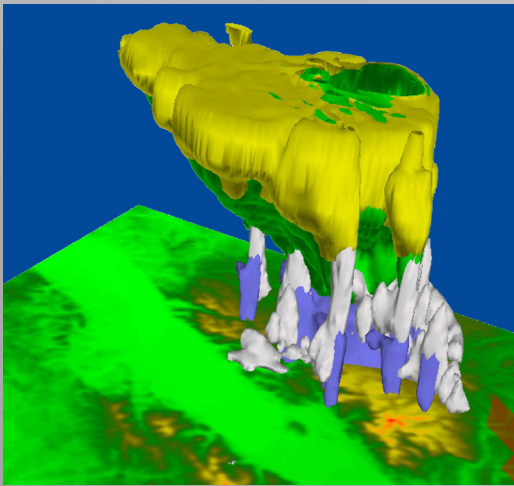


# Earth System Science

## Master of Science

Curriculum



Outdated



Dear students

This study guide offers an overview of the Master's programme in Earth System Science. It contains all pertinent information concerning your studies in brief, as well as references to more detailed information.

Please keep in mind that all information in this guide may be subject to change. For the latest updates please visit the website of the University of Hohenheim at **[www.uni-hohenheim.de](http://www.uni-hohenheim.de)**.

Answers to specific questions concerning rules and regulations of the programme can be found in the examination regulations at **[www.uni-hohenheim.de/examination-regulations](http://www.uni-hohenheim.de/examination-regulations)**.

We hope you enjoy your stay at the University of Hohenheim and wish you all the best for your studies!

Dean's Office of the Faculty of Natural Sciences &  
Study Counsellors of Earth System Science

## Contents

---

Final degree	2
Prescribed period of study	2
Language of instruction	2
Lecture period	2
Aims of the degree programme	2
Contents and structure of the programme	3
Competency profile	5
Course of studies table	6
Modules	7
Elective modules of the 2nd semester (SS 2015)	7
Elective modules of the 3rd semester (WS 2015/16)	8
Language courses	9
English language course – UNiCert III	9
Examinations	9
Grading system	10
Recognition of credits obtained during a stay abroad	11
Extending the period of study	11
Before modules are completed	11
After modules are completed	11
Career prospects	12
And finally...	13
Do you have further questions?	13
Semester Dates	13

## ***Final degree***

---

Master of Science (M. Sc.)

## ***Prescribed period of study***

---

4 semesters – full-time, on-site – 120 ECTS credits

## ***Language of instruction***

---

The language of instruction is English.

## ***Lecture period***

---

The lecture period of the winter semester lasts from mid-October to the end of January. The lecture period of the summer semester lasts from early April until mid-July. The lecture period lasts for 14 weeks each semester. All courses of this programme are running for the entire duration of the semester; no compact courses are offered in this programme.

The semester dates for the respective academic year may be found on the last page of this curriculum.

## ***Aims of the degree programme***

---

In the era of climate change, the understanding of the Earth system is of fundamental importance. Its components are interacting in a complex way. The Master's programme in Earth System Science is both interdisciplinary and research-oriented. It requires the study of key processes of the Earth system, including human activities, food security and climate change. Thus, aspects of the natural sciences are linked to topics in the agricultural and social sciences. The focus of this programme lies on the understanding and the simulation of Earth system components, such as the regional climate, particularly over the land surface, land use and land management as well as agricultural activities. The study programme in

Earth System Science conveys the following key skills and competencies.

As a graduate of this programme, you will have acquired a comprehensive understanding of the Earth as a system. You know of the importance of an intact Earth system to humanity and are aware of the various ways in which human behaviour influences this system. You are able to determine and assess the Earth system's current status, while also being able to analyse and predict changes of the state of the Earth system by applying scientific methodologies. You are capable of objectively assessing your own methods and results as well as communicating them factually and clearly to fellow experts or laymen.

