are working towards sustainability. This course is designed to develop understanding, critical awareness, and skills for effective action and problem solving; particular emphasis will be placed on developing the follow competences: • To familiarise students with the key principles of organisational systems and their respective attitudes, and how they influence and contribute to sustainability • To familiarise students with change management for corporate and organisational sustainability • To develop the students' understanding on the complexities of change management in organisations (such as corporations and universities), and how it can contribute to more sustainable societies • To enable students to critically think and reflect on and analyse key literature and case studies • To enable students to implement recommendations to organisations to help them become more sustainability orientated, and improve employability After completion of the course, the student will be able to: • understand organisations, their elements, and their attitudes, and how they influence and contribute to sustainability; • understand the different types of change and how they can be managed in the corporate sustainability context; • recognise drivers, barriers to change, and strategies to overcome the barriers in a sustainability context within the organisation; • critically reflect on and analyse organisations, in order to be able to	

	implement change management for sustainability.
Content	Sustainability has appeared as an alternative to development models prioritising economic activities at the expense of environmental and social issues. Sustainability aims to produce a dynamic balance among economic, environmental and social aspects, and the time dimension. A variety of corporate efforts, (such as Life Cycle Assessment, Eco-efficiency, and Corporate Social Responsibility), are being used to incorporate Sustainability principles into companies and organisations' activities. Nonetheless, in many cases these efforts have been limited by their focus on a particular Sustainability issue, 'hard' technocentric solutions, or not being effectively integrated into organisational change processes. This course is aimed at operationalizing the tools and techniques by engaging with internal stakeholders, i.e. employees. It is also aimed at providing the students a more in depth understanding of a company's culture The course structure is: • Introduction • Organisations and their systems • Attitudes and behaviour • Change management in the organisational sustainability context • Principles and concepts of change management • Types of change • Processes of change • Drivers to change • Change incorporation • Resistance to change • Barriers to change • Strategies to overcome change • Steering mechanisms • Institutionalisation For every element there is a mixture of theoretical knowledge, contact with practice and the possibility for the students to explore themselves these elements by means of assignments.
Entry requirement for	This course is an entry requirement for: Master's Thesis Internship (GEO4-2606) and Consultancy Project SBI (GEO4-2605)
Instructional modes	
Instructional modes	Lectures (Required); Seminars (Required)
General remarks	Lectures, Guest Lectures, Interactive and participatory Workshops, and Student meetings
Assessment	
Explanation	See course manual
Study materials	
Literature	List of scientific articles

SBI-Sustainable Entrepreneurship		
Code: ECMSE	**Credits: 7,5 EC**	**Level: M**
Programme	SBI	
Status	Obligatory for SBI; elective for IS, SD, ES, WSM and SBM Required for the university wide Annotation Sustainable Entrepreneurship & Innovation.	
Period/Timeslot	3 D	
Language	English	
Coordinator	dr. N.S. Bosma (n.s.bosma@uu.nl)	
Instructor(s)	dr. N.S. Bosma	
Open to other students	Yes	
Remarks	**Registration for this course in Osiris runs from 30 October – 27 November 2016.**	
Entry requirements		
Entry requirements	Students must be registered for one of the following degree programmes: Energy Science, Water Science and Management, Innovation Sciences, Sustainable Business and Innovation, Sustainable Development, Science and Business Management.	
Recommended pre-requisites	International Business Ventures (ECMIBV)	
Course content		
Objectives	This course is designed to provide academic knowledge related to idea development, value proposition, market introduction and management of new sustainable business and to put these into practice. The major learning objectives include: • To provide understanding of (sustainable) entrepreneurship (what entrepreneurship is, cognitive foundations of entrepreneurship, and entrepreneurial opportunities, distinctive characteristics of entrepreneurs); • To analyse and evaluate the economic sources of social and environmental problems and to identify opportunities to alleviate or eliminate these problems and the underlying conditions; • To apply the accumulated knowledge by either developing a business model from scratch or by introducing an initially developed plan to the market by means of bootstrapping methods; This necessitates that students understand the concepts of sustainability and sustainable entrepreneurship, and that students learn about the economic, environmental and social problems facing local and global communities and recognise the opportunities that arise from this. Finally, students should be able to evaluate the risks and rewards of undertaking sustainable entrepreneurship, which involves finding ways to measure the economic as well as social and environmental risks and rewards of a new venture.	
Content	Entrepreneurship focuses on identifying new opportunities for creating value for customers or users and commercially developing those opportunities to establish a profitable business. Sustainable entrepreneurship combines the traditional focus of entrepreneurship with an emphasis on opportunities to alleviate social or environmental conditions. Sustainable entrepreneurship is about entrepreneurs striving simultaneously for profit and for improving local and global environmental and social conditions.	

	This course is addressed to students interested in exploring the challenges of sustainable entrepreneurship. The course will provide academic insights into the entrepreneurial process and in particular: • The opportunities and challenges of developing a new venture, given characteristics of the market and the institutional context; • The challenges of aligning profits with social and environmental value; The overall objective of this course is to make the students aware of the opportunities offered by an entrepreneurial career, the skills needed for and academic knowledge about entrepreneurial processes, in the context of sustainability. The course emphasizes the business & management perspectives to entrepreneurship.
Entry requirement for	This course is an entry requirement for: • Consultancy Project SBI (GEO4-2605) • Master's Thesis Internship (GEO4-2606)
Instructional modes	
Instructional modes	This course is an interactive and participatory course that teaches students the key concepts from theory to practice. It adopts a mix of lectures, tutorial sessions, workshops and activities related to the business model assignment. Students are expected to attend and participate in all lectures and take part in all tutorial sessions. The students will be allocated into groups (4 or 5 students) for the business model assignment. For each group the aim is to establish a mix of enrolled students from Utrecht University School of Economics and from Geosciences , in order to facilitate multidisciplinary work.
Assessment	
Explanation	The elements that constitute the final grade are the following: *Business Model Assignment (group work):* Groups will either develop a business model from scratch, or introduce developed ideas to the market. This will be achieved in several steps throughout the course period. The evaluation will be based on the quality of the final work, the presentation and the process towards the final document(s). *Business Case Assignment (group work):* Students will be presented with a case study and are required to answer questions that relate to the case. The questions focus on marketing and finance applied to sustainable entrepreneurship. The evaluation will be based on a concise report in which the answers are motivated. *Written Exam (individual work):* There will be a midterm exam that consists of open-ended questions. The questions are based on the key course concepts that are taught and discussed during the course. **Assessment method** • Written midterm exam with open-ended questions (30%); Individual • Evaluation of Business Case Assignment (20%); Group grade • Evaluation of business model assignment (50%). Group grade, with a group component (25%) and an individual component (25%).
Study materials	
Literature	• Sustainable Venturing: Entrepreneurial Opportunity in the Transition to a Sustainable Economy. Dean. ISBN-13.: 978-0136044895. Pearson: Boston • Syllabus with academic articles • Course manual

Appendices

Appendix I Rules for choosing elective courses

1. Students in the Master's programme choose elective courses from another or their own Master's programme to the value of 15 EC. Courses that are obligatory in the examprogramme cannot be used as elective courses. Electives worth at least 7.5 EC should be natural science electives.

