Syllabus
Master’s programme in Science for Sustainable Development
120 ECTS credits

Aim
The Master’s programme in Science for Sustainable Development consists of theoretical and empirical studies in the natural, social and technological sciences that relate to societal and environmental aspects of sustainable development. Climate science and policy is one important focus of the programme, since successful mitigation of, and adaptation to, climate change are closely linked to the possibilities of achieving sustainable development. Mitigation possibilities are predominantly linked to management of energy resources, as are adaptation possibilities predominantly linked to management of water resources. Thus, issues of energy and water resources management, as well as their biogeochemical and ecological basis, are two important foci of the programme.

The programme aims at preparing students for work with issues regarding sustainable development in international and national agencies, universities, municipalities, non-governmental organisations and international corporations. The programme should also make the student eligible for doctoral programmes in related fields.

Learning outcomes

Knowledge and understanding
On completion of the programme students should be able to:

- identify and frame issues of sustainable development through the integration of theoretical knowledge from several disciplines;
- define and discuss key concepts used in policy discussions and in the research community.

Skills and abilities
On completion of the programme students should have:

- ability to formulate relevant research questions, assess the applicability of relevant scientific theories and methods, and to conduct, report and discuss scientific studies and undertake advanced tasks within predetermined time frames;
- competence to both work within and manage projects regarding sustainable development;
- skills in communicating both the research process and the final results;
• skills in effectual participation in discussions and presentations in an interdisciplinary environment and in dialogue with different audiences.

Evaluation capability and scientific approach
On completion of the programme the students should have:

• capability to judge which types of information various methods can provide, and to critically assess scientific results in terms of validity and reliability;
• capability to understand professional, societal and ethical responsibilities associated with sustainable development;
• capability to critically assess and approach current challenges for sustainable development from various perspectives.

Content
Issues of sustainability are inherently complex and constantly changing. It is therefore crucial to address these issues in an interdisciplinary way. Courses are designed to give a deep knowledge in relevant fields, and at the same time widen the students’ perspective regarding questions and challenges related to sustainable development. Students will also learn how to use relevant analytical tools.

One important focus of the programme is on the implications of climate change for sustainable development. The climate system and how humans contribute to a changing climate are addressed, as are planning and management options to mitigate greenhouse gases and adapt to climate change. In particular, the links between climate change and the energy and water resources sectors are emphasised.

Another important focus is the understanding of biogeochemical and ecological processes that are fundamental for life on earth and how humans affect these processes, e.g., through resource utilization. Such aspects will be integrated in all parts of the programme.

Environmental, social and economic aspects - the three ‘pillars’ of sustainability - of the energy and water resources sectors, as well as interlinkages between them, are studied also in historical contexts other than climate change, such as demographic, political and technological change, production of scientific knowledge and economic globalisation. The programme also draws on recent research results and analytical frameworks from the field of science and technology studies.

As an international programme, the Master’s programme in Science for Sustainable Development co-operates with similar programmes at universities in other countries, and
offers the students the possibility of carrying out studies at one of these universities. Similar possibilities to study at Linköping University on an exchange basis are offered to students from the co-operating universities.

Programme schedule
Below follows an overview of the programme schedule and short descriptions of the content of compulsory courses.

Curriculum

<table>
<thead>
<tr>
<th>Semester</th>
<th>Science for Sustainable Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Introduction to Sustainable development</strong> 7.5 credits</td>
</tr>
<tr>
<td></td>
<td><strong>Environmental and Resource Use Challenges</strong> 7.5 credits</td>
</tr>
<tr>
<td></td>
<td><strong>Analytical Frameworks in Sustainability Studies</strong> 15 credits</td>
</tr>
<tr>
<td>2</td>
<td><strong>Climate Science and Policy</strong> 15 credits</td>
</tr>
<tr>
<td></td>
<td><strong>Sustainable Resources Management</strong> 15 credits</td>
</tr>
<tr>
<td>3</td>
<td><strong>Designing environmental studies in sustainable development</strong> 7.5 credits</td>
</tr>
<tr>
<td></td>
<td><strong>Electable courses</strong> 22.5 credits</td>
</tr>
<tr>
<td>4</td>
<td><strong>Master’s Thesis</strong> 30 credits</td>
</tr>
</tbody>
</table>

---

For instance, the programme is offered in co-operation with the European Inter-University Association on Society, Science and Technology (ESST) and involves collaboration and exchange with other European universities participating in ESST (see http://www.esst.eu).
Semester 1

*Introduction to Sustainable development (7.5 credits)*

An introduction to sustainable development as a political idea and an analytical concept, and to key perspectives within science & technology studies.

*Environmental and Resource Use Challenges (7.5 credits)*

The course has a focus on the historic development of environmental changes induced by human use of energy, water, land and minerals, and the challenges these changes and uses imply for sustainable development.