### ***Contents and structure of the programme***

---

During the course of the two-year study programme, modules in the amount of a minimum of 120 credits, including the Master's thesis, have to be completed successfully. You complete your studies with the submission of your Master's thesis at the end of the fourth semester. The semi-elective modules allow for the pursuing of personal interests by freely choosing three modules in the second and third semester.

The first semester brings all students to the same advanced level of knowledge concerning mathematics, physics, chemistry, biology and economics. This ensures that all students are able to successfully complete the courses of the following semesters. The module "Lecture Series Earth System Science" provides an overview of current topics and introduces students to scientific staff members and their research projects at the University of Hohenheim.

The key aspect of Earth System Science is to transcend common boundaries of scientific disciplines. For this reason, the components of the Earth system are not covered in individual modules. Instead, the second semester courses "Climate History and Evolution of the Earth System" and "Energy and Water Regime at the Land Surface" cover cross-cutting topics essential for understanding the Earth system. These courses further impart awareness for interdisciplinary contexts.

Another focus of the programme lies in measurements, their analysis and interpretation, as well as the application of computer models. Expertise in these areas is taught in the modules “Measurement, Modeling and Data Assimilation I”, “Remote Sensing of the Earth System” and “Measurement, Modeling and Data Assimilation II” in the second and third semester, respectively. Measurements in the field will make up parts of these modules. The collected data will be processed and analysed. This will also serve, amongst other things, as an introduction to data assimilation. This method connects measurement data with physical process descriptions in order to create an as complete as possible impression of the state of the Earth system at a given time. The results will be used to create models, which is the main topic of “Measurement, Modeling and Data Assimilation II”.

Socio-economic modelling of land use decisions is the focus of the module “Land Use Economics” in the third semester. The topic ecology is covered in the module “Environmental Economics 2”. With the “Debate Seminar”, the third semester contains a unique element that serves to foster social and communication skills while applying knowledge you have obtained in the course of this programme.

The competencies you acquire will be further enhanced while writing your Master’s thesis in the fourth semester. The thesis serves to document your ability to employ scientific methods and draw sound conclusions.



## Competency profile

The competency profile helps you identify the skills we expect you to acquire during the course of your studies. In addition to specialized knowledge in the field of earth system science, these skills supplement and complete your education. The recommended course of studies as displayed on the next page is an outline of how we are going to support you in acquiring these competencies.

	Professional skills	Cognitive skills	Key skills
	Upon completion of your studies you...		
Knowledge	<ul style="list-style-type: none"> <li>understand the Earth as a system and are able to clearly explain the various compartments of the Earth system as well as their interrelations, even to laymen.</li> <li>are able to grasp new and unknown facts and developments related to the Earth system and thereby expand upon your already existing knowledge.</li> </ul>	<ul style="list-style-type: none"> <li>are able to describe the principle of a method in detail from a natural scientific, agricultural or economic point of view.</li> <li>are able to comprehend and describe methods and (sets of) problems from a transdisciplinary point of view.</li> </ul>	<ul style="list-style-type: none"> <li>are able to develop creative problem-solving strategies.</li> <li>are able to work efficiently towards a goal, both independently and as part of a team.</li> <li>are able to design, coordinate, execute and analyse diverse projects.</li> <li>possess the ability to correctly and diligently conduct scientific work and you can transfer this attitude to other non-scientific areas of operation.</li> </ul>
Application	<ul style="list-style-type: none"> <li>know how to create computer simulations and models for natural scientific, agricultural and economic phenomena and combine these with descriptions of the Earth system to arrive at a holistic representation of the Earth system at a given time.</li> <li>can employ your subject-specific knowledge in a problem-oriented manner.</li> </ul>	<ul style="list-style-type: none"> <li>know how to use the modelling system WRF-NOAH-MP for creating simulations of soil, vegetation and atmosphere and use these to find solutions to challenges in weather and climate research.</li> <li>are able to use visualisation and analysis software such as IDL and Matlab</li> <li>can adapt knowledge generated in the areas of weather and climate research to meet the needs of end-users, e.g. in politics, industry and hydrology, and allow for the development of inter- and transdisciplinary methods.</li> </ul>	<ul style="list-style-type: none"> <li>can take part and contribute to (scientific) discussions as well as moderate them.</li> <li>know how to deal with contrary opinions in a productive and fair manner.</li> <li>are able to confidently give presentations.</li> <li>know how to express yourself appropriately in spoken and written form.</li> </ul>
Analysis	<ul style="list-style-type: none"> <li>know how to derive concrete and practical courses of action for society and industry from your research-based conclusions in order to foster a sustainable development of the Earth system.</li> <li>can implement existing methods in strategies and know how to modify existing methods when required to suit a particular problem.</li> <li>are able to analyse your own methods and strategies and optimise them if necessary.</li> </ul>	<ul style="list-style-type: none"> <li>are able to synthesise developments in all areas of the Earth system for state and private institutions according to their specific needs.</li> </ul>	

