



UNIVERSITY OF  
HOHENHEIM

**CHANGE  
THE  
SYSTEM.  
SHAPE  
THE  
FUTURE.**



As of Summer Semester 2024

Curriculum

**Bioeconomy**

Master of Science

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

Dear students

This curriculum provides you with comprehensive information on the Master's program in Bioeconomy. It contains information on the course structure and summarizes the most important examination regulations.

The information presented here reflects the current situation. Titles and contents of modules are however changed from time to time. For administrative reasons, there is often a delay before these changes appear in printed materials. Therefore, the correctness of the information provided in this brochure cannot be guaranteed.

If case of doubt, please contact the program coordinator, Ms. Svenja Schuhmacher, for the latest information. You can find up-to-date module descriptions in the online module catalogue at **[www.uni-hohenheim.de/module-catalogue](http://www.uni-hohenheim.de/module-catalogue)**. Time schedules and lecture halls of all courses are displayed in the University of Hohenheim's course catalogue, available at the beginning of each semester at **<https://hohcampus.verw.uni-hohenheim.de>**.

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

Faculty of Agricultural Science

Faculty of Natural Sciences

Faculty of Business, Economics and Social Sciences

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## Program design

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<b>Final degree</b>	Master of Science (M. Sc.)
<b>Standard period of study</b>	4 semesters (120 ECTS credits)
<b>Type of program</b>	Full-time, on site
<b>Language of instruction</b>	English

### Program Objectives

The Master's program in Bioeconomy offers a comprehensive and systematic overview of all aspects of the production of (new) biobased products. In this program, you will examine all aspects of renewable resources in the biobased value chain: their production and utilization in agricultural ecosystems in diverse climatic regions, their ecological performance, their properties, means of conservation, and biotechnological and sustainable industrial processes to convert these resources into (new) biobased products. In addition, you will consider the potential market launch of these innovations on an individual and societal basis.

As an interdisciplinary program jointly offered by Hohenheim's three faculties, it enables a systemic analysis of the entire biobased value chain. Consequently, you will acquire the expertise necessary to consider a range of issues in this complex field from the perspectives of producers of new resources and products; of those already producing and seeking to introduce renewable resources and their corresponding products onto the market; and of those trying to gauge the need and acceptance of such products. This reconciliation of varying interests is one of the strengths of this program and its graduates.

## Qualification Framework

Required background	Course content	Competences and Levels		Learning Outcomes
Bachelor qualification in natural sciences, agricultural sciences or management and economics	<ol style="list-style-type: none"> <li>1. Essential background knowledge and reasoning in the natural and agricultural sciences as well as management and economics</li> <li>2. Interdisciplinary approach to the systematic assessment of economic, social, ecological and technical aspects of (new) biobased products and services. The complete life cycle is analysed through biobased value chains and nets (life-cycle thinking), with a focus on <ul style="list-style-type: none"> <li>• the sustainable production and use of biological resources,</li> <li>• their properties, and techniques for their conversion and further processing,</li> <li>• economic assessment up to marketing and consumer behaviour with regard to biobased products and services, from the perspective of primary producers, processing industries, service providers and consumers.</li> </ul> </li> <li>3. Tools for inter- und transdisciplinary cooperation.</li> <li>4. Specialization in one of the three bioeconomy disciplines: natural sciences, agricultural sciences or management and economics</li> </ol>	Disciplinary Competence (vertical bar of the T-profile)	Knowledge and understanding	Graduates have <ul style="list-style-type: none"> <li>• a solid background in the natural and agricultural sciences and management and economics with respect to the bioeconomy</li> <li>• in-depth knowledge, depending on their specialization, in one of the following disciplines: natural sciences, agricultural sciences or management and economics</li> </ul>
			Knowledge and understanding	Graduates <ul style="list-style-type: none"> <li>• are familiar with the paradigm of biobased value chains and nets.</li> <li>• have developed a systematic overview of the interconnections and dependencies of the various sub-areas of the bioeconomy and are aware of the particular characteristics of this complex system.</li> </ul>
			Application	Graduates are able to <ul style="list-style-type: none"> <li>• implement projects within their discipline using an inter- and transdisciplinary approach and establish possibilities within these projects to connect them to adjoining disciplines.</li> <li>• apply their expertise in projects outside of their own discipline that use biobased value chains and nets, taking into account the various sub-areas of the bioeconomy and their appropriate demands.</li> <li>• design and coordinate bioeconomic projects using an inter- and transdisciplinary approach.</li> <li>• effectively communicate across disciplinary boundaries.</li> </ul>
		Inter- and transdisciplinary competence (horizontal bar of the T-profile)	Analysis and synthesis	Graduates are able to <ul style="list-style-type: none"> <li>• analyse and compare existing economic structures and production processes within biobased value chains and nets.</li> <li>• analyse the given political framework of biobased value chains and nets.</li> <li>• evaluate and perform exact calculations of the (economic) costs and (societal) benefits of new biobased products with the most appropriate methods.</li> <li>• evaluate products and services on the basis of their complete life cycle, understand how individual processes form part of a larger system and analyse how they impact the system as a whole</li> <li>• perform empirical assessments of the acceptance of biobased products and services as well as consumer willingness to contribute to environmental improvement through a biobased economy.</li> <li>• devise models for the optimal utilization of renewable natural resources and develop strategies for their implementation.</li> </ul>
	Creativity	Graduates are able to <ul style="list-style-type: none"> <li>• employ strategies to effectively and appropriately engage with stakeholders. They can determine which approach fits a given situation in order to attain common goals.</li> <li>• conceptualize bioeconomic activities, determine the criteria for their success, and also plan and supervise their implementation.</li> <li>• develop sustainable resource strategies.</li> <li>• develop new biobased products, or actively participate in their development, based on sound cost-benefit analyses.</li> <li>• contribute to the creation of structures and parameters that enable the establishment of biobased value chains and nets.</li> </ul>		