*Analytical Frameworks in Sustainability Studies (15 credits)*

Theoretical and methodological aspects, as well as applications, of different natural and social science based analytical approaches.

In addition to the content specified above, all three courses of semester 1 include various aspects of the scientific craft: academic writing and critical reflection; library skills; avoidance of plagiarism; measurement, computational, analytical and presentation techniques. The courses should facilitate the transition from the consumption of science to the production of science.

Semester 2

*Climate Science and Policy (15 credits)*

The course consists of three blocks: 1. The basic science of climate change; 2. The policy of climate change; 3. Climate change assessments and measures.

*Sustainable Resources Management (15 credits)*

Sustainability aspects on, primarily, energy and water resources management are studied in different contexts.

Both courses of semester 2 also include the possibility for students to specialize and seek deeper knowledge regarding the specific issues they want to focus their thesis on.

Semester 3

*Designing environmental studies in sustainable development (7.5 credits)*

Workshop based hands-on course on the planning of a master’s study, conducting the research, analysing, presenting and discussing the results, as well as considerations regarding content and form of the written text.

*Electable courses covering 22.5 credits.*

Semester 4

*Master’s Thesis (30 credits)*
The Master’s thesis is to be written in a selected area of specialisation. Students select their thesis topic and methods of research and analysis in consultation with a thesis supervisor and course responsible.

Admission Requirements

General requirements

Degree
A person meets the general entry requirements for courses or study programmes that lead to the award of a second-cycle qualification if he or she:

1. possesses a first-cycle qualification comprising at least 180 credits or a corresponding qualification from abroad, or
2. by virtue of courses and study programmes in Sweden or abroad, practical experience or some other circumstance has the aptitude to benefit from the course or study programme.

Specific requirements

Knowledge of English
Documented knowledge of English equivalent to "Engelska B"; or an internationally recognized test, e.g. TOEFL (minimum scores: Paper based 575 + TWE-score 4.5, and internet based 90), IELTS, academic (minimum score: Overall band 6.5 and no band under 5.5), or equivalent.

Degree results
The specific requirements will be assessed as not fulfilled if the average grade is in the lower third of the grading scale used in the country where the degree was awarded, that is grades have to be average/pass or above (the equivalent to the Swedish grade “Godkänd”).

Letter of Intent
Each applicant must enclose a Letter of Intent, written in English by the applicant, comprising a motivation why the applicant wishes to follow the programme, and a summary of degree thesis/degree project.

For those holding a degree that does not require such a degree thesis/degree project the Letter of Intent should describe previous studies and academic activities related to the Master’s programme/es applied for.

Programme specific requirements
Relevant background for the programme are areas within natural science, social science, health science, humanities and engineering that relate to the environmental, social or economic aspects of sustainable development.
Teaching activities and Examination

Teaching activities
Established concepts, novel and proven strategies and models of research will be penetrated through lectures, seminars, workshops, experimental studies, computer laboratory work, role play and field excursions.

Students will gain the opportunity to deepen their skills in how natural and social sciences can contribute to sustainable development and to learn from each other’s experiences. A comparative approach is used to illustrate similarities and differences between societies at various stages of development.

Examination
Examination forms vary between courses, but in general, active participation in group work and seminars, written assignments and oral presentations are required. A description of the examination for each course can be found in the respective syllabus. Students who have failed an examination are normally allowed to retake it on two additional occasions. Those who have passed an examination may not retake it to improve grades.

In the completed Master’s thesis the student should demonstrate the ability of independent and critical thinking, logical reasoning about the results obtained and an ability to discuss these results in relation to relevant scientific theories. The work should be well structured and illustrate a proper treatment of reference literature and methods of analysis. Each student should present and defend her/ his thesis work in a seminar and in the presence of an assigned opponent.

Regulations for semester admission
The student must have passed at least 45 ECTS credits of the first year in order to be admitted to the third semester of the programme.

The student must have passed at least 75 ECTS credits of the programme in order to be allowed to start the Master’s Thesis course.

Grades
Grades given are stipulated in each of the course syllabi.

Certificate
The student will be awarded the degree of Master of Science (120 credits) in Environmental Science, provided all course requirements are completed and that the student fulfils the general and specific eligibility requirements including proof of holding a Bachelor’s (kandidat) or a corresponding degree.

Completed courses will be listed in the degree certificate.

A degree certificate is issued by the Faculty Board on request.


**Enrolment procedure**
Students are admitted to the programme in its entirety.

**Transfer of Credits**
The Board of the Faculty of Arts and Sciences or person nominated by the Board decides whether or not previous education can be transferred into the programme.

**Language of instruction**
Language of instruction is English.

This syllabus was approved by the Board of the Faculty of Arts and Science on December 8, 2006, and was changed on November 3, 2008 and November 20, 2009, November 10, 2010 and August 17, 2012.

It is valid for students admitted to the programme starting from Autumn 2013.

LiU-2012-01411