2. The student must subject in advance his elective courses to the approval of the Board of Examiners. The programme leader of the Master's programme will advise the Board in this matter.

3. The Board tests the proposed elective course on the following criteria:
   a. They must be thematically linked to the Master's programme;
   b. The programme leader supports the proposition;
   c. It concerns a course at a master level (M);
   d. The course is not taught in the same period and timeslot as another course the student has selected.

4. Within these bounds students are **free to propose any course** (even in Dutch) from any other programme in the Faculty of Geosciences, the UU or another recognised University in the Netherlands (see www.vsnu.nl > universiteiten) or abroad. Useful sources to find electives are the Osiris webpage (www.uu.nl/osirisstudent), the USI website (www.usi-urban.nl) and the Innovation Studies website offering an overview of related programmes abroad (www.innovationstudies.org).

5. If the student wishes to choose an elective course, he must do so by a written request (form) to the Board of Examiners and he must attach written information on the contents, the level, and the study load of the course, preferably by means of a copy of the course's description from the course catalogue. The 'Application Form Elective courses IMEW' can be found in the Blackboard community Innovation Sciences or it can be downloaded at http://students.uu.nl/sites/default/files/geo-iees-application_form_optional_courses.pdf.

6. The student can either ask the programme leader to sign the application form or forwards an email containing the **programme leader's approval** to the Board of Examiners. The form (and email if applicable) and the course description can be sent to the Board's secretary, mrs. drs. Erika Dijksma (room 10.23, pigeon-hole at the 10th floor of the Unnik building).

7. Recommended elective courses as mentioned on the Blackboard community IS do not need to be approved by the programmeleader but must still be approved *before starting* by the Board of Examiners.

8. Actual participation is only possible if students satisfy the course's entrance conditions; in case of doubt they should contact the course coordinator first.

9. In the programme's course schedule, room has been reserved for taking electives. However, the student is free to deviate from this planning, e.g. because he wishes to take an interesting elective course in another period. If this causes delay in his study planning, the responsibility is for account of the student! Students are therefore advised to take their electives in the reserved periods and timeslots, or use a part of the time planned for their internship and/or Master's thesis.

Appendix II Teaching and Examination Regulations Graduate School Geosciences 2016-2017

The Education and Examination Regulations set out the degree programme-specific rights and obligations of students on the one hand and of Utrecht University on the other hand. The University's student charter contains the rights and obligations that apply to all students.

These Regulations were adopted by the Dean of the Graduate School of the Faculty of Geosciences on 26 April 2016 with the approval of the Faculty Council on 26 April 2016.

SECTION 1 – GENERAL PROVISIONS

Art. 1.1 – applicability of the Regulations

These Regulations apply to the teaching and examinations of the Master's degree programmes in Development Studies, Earth Sciences, Environmental Sciences, Geographical Sciences, Human Geography, Human Geography and Planning (research programme), Spatial Planning and Science and Innovation (hereinafter called the degree programmes) and to all students registered for these degree programmes and to all students who have applied for admission to these degree programmes for the academic year 2016-2017.
The degree programmes and individual Master's programmes are run by the Graduate School of Geosciences within the Faculty of Geosciences.

Art. 1.2 – definition of terms

In these Regulations, the terms below have the following meanings:
a. the Act: the Dutch Higher Education and Research Act 1992 (*Wet op het Hoger onderwijs en wetenschappelijk onderzoek 1992, WHW*).
b. student: a person who is registered at the University to take courses and/or sit the tests and final examination of the degree programme. In these Regulations, reference to a student is in the masculine form, in accordance with the General Regulations Guideline applicable to Dutch legislation.
c. credit: a value expressed in EC (according to the European Credit Transfer System), where the study load is expressed as one credit being equivalent to 28 hours of learning.
d. degree programmes: the Master's degree programmes referred to in Art. 1.1 of these Regulations, consisting of a coherent whole of units of study. A Master's degree programme may comprise several Master's programmes.
e. component: a unit of study (course) within the degree programme, as included in the prospectus and the University Course Catalogue.
f. course: the whole of education and testing of a component.
g. test: interim examination as referred to in Art. 7.10 of the Act.
h. examination: the final examination of the degree programme that is passed if all obligations of the entire Master's degree programme have been fulfilled.
i. special needs contract: the contract concluded by the Director of Education (or another officer on behalf of the degree programme) and the disabled student, which lays down the necessary and reasonable facilities to which the student is entitled.
j. International Diploma Supplement: the annex to the Master's degree certificate, which includes an explanation of the nature and contents of the degree programme (partly in an international context).
k. Board of Studies: the Board of the Graduate School of Geosciences.
l. Student Affairs Geosciences: student information desk and student progress administration unit of the Faculty.
m. course guide: document specifying for each course: the exit qualifications; the requirements (such as the attendance and effort requirements) that a student must meet to achieve the exit qualifications; the way in which the final grade is calculated; the timetable and the instructional formats; name and availability of the course coordinator.
n. academic vacation periods: periods without any teaching obligations for teaching staff and learning obligations for students, as laid down in the academic calendar for the degree programmes.
o. examiner: the assessor.

The other terms have the meanings ascribed to them in the Act.

SECTION 2 – ADMISSION

Art. 2.1 – admission requirements of the degree programmes

1. The holder of a Dutch or foreign higher education degree who possesses knowledge, understanding and skills at university bachelor's level and who demonstrates the specific knowledge, understanding and skills as specified in Annex 1, can be admitted to one of the Master's programmes.
2. Selection of students is based on a review of the following core competences of applicants:
   a) motivation and talent (partly based on GPA and study progress);
   b) level of relevant knowledge and competence in the methods and techniques of the field of study concerned;
   c) general level of academic and professional skills;
   d) level of proficiency in the language(s) of instruction used in the programme.

This information is used to assess whether a student is able to complete the Master's programme successfully within the nominal duration.

Art. 2.2 – English language (for Master's Degree Programmes taught in English)

1. Registration for the degree programmes is possible only after it has been demonstrated that the requirement of adequate command of the English language is fulfilled. Deficiencies in previous education in English must be made up before the start of the degree programme by sitting one of the following tests:
   - IELTS (International English Language Testing System), academic module. The minimum required IELTS score (overall band) is: 6.5 with at least 6.0 for the component 'writing'.
   - TOEFL (Test of English as a Foreign Language). The minimum required TOEFL score is 93 (internet-based test).
   - Cambridge EFL (English as a Foreign Language) Examinations, with one of the following certificates:
     - Cambridge Certificate in Advanced English; minimum score B.
     - Cambridge Certificate of Proficiency in English; minimum score C.
2. The holder of a university Bachelor's degree awarded in the Netherlands fulfils the requirement of adequate command of the English language.