## Program Design

During the **first year** of the program, you are expected to acquire fundamental knowledge of all aspects of the bioeconomy, including their interconnections and interdependencies. Three semi-elective modules are offered in the first semester, which introduce the basic concepts of the agricultural, natural or economic sciences, respectively. This allows you to complement your academic background with the qualifications necessary to successfully complete this interdisciplinary program. Beyond that, you will acquire the knowledge and methods necessary for a systematic analysis of biobased economies in several compulsory modules. Topics range from a natural and agricultural scientific study of the properties of biobased resources to the economic analysis and optimisation of production and processing across the entire biobased value chain.

The **second year** of studies gives you the opportunity to design your own curriculum by choosing from a range of elective modules. You can study as a generalist or specialize in an area of your choice. For guidance, we offer six profiles that you can choose from:




- Bioeconomy policy analysis
- Sustainable biomass production systems
- Sustainability assessment in the bioeconomy
- Innovation and entrepreneurship in the bioeconomy
- Transforming food systems within the bioeconomy
- Data Science and Artificial Intelligence in the Bioeconomy

You will also complete the module "Projects in Bioeconomic Research" in which you will put your acquired skills into practice in collaboration with industry or other organizations by tracing a specific product from inception to market launch in a systematic examination of the entire biobased value chain.

You complete the program by writing a research-intensive **Master's thesis** in the fourth semester.

## Course of study

	1st semester	2nd semester	3rd semester	4th semester
6 credits	Inter- and Trans-disciplinary Research Approaches in Bioeconomy (4301-420)	Sustainable Industrial Processes (1510-410)	Elective modules (36 credits)	Master's thesis (30 credits)
6 credits	Properties of Biobased Resources and Products (3405-430)	Farm Economics and Value Chain Development (4101-460)		
6 credits	Agricultural Production of Biobased Resources (3403-430)	Economic Policy Analysis of the Bioeconomy (5213-510)		
6 credits	Economics and Management (5205-410)	Projects in Bioeconomic Research – Group Project (1505-410)		
6 credits	Natural Science Concepts (1507-400)			

	compulsory modules
	semi-elective modules
	elective modules

## Examination Regulations



Important regulations and deadlines concerning your studies can be found in the **examination regulations for the Master's program in Bioeconomy**. Please read them carefully at the beginning of your studies.

← <https://www.uni-hohenheim.de/pruefungsordnung-bioecon-msc>

## Modules

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There are three types of modules – compulsory, semi-elective and elective modules – which are described in detail on the following pages.

Modules offered at the University of Hohenheim can be either blocked (in the form of four-week compact courses) or non-block (running the entire duration of the lecture period). All compulsory modules are non-block modules and last the entire semester. Elective modules however can be blocked but may also be offered as non-block modules. Please note that for some modules registration is necessary.