## Course of studies table

This table represents a recommendation for the ideal course of studies during the four semester Master's programme. It shows which modules should be completed in which semester. Depending on the course offerings deviations are possible, as long as they conform to the rules set forth in the study and examination regulations. Depending on your area of specialization and courses on offer you choose elective modules in the amount of a minimum of 18 credits. These are integrated flexibly into the course of the first three semesters.

Semester	30 credits					
1st	Lecture Series Earth System Science (1201-550)	Economics for Earth System Science (1201-510)	Mathematical Methods in Earth System Science (1201-610)	Physics of the Earth System (1201-580)	Chemistry of the Earth System (1301-460)	Biology of the Earth System and Biodiversity (2101-500)
2nd	Climate History and Evolution of the Earth System (1201-560)	Energy and Water Regime at the Land Surface (3103-500)	Measurement, Modeling and Data Assimilation I (1201-520)		Remote Sensing of the Earth System (1201-500)	Elective Module
3rd	Land Use Economics (4904-430)	Environmental Economics 2 (5206-610)	Debate Seminar (1201-570)	Measurement, Modeling and Data Assimilation II (1201-600)	Elective Module	Elective Module
4th	Master's Thesis Earth System Science (1200-500)					



Detailed information on individual modules and their corresponding courses, as well as the current state of courses on offer may be obtained at [www.uni-hohenheim.de/module-catalogue/ess](http://www.uni-hohenheim.de/module-catalogue/ess).



## Modules

In addition to the compulsory modules included in the course of studies table, you have to complete elective modules in the amount of a minimum of 18 credits. These modules can be integrated flexibly into the first three semesters, depending on the availability of modules.

You may choose elective modules of the Earth System Science programme, of other natural science Master's programmes of the University of Hohenheim or of other degree programmes offered at the University of Hohenheim or at other German or foreign universities, for which a successful petition with the board of examiners is required.



Detailed information on individual modules, their corresponding courses, the current state of courses on offer as well as on how to register for exams may be obtained at [www.uni-hohenheim.de/module-catalogue/ess](http://www.uni-hohenheim.de/module-catalogue/ess)

For any changes please see the latest version of the curriculum at [www.uni-hohenheim.de/curricula](http://www.uni-hohenheim.de/curricula)

### *Elective modules of the 2nd semester (SS 2015)*

Code	Module title
1201-620	Special Topics of Earth System Science
1102-500	Statistics for Natural Scientists
3102-420	Project in Soil Sciences
1301-430	Practical Course Chemical Evolution
1000-040	UNICert III English for Scientific Purposes

Lecture free period: 26.05.2015 - 30.05.2015 (Pentecost)