Art. 2.3 – proficiency in Dutch for holders of foreign qualifications (for Master's Degree Programmes taught in Dutch)

Holders of a foreign diploma may only register:
1. once it has been demonstrated that the requirement of adequate command of the Dutch language has been fulfilled by passing the state examination in Dutch as a Second Language, Programme 2, or the certificate in Dutch as a Foreign Language, 'Educatief Professioneel' ('Educational Professional', previously 'Academic Language Skills Profile' (PAT)) or 'Educatief Startbekwaam' ('Educational Beginner's proficiency', previously 'Higher Education Language Skills Profile' (PTHO)), and
2. once it has been demonstrated that the requirement of adequate command of the English language has been fulfilled. Deficiencies in previous education in English must be made up before the start of the degree programme by sitting one of the following tests:
   - IELTS (International English Language Testing System), academic module. The minimum required IELTS score (overall band) is: 6.5 with at least 6.0 for the component 'writing'.
   - TOEFL (Test of English as a Foreign Language). The minimum required TOEFL score is 93 (internet-based test).
   - Cambridge EFL (English as a Foreign Language) Examinations, with one of the following certificates:
     - Cambridge Certificate in Advanced English; minimum score B.
     - Cambridge Certificate of Proficiency in English; minimum score C.

Art. 2.4 – deficiencies

1. The Board of Admissions of the Graduate School may require those applicants who do not meet the admission requirements referred to in Art. 2.1 to complete a package of courses to a maximum of 60 EC, to be taught by Utrecht University and tailored to the Master's programme concerned, in order to make up for prior educational deficiencies.
2. The Board of Admissions may establish in its decision that deficiencies must be made up within a certain period of time and prior to admission to the Master's degree programme.

Art. 2.5 – admissions procedures

1. Responsibility for admission to the degree programmes of the Graduate School and the various Master's programmes lies with the Board of Admissions of the Graduate School.
2. In order to determine eligibility for admission to the degree programme, the Board of Admissions will consider and evaluate the knowledge, understanding and skills of the applicant. The Board may request experts within or outside the University to assess the applicant's knowledge, understanding and skills in particular areas, in addition to a review of written documents of qualifications gained.

3. In order to determine eligibility for admission to a programme within the Master's degree programme, the Board of Admissions will examine whether the applicant meets the admission requirements referred to in Art. 2.1(1) or will meet them in time. In its review, the Board will include the applicant's core competences referred to in Art. 2.1(2), as well as the applicant's knowledge of the programme's language of instruction. On this basis the Board of Admissions will assess whether the candidate is able to achieve the exit qualifications of the Master's degree programme with sufficient effort within the nominal duration of the programme.
4. Requests for admission to one of the degree programmes and to a specific Master's programme are submitted to the Board of Admissions before 1 April and 1 September. In special cases, the Board of Admissions may consider requests submitted after these closing dates.
5. The applicant will receive written notification whether or not he has been admitted to the degree programme and a specific Master's programme. The possibility to appeal to the Examinations Appeal Board will be indicated in this notification.

SECTION 3 – CONTENTS AND STRUCTURE OF THE DEGREE PROGRAMMES

Art. 3.1 – aim of the degree programmes

1. The degree programme aims to:
   - equip students with specialist knowledge, skills and understanding in the field of Geosciences, and help them achieve the exit qualifications referred to in paragraph 2;
   - prepare students for a career in one or more sub-fields of Geosciences;
   - prepare students for undertaking a programme to train as a researcher in the field of Geosciences.

2. The graduate:
   - has a deep knowledge and understanding of the subject matter of Geosciences;
   - has a thorough knowledge of a specialism in his degree programme and thorough knowledge at the interface of the degree programme and another field;
   - has the skills to identify, formulate, analyse and suggest possible solutions to problems independently in the field of Geosciences;
   - has the skills to conduct research in the field of Geosciences and to report on this research in a manner that meets the customary standards of the discipline;
   - possesses professional and academic skills, particularly in relation to the field of Geosciences;
   - is able to apply knowledge and understanding in such a way that demonstrates a professional approach to his work or profession;
   - is able to communicate conclusions, as well as the underlying knowledge, grounds and considerations, to an audience composed of specialists or non-specialists.

   The prospectuses for the Master's degree programmes set out the subject-specific exit qualifications for the different Master's programmes.

Art. 3.2 – mode of attendance

The degree programmes in Development Studies, Earth Sciences, Environmental Sciences, Human Geography and Planning (research programme) and Science and Innovation are offered full-time. The degree programmes in Spatial Planning, Geographical Sciences and Human Geography are offered full-time as well as part-time.

Art. 3.3 – language of instruction

The degree programmes in Development Studies, Earth Sciences, Environmental Sciences, Geographical Sciences, Human Geography and Planning (research programme), Spatial Planning and Science and Innovation are taught in English. The degree programme in Human Geography is taught in Dutch. The Master's programme Urban Geography within the degree programme Human Geography is taught in English.

Art. 3.4 – study load

The degree programmes in Earth Sciences, Environmental Sciences, Geographical Sciences, Human Geography and Planning (research programme) and Science and Innovation have a total study load of 120 credits. The degree programmes in Development Studies, Spatial Planning and Human Geography have a total study load of 60 credits.

Art. 3.5 – programmes; start dates

1. The Graduate School of Geosciences offers the following Master's degree programmes and Master's programmes:

Master's degree programmes	Master's Programmes
Earth Sciences	Earth, Life and Climate Earth Structure and Dynamics Earth Surface and Water Marine Sciences Water Science and Management
Environmental Sciences	Sustainable Development Water Science and Management
Geographical Sciences	Geographical Information and Management Applications
Human Geography and Planning	Urban and Economic Geography
Science and Innovation	Innovation Sciences Energy Science Sustainable Business and Innovation
Development Studies	International Development Studies
Spatial Planning	Spatial Planning
Human Geography	Economische Geografie Geo-communicatie Urban Geography

The Master's degree programmes prepare students for undertaking research in one or more sub-fields of Geosciences.

2. All Master's degree programmes have one start date a year: 1 September.

Art. 3.6 – components of the Master's programmes

1. The core components of the different Master's programmes and their study loads are described in Annex 1.
2. Upon approval by the Board of Examiners, the student will choose one or more components. The study loads for the elective components of the specific Master's programmes are set out in Annex 1.
3. In the prospectus, the contents and form of instruction of the components of the different Master's programmes are described in more detail, stating the prior knowledge desirable to pass the relevant component.

Art. 3.7 – components taken elsewhere

1. The condition for gaining the degree certificate of the Master's examination of the programme is that at least half of the Master's degree programme is passed in components provided by Utrecht University.
2. Components passed elsewhere during the degree programme can only be incorporated in the student's examinations programme with prior permission from the Board of Examiners.
3. Exemption can be granted for components passed at an institute of higher education prior to the start of the Master's degree programme only on the basis of Art. 5.13.
4. Contrary to Art. 3.7.3., components that have been passed in a Master's degree programme at Utrecht University prior to the start of the Master's degree programme may be counted towards the student's examinations programme with the classification awarded.

Art. 3.8 – actual teaching structure

The teaching structure of each course is shown in the University Course Catalogue and/or course guides and/or in the digital learning environment (Blackboard).
The student can view the room timetables of the classes for which he is registered via Osiris Student. The Student can also see in Osiris Student where and when the course tests for which he is registered will be held.

SECTION 4 – COURSES

Art. 4.1 – course

All courses that are part of the degree programmes have been included in the prospectuses for the programmes and can be found at the student site.

Art. 4.2 – course admission requirements

The Board of Studies will decide the order in which the required components of a Master's degree programme must be completed. This will be announced in the prospectus and/or the course guide.