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

A tool for creating individual timetables is available in Hohcampus. For further information, please read the hints at **<https://hohcampus.uni-hohenheim.de/en/hohcampus-help-schedule>**. Please note: non-blocked modules in particular often consist of more than one course!

Each module has a specific **module code**. The first four digits of the module code designate the institute and the department of the module responsible. The following three digits designate the type of module and the relevant study section as well as the associated courses:

**1100**-000 = number of the Institute (11 - 19 for Faculty of Natural Sciences)

00**01**-000 = department of an Institute (01 - 99 possible)

0000-**010** = module designation:

000 - 300 modules for Bachelor students

400 - 600 modules for Master students

900 modules for doctoral candidates

0000-0**11** = course 1 of a module (1 - 9 courses possible)



## Compulsory modules

All students must complete a minimum of 36 credits from compulsory modules as well as the Master's thesis (minimum 30 credits):

Semester	Code	Module title	Credits	Professor
1st	3405-430	Properties of Biobased Ressources and Products	6	Zörb
1st	4301-420	Inter- and Transdisciplinary Research Approaches in Bioeconomy	6	Knierim
2nd	1510-410	Sustainable Industrial Processes	6	Hausmann
2nd	4101-460	Farm Economics and Value Chain Development in the Bioeconomy	6	Lippert
2nd	5213-510	Economic Policy Analysis of the Bioeconomy	6	Schünemann
2nd	1505-410	Projects in Bioeconomic Research – Group Project	6	Hinrichs

## Compulsory “Project Work” module

Module slot	Module dates	Module code	Module title
any	may be completed anytime	1500-530	Project Work (Compulsory)

## Semi-elective modules

All students require a minimum of 12 credits from semi-elective modules. These modules impart basic knowledge in the agricultural, natural and economics sciences and are intended to bridge knowledge gaps in the basic processes of the bioeconomy that students from different academic backgrounds may have. Depending on your previous education, you may replace one semi-elective module with an elective module.

If you have a **Bachelor's degree in economics**, you must take the following modules and may replace the module “Economics and Management” with an elective module:

Semester	Code	Module title	Credits	Professor
1st	3403-430	Agricultural Production of Biobased Resources	6	Lewandowski

Semester	Code	Module title	Credits	Professor
1st	1507-400	Natural Science Concepts	6	Weiss

If you have a **Bachelor's degree in natural sciences**, you must take the following modules and may replace the module "Natural Science Concepts" with an elective module:

Semester	Code	Module title	Credits	Professor
1st	3403-430	Agricultural Production of Biobased Resources	6	Lewandowski
1st	5205-410	Economics and Management	6	Schünemann

If you have a **Bachelor's degree in agricultural sciences**, you must take the following modules and may replace the module "Agricultural Production of Biobased Resources" with an elective module:

Semester	Code	Module title	Credits	Professor
1st	5205-410	Economics and Management	6	Jung
1st	1507-400	Natural Science Concepts	6	Weiss

## Elective modules

In addition to compulsory and semi-elective modules, you need a minimum of 36 credits from elective modules. Elective modules provide you with the opportunity to specialize in an area that corresponds to your personal and professional interests.

A comprehensive list of all elective modules recommended for the Master's program in Bioeconomy may be found online at [www.uni-hohenheim.de/module-catalogue](http://www.uni-hohenheim.de/module-catalogue).

In addition, elective modules can be selected from other Master's programs offered at the University of Hohenheim or from Master's programs offered at other German or foreign universities. You need to apply to the examinations board to have such modules counted.

Information on all modules offered at the University of Hohenheim is also available on the above mentioned website.

Please refer to the following tables to find out which modules belong to a profile.

## Profiles

Within the framework of the elective modules, we offer the possibility of taking a profile. However, it's not obligatory to choose a profile. By taking **at least 3 blocked or 4 unblocked elective modules (in total at least 22.5 ECTS)** from one of our profiles, you can have the name of the profile displayed on your Master's certificate. If you would like your profile to appear on your degree certificate, please send a request to the Examinations Office by the end of your studies (at the latest immediately after your defense) to have your profile name added to your degree certificate.

The following tables give an overview of the modules assigned to a profile. Please check the additional information provided in the module catalogue, especially with regard to the participation requirements. Make sure, you fulfil all participation requirements.