## Elective modules of the 3rd semester (WS 2015/16)

Code	Module title
1201-540	Data Assimilation III
1201-590	Agricultural and Forest Meteorology
1301-430	Practical Course Chemical Evolution
3202-420	Global Change Issues
3202-430	Air Pollution and Air Pollution Control
3302-460	Plant Quality
4901-420	Poverty and Development Strategies
4901-470	Quantitative Methods in Economics
4303-490	Ethics of Food and Nutrition Security
4303-470	Gender, Nutrition and Right to Food
4303-440	Social Conditions of Organic and Sustainable Agriculture
3802-410	Ecology and Agroecosystems
4201-440	Economics and Environmental Policy
3000-410	Portfolio Module (Master)
<i>TBD</i>	Natural Resource Use and Conservation in the Tropics and Subtropics
1000-040	UNiCert III English for Scientific Purposes

## **Language courses**

---

The Language Center of the University of Hohenheim offers courses in more than ten languages, including German.

For more information on German language courses please visit **[www.spraz.uni-hohenheim.de/deutsch](http://www.spraz.uni-hohenheim.de/deutsch)**.

For more information on the Language Center and all other language courses please visit **[www.spraz.uni-hohenheim.de](http://www.spraz.uni-hohenheim.de)**.

## **English language course – UNIcert III**

---

UNIcert III – “English for Scientific Purposes” courses are available for all students of the Faculty of Natural Sciences. These courses are intended to aid students in improving their English skills and provide them with an internationally recognised language certificate.

This UNIcert III programme is designed to meet the specific needs of our students and can easily be integrated into the course of studies as an elective module, which also awards credits contributing towards your degree.

For further information please visit **[www.natur.uni-hohenheim.de/languagecourse](http://www.natur.uni-hohenheim.de/languagecourse)**.

## **Examinations**

---

Each module of the Master’s programme in Earth System Science is completed with an examination. Modules counting towards the final grade are graded according to the German grading system, while modules that do not count towards the final grade are graded either according to the German grading system or marked with either “passed” or “failed”.

Types of examinations offered at the University of Hohenheim include written and oral examinations, protocols of practical courses, preparation and presentation of contributions to seminars, as well as colloquia.

Written and oral examinations have to be taken during the examination period. Other assignments, such as protocols, reports, presentations, etc. are to be handed in during the lecture period.

Two examination periods are assigned to every module. The first examination period commences right after the end of the lecture period, while the second takes place at the end of the lecture-free period. You have to register for every exam. Please check the online module catalogue for information on how to register for the respective exam. The dates for module examinations are set by the party responsible for the respective module.

Detailed information regarding requirements, type and duration of the examination, as well as the employed grading system may be found in the examination regulations of the Master's programmes of the Faculty of Natural Sciences.

Information on the respective valid examination regulations, deadlines, examination dates, etc. may be obtained at the examinations office or online at [www.uni-hohenheim.de/exams](http://www.uni-hohenheim.de/exams)

## Grading system

	German	English
1,0 1,3	sehr gut	very good
1,7 2,0 2,3	gut	good
2,7 3,0 3,3	befriedigend	satisfactory
3,7 4,0	ausreichend	sufficient
> 4,0	nicht ausreichend	fail

## *Recognition of credits obtained during a stay abroad*

---

Credits obtained at another university during an exchange period can be recognised by the board of examiners and thus contribute towards your degree, as long as the awarding institution is equivalent to a German university and the competencies imparted by the courses taken do not exhibit substantial differences to the competencies of the programme in Earth System Science as a whole.

## *Extending the period of study*

---

Whilst the standard period of study is four semesters, the programme does not require you to complete your studies within that time. There are ways and reasons to naturally extend the period of study. **Please note that the maximum period of study is 7 semesters!**

## *Before modules are completed*

---

If you have yet to complete your regular modules, excluding the Master's thesis, it is possible to take a semester on leave (*Urlaubssemester*). During this time you are free to spend a semester abroad and take courses and examinations at a host university. Completed modules can be accredited by the University of Hohenheim and thus contribute towards your degree. It is also possible to complete an internship, which may also be an extension of an internship done as part of an elective module; however, no extra credit is awarded.