Art. 4.3 – registration for courses

Participation in a course is possible only if the student has registered for it in good time. The Board of Studies will decide how and when registration takes place. Registration rules and closing dates will be published through the student site.

Art. 4.4 – attendance and effort requirements

1. Each student is expected to participate actively in the course for which he is registered.
2. Besides the general requirement for the student to participate actively in the course, the additional requirements for each component are listed in the University Course Catalogue and the course guide.
3. A student may be granted exemption from attendance for reasons demonstrably beyond his control (for instance as a result of illness or family circumstances), at the discretion of the course coordinator. The student must notify the study programme's secretariat of his absence in advance. The course coordinator or the Director of Education may request the student to provide written evidence of the exceptional circumstances.
4. In the event of qualitatively or quantitatively inadequate participation, the course coordinator may exclude the student from further participation in the course or part of it.
5. Effort requirements (such as holding a presentation or writing a paper) can never expire. If a student fails to meet an effort requirement in time for reasons beyond his control, the course coordinator will set a new date for the student to fulfil the obligation.
6. Students who wish to apply for special arrangements with regard to course obligations as a result of chronic illness, disability or Outstanding Student Athlete status, may submit a request to the Board of Examiners (see also Art. 7.3).

SECTION 5 – TESTING

Art. 5.1 – general

1. During the course, the student will be tested for academic schooling and on the extent to which he has sufficiently achieved the learning objectives set. The testing of the student will be concluded at the end of the course.
2. The University Course Catalogue and/or course guide describe the achievements the student must demonstrate to pass the course, as well as the criteria on which the student is assessed. In the event of a difference of opinion, the course guide will be followed.
3. If a course has to be repeated, the last classification gained will count.
4. Should a student pass a course, but still wishes to repeat the course, the complete course must be repeated.
5. The Regulations of the Board of Examiners describe the testing process (see: student site).

Art. 5.2 – Board of Examiners

1. The Dean will establish a Board of Examiners for each degree programme or group of degree programmes and will sufficiently ensure that the Board of Examiners can operate independently and professionally.
2. The Dean will appoint the chair and the members of the Board of Examiners for a period of three years on the basis of their expertise in the field of the degree programme(s) in question or the field of testing, in which:
   - at least one member comes from outside the degree programme or group of degree programmes concerned, and
   - at least one member is a lecturer on the degree programme or group of degree programmes concerned.

   Re-appointment is possible. Before making this appointment, the Dean will consult the members of the Board of Examiners concerned.
3. Persons holding management positions that include financial responsibilities or who are wholly or partially responsible for Master's degree programmes are not eligible for appointment to the Board of Examiners or as chair of the Board of Examiners. These persons will in any event include the Dean, the Vice Dean, directors/heads/managers of a department, members of a department's management/governing team, members or chairs of the Board of Studies of the Graduate or Undergraduate School and the Director of Education.
4. Membership of the Board of Examiners will end on completion of the term of appointment. The chair and members of the Board may also be dismissed by the Dean at their own request. The chair and members of the Board will be dismissed by the Dean if they no longer meet the requirements of paragraphs 2 or 3 of this article. The Dean may also dismiss a chair or members found to be performing their statutory duties unsatisfactorily.

5. The Dean will announce the composition of the Board(s) of Examiners to students and lecturers.

Art. 5.3 – assessment of traineeship or research assignment and thesis

1. A traineeship or research assignment will be assessed by the supervisor in question and one or more other internal and/or external experts.
2. Master's theses will be assessed by at least two examiners.

Art. 5.4 – grades

1. Grades will be awarded on a scale of 1 to 10. The final assessment of a course is either pass or fail, expressed in numbers: 6 or higher and 5 or lower respectively.
2. The final course grade will be rounded to one decimal place. A partial course grade will never be rounded.
3. The final course grade of 5 will not have any decimal places. An average grade of 4.95 to 5.49 is a fail (5); an average grade of 5.50 to 5.99 is a pass (6).
4. The course guide sets out the way in which the final course grade is calculated.
5. Alphanumeric results are awarded in the following cases:
   - a student who is registered for a course and has not participated in one of the test modules will be given an NV (*Niet Verschenen* – No Show). If non-participation is for reasons beyond the student's control the student will be given an ND (*Niet Deelgenomen*– Not Participated);
   - a student who has not participated in all the test modules will be given an NVD (*Niet VolDaan* – Incomplete);
   - if the student has completed a module, but has not received a grade for it, he may be given a V (*Voldoende* – Satisfactory) as the result;
   - if the student has not completed a module but does not receive a grade for it, the student can be given an ONV (*ONVoldoende* - Unsatisfactory) as the result;
   - a student who has been granted exemption by the Board of Examiners will be given a VR (*VRijstelling* – Exemption);
   - if the Board of Examiners establishes fraud, the student may be given an FR (*FRaude* – Fraud) as the result.

Art. 5.5– repeat exams: supplementary or replacement tests

1. If during the course the student satisfies all the effort requirements and does not receive a pass grade but does receive a final grade of at least 4.00 before rounding, he will be given a once-only opportunity to take a supplementary test.
2. The lecturer will determine the form and content, as well as date and time, of the supplementary test.
3. If the student passes the individual supplementary test, a final grade of 6 for the entire course will be recorded in the student progress administration system. Partial course grades that the student has achieved will not be taken into account in establishing the final grade of the supplementary test.
4. If the student does not pass the supplementary test, the initial final grade will be entered into the student progress administration system, thus rendering all partial course grades no longer valid.
5. Students who miss a test or part of a test owing to circumstances demonstrably beyond their control will be given only one opportunity to sit a replacement test. Only students reporting these circumstances beyond their control immediately after their occurrence to the study programme's secretariat will be eligible to sit a replacement test.
6. The lecturer will determine the form and content of the replacement test.
7. If the student is not present at the replacement test, or fails to meet the terms of the replacement test in good time, he will not be offered another opportunity.

Art. 5.6 – type of test

1. Testing as part of a course will take place as stated in the course guide.
2. Upon request, the Board of Examiners may allow a test to be administered in a manner which departs from the provisions of the first paragraph.

Art. 5.7 – oral tests

1. Only one person at a time may be tested orally, unless the Board of Examiners decides otherwise.
2. Oral tests will be administered in public, unless the Board of Examiners or the examiner in question has decided otherwise in a special case, or the student has objected to this.

Art. 5.8 – provision for testing in special cases

1. If not providing for an individual testing possibility would result in a 'special case of manifest unfairness', the Board of Examiners may decide to grant an individual testing possibility.
2. Requests for a special possibility to sit a test must be submitted to the Board of Examiners as soon as possible, together with supporting documentary evidence.

Art. 5.9 – time limit for grading tests

1. Within 24 hours of administering an oral test the examiner will determine the grade and provide the student with a written statement of the grade awarded.
2. The examiner will grade a written or differently administered test or partial test within 10 working days of the test date, and will provide the administrative office of the Faculty with the information necessary to provide the student with written or electronic proof of his grade.
3. If there is a third examiner, a new assessment period of 10 working days will commence, immediately following the first period of 10 working days. It is not possible to commence a new period following this second period.
4. Time frames for assessment do not apply during academic vacation periods.
5. The written statement of the grade awarded must inform the student of the right of inspection referred to in Art. 5.11 and of the possibility to appeal to the Examination Appeals Board.

Art. 5.10 – period of validity

1. The term of validity of courses passed is eight years.
2. Notwithstanding this, in case of special circumstances the Board of Examiners may, if the student requests, determine an extended validity period for a course, or impose a supplementary or replacement test.
3. Partial tests and assignments passed in a course that was not successfully completed will expire at the end of the academic year in which they were passed. Partial tests and assignments expire at the end of the period in which they were passed, if the course concerned is taught more than once per academic year.

Art. 5.11 – right of inspection

1. Within 30 days after the announcement of the result of a written test, the student is allowed to inspect his graded work upon request. A copy of that work will be supplied to the student on request.
2. During the period referred to in the first paragraph, any interested party may inspect the questions and assignments of the test concerned, as well as, if possible, the standards on which the grade was based.

Art. 5.12 – retention of tests

1. The assignments, answers and the work assessed in the written tests will be kept in paper or electronic form for a period of two years following the assessment.
2. The thesis and its assessment will be kept in paper or electronic form for a period of seven years following the assessment.

Art. 5.13 – exemption

At the student's request, the Board of Examiners may, after consulting the examiner in question, grant the student exemption from a programme component if he:

a. has already either completed a university or higher vocational programme component which is equivalent in content and level; or
b. has demonstrated through work or professional experience that he has sufficient knowledge and skills in relation to that component.

Art. 5.14 – fraud and plagiarism

1. Fraud and plagiarism are defined as an action or failure to act on the part of a student, as a result of which a correct assessment of his knowledge, understanding and skills is made impossible, in full or in part.
   Fraud includes:
   - cheating during examinations. The person offering the opportunity to cheat is an accessory to fraud;
   - having within reach tools and resources during examinations, such as a pre-programmed calculator, mobile phone, smartwatch, smartglasses, books, course readers, notes, etc., consultation of which is not explicitly permitted;
   - having others carry out all of part of an assignment and passing this off as own work;
   - gaining access to questions, assignments or answers of an examination prior to the date or time that the examination takes place;
   - making up survey or interview answers or research data.

   Plagiarism is defined as including data or sections of text from others in a thesis or other paper without quoting the source. Plagiarism includes the following:
   - cutting and pasting text from digital sources such as encyclopaedias and digital magazines without using quotation marks and referring to the source;
   - cutting and pasting text from the internet without using quotation marks and referring to the source;
   - using excerpts from texts of printed material such as books, magazines and encyclopaedias without using quotation marks and referring to the source;
   - using a translation of the abovementioned texts without using quotation marks and referring to the source;

- paraphrasing of the abovementioned texts without clearly referring to the source: paraphrasing must be marked as such (by explicitly linking the text with the original author, either in text or a footnote), so that the impression is not created that the ideas expressed are those of the student;
- using visual, audio or test material from others without referring to the source and presenting this as own work;
- resubmission of the student's own earlier work without referring to the source, and allowing this to pass for work originally produced for the purpose of the course, unless this is expressly permitted in the course or by the lecturer;
- using the work of other students and passing this off as own work. If this happens with the permission of the other student, the latter is also guilty of plagiarism;
- in the event that, in a joint paper, one of the authors commits plagiarism, the other authors are also guilty of plagiarism, if they could or should have known that the other was committing plagiarism;
- submitting papers obtained from a commercial institution (such as an internet site offering excerpts or papers) or having such written by someone else whether or not in return for payment.

2. a. In all cases in which fraud or plagiarism is found or suspected, the examiner will inform the student and the Board of Examiners of this in writing.
   b. The Board of Examiners will give the student the opportunity:
      - to respond to that in writing;
      - to be heard.
3. The Board of Examiners will determine whether fraud or plagiarism has occurred and will inform the student of its decision in writing and of the sanctions in accordance with the stipulations of the fourth paragraph, stating the possibility of appeal to the Examination Appeals Board.
4. Fraud and plagiarism will be punished by the Board of Examiners as follows:
   a. In any event:
      - invalidation of the paper or examination submitted
      - a reprimand, a note of which will be made in OSIRIS.
   b. In addition, – depending on the nature and scale of the fraud or plagiarism, and on the student's phase of study – one or more of the following sanctions:
      - removal from the course
      - no longer being eligible for a positive degree classification (cum laude) as referred to in art. 6.2
      - exclusion from participation in examinations or other forms of testing belonging to the educational component concerned for the current academic year, or for a period of 12 months
      - complete exclusion from participation in all examinations or other forms of testing for a period of 12 months.
   c. In the event that the student has already received a reprimand: complete exclusion from participation in all examinations or other forms of testing for a period of 12 months.
   d. In the case of extremely serious and/or repeated fraud, the Board of Examiners may recommend that the Executive Board permanently terminate the student's registration for the degree programme.
5. If the Board of Examiners determines that there has been widespread or organised fraud, on a scale which would affect the examination results in their entirety, the Board of Examiners will decide without delay that the examination concerned is invalid and that all the participants must resit the whole examination at short notice. The Board of Examiners will set the date on which the examination must be retaken. This date will be no later than two weeks after the fraud was established, so that the participants can still benefit from their preparatory work for the examination.

Art. 5.15 – right of appeal

The student has a right to appeal decisions taken by the Board of Examiners or by examiners. The appeal must be made in writing, and explaining the basis for the appeal, to the Examination Appeals Board within six weeks of taking the test or examination, or of the decision being made, pursuant to Section 7.61 of the Higher Education Research Act 1992.

SECTION 6 – EXAMINATION

Art. 6.1 – examination

1. As soon as a student has fulfilled the requirements of the examinations programme, the Board of Examiners will determine the result of the examination and award a certificate, as described in Art. 6.4.
2. Prior to determining the result of the examination, the Board of Examiners may conduct its own examination of the student's knowledge of one or more components or aspects of the degree programme, if and in so far as the results of the relevant tests give it reason to do so.
3. Assessment of the examinations file constitutes part of the final examination. The date of examination will be the last working day of the month in which the Board of Examiners has determined that the student has fulfilled all the requirements of the examinations programme.
4. Conditions to pass the examination are
   - all components are passed;
   - the composition of the course package completed meets the level requirements set.

5. A further condition for passing the examination and receiving the certificate is that the student was registered for the degree programme during the period in which the tests were taken. If the student does not fulfil this condition, the Executive Board may issue a statement of no objection in relation to the passing of the examination and the issue of the certificate, after the student has paid the tuition fees and administration charges owing for the 'missing' periods.
6. A student who has passed the examination and is entitled to a certificate may request the Board of Examiners to not yet grant the certificate and to postpone the examination date referred to in paragraph 3. This request has to be submitted within two weeks after the student has been informed of the result of the examination. The student will indicate in this request when he does wish to receive the certificate. The Board of Examiners will grant the request in any case if the student:
    - is to fulfil a management position for which Utrecht University has provided an administrative grant
    - is to do a traineeship or take a component of a programme abroad.

   The Board of Examiners may also grant the request if refusal would result in an exceptional case of extreme unfairness on account of the circumstance the the student concerned could not have taken automatic graduation into account when he was planning his study.
7. After the student has passed the final examination he can request the institution to terminate his registration.