A semester on leave provides you with the necessary flexibility to plan your studies on an individual basis. This need not necessarily extend the period of study as an exchange semester, for example, can be fully accredited. For further information on when a semester on leave can be granted please visit [www.uni-hohenheim.de/academicleaveofabsence](http://www.uni-hohenheim.de/academicleaveofabsence)

## *After modules are completed*

---

Once you have successfully completed your last module, with only the master's thesis left, you have six months before you are required to begin

working on your thesis. However, please be aware that the maximum period of study is 7 semesters, which cannot be extended. You may, of course, opt to start writing your thesis right away. These six months provide you with the opportunity to do an internship or spend a semester abroad outside the constraints of the study programme. However, neither of these activities can be accredited, since all credits necessary have already been accumulated.

For further information on exchange semesters please visit the website of the Office of International Affairs at [www.exchange.uni-hohenheim.de](http://www.exchange.uni-hohenheim.de).

For further information on internships please visit the website of the Internship Office at [www.uhoh.de/praktikum](http://www.uhoh.de/praktikum).

## ***Career prospects***

---

The obtained degree allows for further academic qualification at universities or research centers. Another focus lies in consultancy for public officials, private companies or individuals. Corresponding jobs are offered by state or federal government agencies and offices, insurance companies and private consulting firms. Further, employment at international, bilateral and non-governmental organisations involved in development cooperation as well as environmental and food security is possible. For graduates with a talent for communication, science journalism is another attractive career possibility.

You have successfully completed your studies and are wondering what to do next? If you want to enter the job market outside academia, you are advised to contact the CareerCenter for guidance. The CareerCenter Hohenheim is a service center and the first contact point for students and graduates for guidance when creating your own profile, as well as assistance with your career entry and career planning.

**[www.uni-hohenheim.de/careerentry](http://www.uni-hohenheim.de/careerentry)**



## And finally...

You have successfully completed your studies and would like to use your degree certificate to apply for a job? No problem, but please keep the following in mind:

- Only after you have completed all exams and all of your grades have been entered into the system can your diploma be issued. Once all grades have been entered into the system you may exmatriculate yourself and do not need to re-register for the next semester. If you exmatriculate or forego re-registration before all grades have been entered into the system, your studies are considered to have ended prematurely with exams either not taken or not entered into the system.
- If you re-register due to missing entries in the system, you do not have to pay the semester fees.

## Do you have further questions?

Should you have further questions regarding your course of studies, modules or the study programme in general, please send an email to your academic counsellors at [counselling-ess@uni-hohenheim.de](mailto:counselling-ess@uni-hohenheim.de).

## Semester Dates

	Start of lectures	End of lectures	Holidays
Winter 2014/15	13.10.2014	07.02.2014	22.12.2014 - 06.01.2015
Summer 2015	13.04.2014	25.07.2014	26.05.2015 - 30.05.2015