Art. 6.2 – cum laude classification

1. If a student has demonstrated outstanding academic achievement in his Master's degree programme, the degree will be awarded cum laude; this classification will be noted on the degree certificate.
2. The cum laude classification will be awarded to the Master's examination if each of the following conditions have been met:
   1. the weighted average (based on EC) of the grades achieved for the Master's programme components is at least 8.00.
   2. the student has received a minimum grade of 8.00 for the Master's thesis.
   3. the student has been granted no more than 7.5 credits in exemptions that do not count towards the examination programme (1-year programmes) or no more than 15 credits (2-year programmes).
   4. there has been no decision by the Board of Examiners (as referred to in Art. 5.14) that because it has been established that fraud/plagiarism has been committed the student no longer qualifies for a positive classification (cum laude).
   5. the Master's examination has been passed within one and a half years (one-year degree programmes) or three years (two-year degree programme).
3. The Board of Examiners may decide to award the cum laude classification even if not all the requirements referred to in paragraph 2 are met. Such a decision must be unanimous.
4. Classifications other than cum laude will not be noted on the degree certificate.

Art. 6.3 – degree

1. The Master of Science degree will be awarded to the student who passes the examination.
2. The degree awarded will be noted on the examination certificate.

Art. 6.4 – degree certificate

1. The Board of Examiners will award a certificate as proof that the examination was passed.
2. The Board of Examiners will add the International Diploma Supplement to the certificate which provides (international) insight into the nature and contents of the completed degree programme.

Art. 6.5 - Grade Point Average (GPA)

1. The final Grade Point Average (GPA) is stated on the International Diploma Supplement, and represents the academic performance of the student concerned.
2. The final GPA is the average figure from the results achieved in the examinations programme for the Master's degree, weighted by course credits and expressed on a scale of 1 to 4 with two decimals.
3. The final GPA is calculated as follows:
    - all applicable examinations achieved as part of the examinations programme for the Master's degree are converted into quality points;
    - quality points are the applicable examination result multiplied by the number of course credits (EC) for the component in question;
    - the total number of quality points achieved divided by the total number of course credits (EC) obtained, gives the average examination result;
    - the average examination result is converted into the final GPA.

SECTION 7 – STUDENT COUNSELLING

Art. 7.1 – student progress administration

1. The Faculty must record the individual study results of the students and make them available through Osiris-student.
2. Certified student progress files may be obtained from Student Affairs Geosciences.

Art. 7.2 – student counselling

1. The Faculty is responsible for providing an introductory programme and student counselling to students registered for the degree programmes.
2. Student counselling encompasses:
    - encouraging students to feel part of the community;
    - supervising programme choices;
    - assisting a student to familiarise himself with the job market.
    - an introductory programme in the first week of the first semester of the first year of study
    - referring and assisting students who encounter difficulties during their studies.

Art. 7.3 – disability

Students with special needs are afforded the opportunity to take classes and sit tests in the manner agreed in their special needs contracts. Requests for special needs contracts are submitted to the student adviser.

SECTION 8 – TRANSITIONAL AND FINAL PROVISIONS

Art. 8.1 – safety net arrangements

In cases for which these Regulations do not provide, do not clearly provide or lead to obviously unreasonable outcomes, a decision will be taken by or on behalf of the Dean, after having heard the Board of Examiners. If, on the basis of the law, the decision falls within the competence of the Board of Examiners, the Dean will send the request to the Board of Examiners for it to settle.

Art. 8.2 – amendments

1. Amendments to these Regulations will be laid down by the Dean after having heard the Degree Programme Committee and after consultation with the Faculty Council, in separate resolutions.
2. An amendment to these Regulations is not to be applied to the current academic year, unless it is reasonable to assume that it will not harm the interests of the students.
3. Furthermore, an amendment may not have an adverse effect for students on any other decision the Board of Examiners has taken pursuant to these Regulations with respect to a student.

Art. 8.3 – publication

The Dean will provide for the publication of these Regulations, as well as each amendment, on the internet.

Art. 8.4 – effective date

These Regulations take effect on 1 September 2016.

APPENDIX 1 Admission requirements Master's degree programmes

Earth, Life and Climate
Admission to the programme Earth, Life and Climate is given to a student holding a Dutch or foreign diploma confirming that he has gained the knowledge, insights and skills at university Bachelor's level. Furthermore, the student needs to prove that he has gained the following specific knowledge, insights and skills:

a) knowledge in the field of Earth Sciences, Biology or Chemistry, at advanced level of the major Earth Sciences, Biology or Chemistry at Utrecht University, or equivalent to that level.
b) insight in Earth Sciences at advanced level of the major Earth Sciences, Biology or Chemistry at Utrecht University, or equivalent to that level.
c) academic and research skills of the major Earth Sciences, Biology or Chemistry at Utrecht University, or equivalent to that level.

Earth Structure and Dynamics
Admission to the programme Earth Structure and Dynamics is given to a student holding a Dutch or foreign diploma confirming that he has gained the knowledge, insights and skills at university Bachelor's level. Furthermore, the student needs to prove that he has gained the following specific knowledge, insights and skills:

a) knowledge in the field of Earth Sciences or Physics, at advanced level of the major Earth Sciences or Physics at Utrecht University, or equivalent to that level.
b) insight in Earth Sciences at advanced level of the major Earth Sciences or Physics at Utrecht University, or equivalent to that level.
c) academic and research skills of the major Earth Sciences or Physics at Utrecht University, or equivalent to that level.

Earth Surface and Water
Admission to the programme Earth Surface and Water is given to a student holding a Dutch or foreign diploma confirming that he has gained the knowledge, insights and skills on a university Bachelor's level. Furthermore, the student needs to prove that he has gained the following specific knowledge, insights and skills:

a) knowledge in the field of Earth Sciences, at advanced level of the major Earth Sciences at Utrecht University, or equivalent to that level.
b) insight in Earth Sciences at advanced level of the major Earth Sciences at Utrecht University, or equivalent to that level.
c) academic and research skills of the major Earth Sciences at Utrecht University, or equivalent to that level.

Economische Geografie (Economic Geography)
Admission to the programme Economische Geografie is given to a student holding a Dutch or foreign diploma confirming that he has gained the knowledge, insights and skills at university Bachelor's level. Furthermore, the student needs to prove that he has gained the following specific knowledge, insights and skills:

a) knowledge in the field of Economische Geografie, at advanced level of the major Human Geography and Planning at Utrecht University, or equivalent to that level.
b) insight in Economische Geografie at advanced level of the major Human Geography and Planning at Utrecht University, or equivalent to that level.
c) academic and research skills of the major Human Geography and Planning at Utrecht University, or equivalent to that level.

Energy Science
Admission to the programme Energy Science is given to a student holding a Dutch or foreign diploma confirming that he has gained the knowledge, insights and skills at university Bachelor's level. Furthermore, the student needs to prove that he has gained the following specific knowledge, insights and skills:

a) knowledge in the field of Environmental Sciences, Science and Innovation Management, Physics or Chemistry at advanced level of the major Environmental Sciences, Science and Innovation Management, Physics or Chemistry at Utrecht University, or equivalent to that level.
b) knowledge of Thermodynamics, Energy Analysis and Mathematics
c) insight in Environmental Sciences, Science and Innovation Management, Physics or Chemistry at advanced level of the major Environmental Sciences, Science and Innovation Management, Physics or Chemistry at Utrecht University, or equivalent to that level.
d) academic and research skills of the major Environmental Sciences, Science and Innovation Management, Physics or Chemistry at Utrecht University, or equivalent to that level.

Geo-communicatie (Geo-communication)
Admission to the programme Geo-communicatie is given to a student holding a Dutch or foreign diploma confirming that he has gained the knowledge, insights and skills at university Bachelor's level. Furthermore, the student needs to prove that he has gained the following specific knowledge, insights and skills:

a) knowledge in the field of Human or Physical Geography, at advanced level of the major Human Geography and Planning or Earth Sciences at Utrecht University, or equivalent to that level.
b) insight in Human or Physical Geography at advanced level of the major Human Geography and Planning or Earth Sciences at Utrecht University, or equivalent to that level.

c) academic and research skills of the major Human Geography and Planning or Earth Sciences at Utrecht University, or equivalent to that level.

GIMA (Master of Science in Geographical Information Management and Applications)
Admission to the programme Geographical Information Management and Applications is given to a student holding a Dutch or foreign diploma confirming that he has gained the knowledge, insights and skills at university Bachelor's level. Furthermore, the student needs to prove that he has gained the following specific knowledge, understanding and skills at university Bachelor's level, for instance equivalent to the advanced level of the major Human Geography and Planning at Utrecht University:

a) knowledge in the field of geo-information, geography, GIS or another GIMA related field of study.
b) insight in geographical data processes and collecting, processing and distributing information.
c) Academic skills and research skills.

Innovation Sciences
Admission to the programme Innovation Sciences is given to a student holding a Dutch or foreign diploma confirming that he has gained the knowledge, insights and skills at university Bachelor's level. Furthermore, the student needs to prove that he has gained the following specific knowledge, insights and skills:

a) knowledge in the field of Science and Innovation Management, Natural Sciences or Life Sciences, at advanced level of the major Science and Innovation Management, Natural Sciences or Life Sciences at Utrecht University, or equivalent to that level.
b) knowledge in the field of emerging technology issues and complex multidisciplinary problems.
c) insight in Science and Innovation Management, Natural Sciences or Life Sciences, at advanced level of the major Science and Innovation Management, Natural Sciences or Life Sciences at Utrecht University, or equivalent to that level.
d) academic and research skills of the major Science and Innovation Management, Natural Sciences or Life Sciences at Utrecht University, or equivalent to that level.

International Development Studies
Admission to the programme International Development Studies is given to a student holding a Dutch or foreign diploma confirming that he has gained the knowledge, insights and skills at university Bachelor's level. Furthermore, the student needs to prove that he has gained the following specific knowledge, insights and skills:

a) knowledge in the field of Development Geography, at advanced level of the major Human Geography and Planning at Utrecht University, or equivalent to that level.
b) insight in Development Geography at advanced level of the major Human Geography and Planning at Utrecht University, or equivalent to that level.
c) academic and research skills of the major Human Geography and Planning at Utrecht University, or equivalent to that level.

Marine Sciences
Admission to the programme Marine Sciences is given to a student holding a Dutch or foreign diploma confirming that he has gained the knowledge, insights and skills at university Bachelor's level. Furthermore, the student needs to prove that he has gained the following specific knowledge, insights and skills:

a) knowledge in the field of Earth Sciences or Biology, at advanced level of the major Earth Sciences or Biology at Utrecht University, or equivalent to that level.
b) insight in Earth Sciences or Biology at advanced level of the major Earth Sciences or Biology at Utrecht University, or equivalent to that level.
c) academic and research skills of the major Earth Sciences or Biology at Utrecht University, or equivalent to that level.

Spatial Planning
Admission to the programme Spatial Planning is given to a student holding a Dutch or foreign diploma confirming that he has gained the knowledge, insights and skills at university Bachelor's level. Furthermore, the student needs to prove that he has gained the following specific knowledge, insights and skills:

a) knowledge in the field of Planning, at advanced level of the major Human Geography and Planning at Utrecht University, or equivalent to that level.
b) insight in Planning at advanced level of the major Human Geography and Planning at Utrecht University, or equivalent to that level.
c) academic and research skills of the major Human Geography and Planning at Utrecht University, or equivalent to that level.

Sustainable Business and Innovation
Admission to the programme Sustainable Business and Innovation is given to a student holding a Dutch or foreign diploma confirming that he has gained the knowledge, insights and skills at university Bachelor's level. Furthermore, the student needs to prove that he has gained the following specific knowledge, insights and skills:

a) knowledge in the field of Science and Innovation Management, Environmental Sciences, Environmental Studies or Economics, at advanced level of the major Science and Innovation Management, Environmental Sciences, Environmental Studies or Economics at Utrecht University, or equivalent to that level.
b) knowledge of sustainable development and/or innovation sciences.
c) basic knowledge of natural sciences at Bachelor's level, including Mathematics, and/or Chemistry and/or Physics.
d) insight in Science and Innovation Management, Environmental Sciences, Environmental Studies or Economics at advanced level of the major Science and Innovation Management, Environmental Sciences, Environmental Studies or Economics at Utrecht University, or equivalent to that level.
e) academic and research skills of the major Science and Innovation Management, Environmental Sciences, Environmental Studies or Economics at Utrecht University, or equivalent to that level.

Sustainable Development
Admission to the programme Sustainable Development is given to a student holding a Dutch or foreign diploma confirming that he has gained the knowledge, insights and skills at university Bachelor's level. Furthermore, the student needs to prove that he has gained the following specific knowledge, insights and skills:

a) knowledge in the field of Environmental Sciences, Natural Sciences or Social Sciences at the advanced level of a major in Earth Sciences, Physics, Chemistry, Biology, Economics, Public Administration and Organisation Science or Social Sciences at Utrecht University, or equivalent to that level.
b) knowledge in the field of sustainability issues.
c) basic knowledge of physical processes in the environment
d) basic knowledge of mathematics at bachelor's level
e) insight in Environmental Sciences, Natural Sciences or Social Sciences at the advanced level of a major in Earth Sciences, Physics, Chemistry, Biology, Economics, Public Administration and Organisation Science or Social Sciences at Utrecht University, or equivalent to that level.
f) academic and research skills of a major in Earth Sciences, Physics, Chemistry, Biology, Economics, Public Administration and Organisation Science or Social Sciences at Utrecht University, or equivalent to that level.

Urban and Economic Geography (Research Master)
Admission to the research programme Human Geography and Planning is given to a student holding a Dutch or foreign diploma confirming that he has gained the knowledge, insights and skills at university Bachelor's level. Furthermore, the student needs to prove that he has gained the following specific knowledge, insights and skills:

a) knowledge in the field of Human Geography or Spatial Planning, at advanced level of the major Human Geography and Planning at Utrecht University, or equivalent to that level.
b) insight in Human Geography or Spatial Planning at advanced level of the major Human Geography and Planning at Utrecht University, or equivalent to that level.
c) academic and research skills of the major Human Geography and Planning at Utrecht University, or equivalent to that level.