## Contact

University of Hohenheim | Study Counselling

Prof. Dr. Volker Wulfmeyer

Dr. Andreas Behrendt

70593 Stuttgart | Germany

Phone +49 (0)711 459-22150

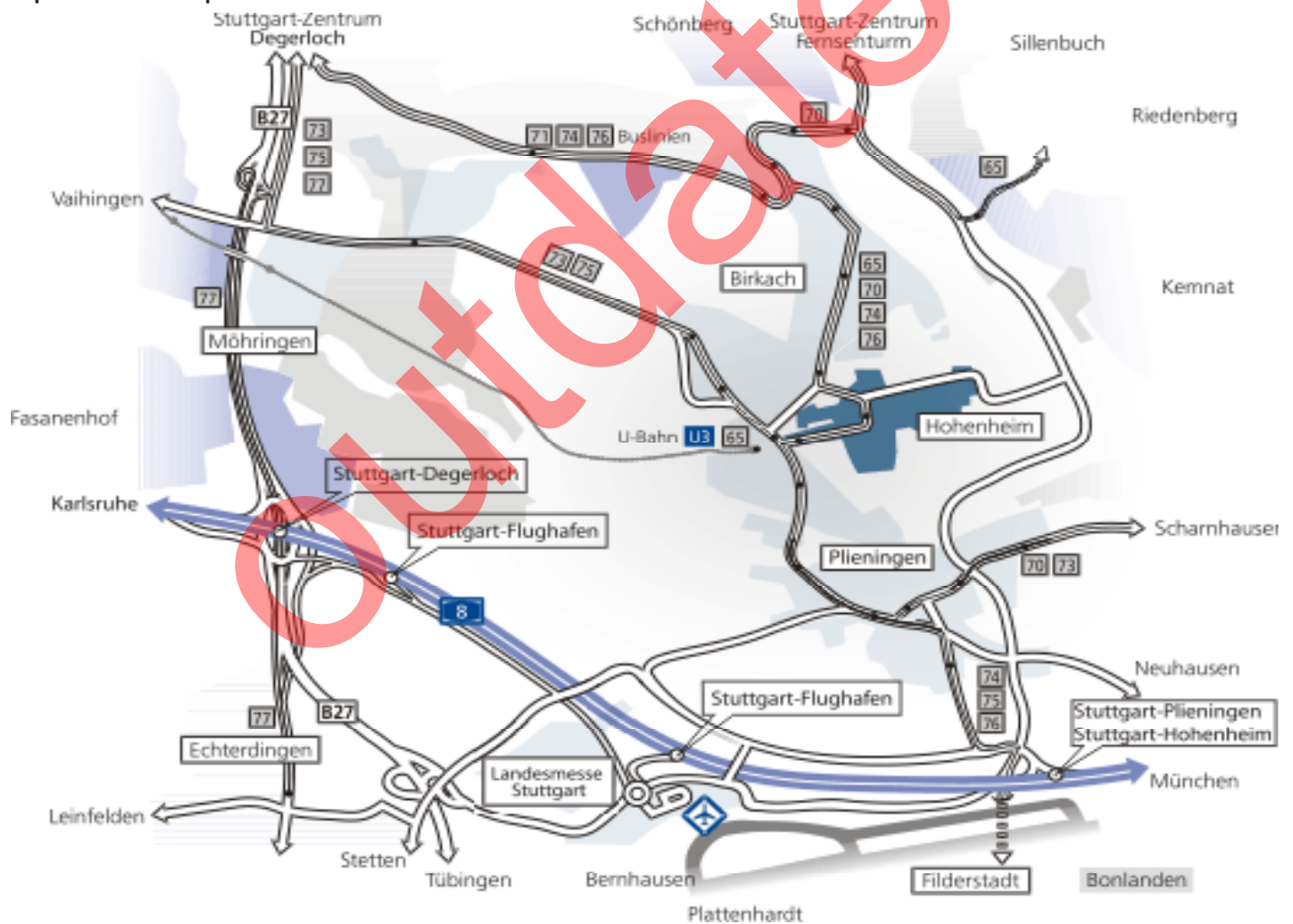
[counselling-ess@uni-hohenheim.de](mailto:counselling-ess@uni-hohenheim.de)

[www.earth-system-science.de](http://www.earth-system-science.de)

[www.uni-hohenheim.de/ess](http://www.uni-hohenheim.de/ess)

## Location of the University

The University of Hohenheim is located to the south of the city of Stuttgart, directly beside the airport and the new trade fair center. The University is ca. 10 minutes away from the Stuttgart city center and can be reached within 30 minutes by means of public transport.



**University of Hohenheim** | Faculty of Natural Sciences

70593 Stuttgart | Germany

Phone +49 (0)711 459-22780

[natur@uni-hohenheim.de](mailto:natur@uni-hohenheim.de) | [www.natur.uni-hohenheim.de](http://www.natur.uni-hohenheim.de)