Urban Geography
Admission to the programme Urban Geography is given to a student holding a Dutch or foreign diploma confirming that he has gained the knowledge, insights and skills at university Bachelor's level. Furthermore, the student needs to prove that he has gained the following specific knowledge, insights and skills:

a) knowledge in the field of Urban Geography, at advanced level of the major Human Geography and Planning at Utrecht University, or equivalent to that level.
b) insight in Urban Geography at advanced level of the major Human Geography and Planning at Utrecht University, or equivalent to that level.
c) academic and research skills of the major of Human Geography and Planning at Utrecht University, or equivalent to that level.

Water Science and Management
Admission to the programme Water Science and Management is given to a student holding a Dutch or foreign diploma confirming that he has gained the knowledge, insights and skills at university Bachelor's level. Furthermore, the student needs to prove that he has gained the following specific knowledge, insights and skills:

a) knowledge in the field of Earth Sciences, Environmental Sciences or Natural Sciences, at advanced level of the major Earth Sciences or Environmental Sciences at Utrecht University, or equivalent to that level.
b) insight in Earth Sciences, Environmental Sciences or Natural Sciences at advanced level of the major Earth Sciences or Environmental Sciences at Utrecht University, or equivalent to that level.
c) academic and research skills of the major Earth Sciences or Environmental Sciences at Utrecht University, or equivalent to that level.

APPENDIX 2 Structure of Master's degree programmes

Earth, Life and Climate

Theoretical courses: required electives	45 EC
Deficiency courses	0-15 EC
MSc research/thesis	30-45 EC
Individual programme/ internship Obligatory 2nd report	up to 30 EC
Additional theoretical courses, seminar modules, advanced-level courses	0- 45 EC

Earth Structure and Dynamics

Theoretical courses: required electives	45 EC
Deficiency courses	0-15 EC
MSc research/thesis	30-45 EC
Individual programme/ internship Obligatory 2nd report	up to 30 EC
Additional theoretical courses, seminar modules, advanced-level courses	0- 45 EC

Earth Surface and Water

Theoretical courses: required electives	45 EC
Deficiency courses	0-15 EC
MSc research/thesis	30-45 EC
Individual programme/ internship Obligatory 2nd report	up to 30 EC
Additional theoretical courses, seminar modules, advanced-level courses	0- 45 EC

Economische Geografie

Required / theoretical	22.5 EC
Methods of research	7.5 EC
MSc research/thesis	30 EC

Energy Science

Required / theoretical	22.5 EC
Methods of research	15 EC
MSc thesis / internship	30 – 52.5 EC
Elective	22.5 – 37.5 EC

Geo-communicatie

Required / theoretical	30 EC
Individual project/ internship	7.5- 15 EC
MSc research/thesis	15-22.5 EC

Geographical Information Management and Applications

Required / theoretical	40 EC
Required (practical methods)	20 EC
MSc research/thesis	30 EC
Internship or Individual programme	30 EC

International Development Studies

Required / theoretical	20 EC
Methods of research	10 EC
MSc research/thesis	30 EC

Marine Sciences

Theoretical courses	45 EC
Elective courses	15-30 EC
MSc research / thesis / individual programme / internship Obligatory 2nd report	30-45 EC 15-30 EC

Innovation Sciences

Required / theoretical	37.5 EC
Methods of research	22.5 EC
MSc research/thesis	45 EC
Elective	15 EC

Spatial Planning

Required / theoretical	22.5 EC
Methods of research	7.5 EC
MSc research/thesis	30 EC

Sustainable Development

Required / theoretical	45 EC
Methods of research	15 EC
MSc research/thesis	30-45 EC
Elective	15-30 EC

Sustainable Business and Innovation

Required / theoretical	45 EC
Methods of research	15 EC
MSc thesis/ internship	45 EC
Elective	15 EC

Urban and Economic Geography

Required / theoretical	60 EC
Elective	15 EC
MSc research/thesis	45 EC

Urban Geography

Required / theoretical	22.5 EC
Methods of research	7.5 EC
MSc research/thesis	30 EC

Water Science and Management

Required / theoretical	75 EC
MSc research/thesis (obligatory external internship format)	30 - 45 EC
Elective / MSc individual programme	0 - 15 EC

Appendix III Teaching periods Innovation, Environmental and Energy Sciences 2016-2017

This holds only for Master's courses offered by the department IEES (codes GEO4-22XX, 23XX, 25XX and 26XX); this might deviate from courses with other (GEO-)codes.

36	37	38	39	40	41	42	43	44	45
1 5/9-11/9	2 12-18/9	3 19-25/9	4 26/9-2/10	5 3-9/10	6 10-16/10	7 17-23/10	8 24-30/10	9 31/10-6/11	10 7-13/11
MSc GEO Intro									break

46	47	48	49	50	51	52	1	2	3	4	5
1 14-20/11	2 21-27/11	3 28/11-4/12	4 5-11/12	5 12-18/12	6 19-25/12	Xmas break	Study week	7 9-15/1	8 16-22/1	9 23-29/1	10 30/1-5/2
			6/12 rep. 1	13/12 rep. 1							break

6	7	8	9	10	11	12	13	14	15	16
1 6-12/2	2 13-19/2	3 20-26/2	4 27/2-5/3	5 6-12/3	6 13-19/3	7 20-26/3	8 27/3-2/4	9 3-9/4	10 10-16/4	11 17-23/4
9/2 UU Careerday			28/2 rep. 2	7/3 rep. 2					Friday 14/4 break	break
									14/4 Good Friday	17/4 Easter

17	18	19	20	21	22	23	24	25	26	27	28	29
1 24-30/4	2 1-7/5	3 8-14/5	4 15-21/5	5 22-28/5	6 29/5-4/6	7 5-11/6	8 12-18/6	9 19-25/6	10 26/6-2/7	11 3-9/7	Break	Break
27/4 King's day	5/5 Liberationday		16/5 rep. 3	23/5 rep. 3		5/6 Pentecost				break	10-13/7 rep. 4	
				25/5 Ascension day								
				26/5 break								

Green = IMEW/IEES	Red = GEO wide

Appendix IV UU-time table 2016-2017

Teaching periods

Semester I:
Period 1: Monday 5 September – Friday 11 November
Period 2: Monday 14 November – Friday 3 February

Semester II:
Period 3: Monday 6 February – Friday 21 April
Period 4: Monday 24 April – Friday 14 July

Timeslots

A Monday morning and/or Wednesday morning
B Tuesday morning and/or Thursday afternoon
C Monday afternoon and/or Thursday morning
D Wednesday afternoon, Friday morning and/or Friday afternoon
E Monday evening, Tuesday evening, Wednesday evening, Thursday evening and/or Friday evening

Course registration (only via Osiris Student: www.uu.nl/osirisstudent)

- For period 1: 30 May 2016 up to and including 26 June 2016
  - late registration 22 and 23 August 2016
- For period 2: 19 September 2016 up to and including 2 October 2016
  - late registration 31 October and 1 November 2016
- For period 3: 31 October 2016 up to and including 27 November 2016
  - late registration 23 and 24 January 2017
- For period 4: 30 January 2017 up to and including 26 February 2017
  - late registration 3 and 4 April 2017
- For period 1, 2017-2018 (provisionally): 29 May 2017 up to and including 25 June 2017
  - late registration 21 and 22 August 2017