### Profile 1 - Bioeconomy policy analysis

#### Objective of this profile: Graduates ...

- ... can apply bioeconomic knowledge to develop models for the analysis of policies.
- ... understand the policy cycle and the concept of policy windows.
- ... are able to use GAMS for policy analysis.

#### Possible career fields ...

- Consulting on the development of policy strategies, e.g. in ministries, at EU or international institutions
- Research, e.g. in international institutions or at Universities with policy or systems sciences, such as agricultural or environmental sciences

Code	Module	Responsible	Sem.	ECTS	Blocked	Participation requirements
4204-420	Advanced Policy Analysis Modelling	Feuerbacher	WS	6.0	No	A solid introduction to economics and policy analysis, equivalent to the contents of the modules "Basic Microeconomics", "Agricultural and Food Policy" and "Microeconomics" is required.
4902-440	Economics and Environmental Policy	Boysen-Urban	WS	6.0	No	-
4201-410	Agricultural and Food Policy	Wieck	SS	6.0	No	Students need to have a background in economics at an introductory level (BSc). It is helpful to join the module "Microeconomics" (4202-450).
3403-480	Bioeconomy Discourses	Lewandowski	WS	6.0	No	-
5213-410	Seminar Bioeconomy Policies	Schünemann	SS	6.0	Yes	<i>Limited to approx. 20 participants</i>
4902-420	International Food and Agricultural Trade	Boysen-Urban	SS	6.0	No	A solid background in microeconomics and some macroeconomics is required.
4903-500	Policy Processes in Agriculture and Natural Resource Management	Birner	WS	6.0	No	-
4901-420	Poverty and Development Strategies	Zeller	WS	6.0	No	-
4904-430	Land Use Economics	Berger	WS	6.0	No	Required: Basic knowledge of Mathematical Programming. Laptop required for computer exercises in class. Please note: Module takes place in the first 7 weeks of the semester.
3202-420	Global Change Issues	Schweiger	WS	6.0	No	Presence on the first day of the module in order to be enrolled for the module is mandatory. General requirements: Ability to think in an interdisciplinary way, background knowledge in natural sciences at least at Bachelor level, basic knowledge and interest in social sciences and economy, readiness for active contribution of knowledge from the students home countries. <i>Limited to 15 participants.</i>
4902-430	Food and Nutrition Security	Boysen-Urban	WS	6.0	No	Students should be familiar with the basics in microeconomics and macroeconomics. Furthermore, some previous exposure to aspects related to poverty and economic development is assumed.

## Profile 2 – Sustainable biomass production systems

### Objective of this profile: Graduates...

- have gained an overview of sustainable agricultural production principles.
- understand how agricultural production will (or should) develop to address future challenges and biomass demand.
- have acquired solid methodical competences (in statistics or modelling or ...) to be applied in their master's thesis.

### Possible career fields ...

- Project management: for companies from the biobased sectors, (international) organisations or Bioeconomy research
- Sustainability consulting and management: in sustainability or strategy as well as supply and trade and international sales departments of companies, at policy level, in (international) organisations or on Sustainability financing, e.g. in banks
- Research at Universities, national or international research institutes or in R&D of companies

Code	Module	Responsible	Sem.	ECTS	Blocked	Participation requirements
4903-510	Innovations for Sustainable Agri-Food Systems	Birner	SS	6.0	No	B.Sc. in agricultural sciences or related fields, B.Sc. modules covering the basics of agricultural engineering
4906-410	Ecology and Agroecosystems	Graß	WS	6.0	No	Basic knowledge of farming and/or closely related topics. Students with only basic knowledge in ecology and biology should enlarge them before starting in this module. <i>Limited to 50 participants.</i>
4905-420	Crop production systems	Cadisch	WS	6.0	No	B.Sc or equivalent degree, basic knowledge of plant production (focus on tropical and subtropical plants!)
4908-440	Livestock Production Systems and Development	Chagunda	WS	6.0	No	Accessible for students from different disciplines related to rural development in the tropics and subtropics and/or animal science.
3403-480	Bioeconomy Discourses	Lewandowski	WS	6.0	No	-
4404-520	Precision Farming	Böttinger	SS	6.0	No	Basic knowledge in process engineering in plant production or practical experience in this field is required.
4302-460	Global Agri-food Systems: Conventional, Organic, and Beyond	Bieling	SS	6.0	No	<i>Limited to 70 participants.</i>

4907-410	Natural Resource Use and Conservation in the Tropics and Subtropics	Asch	WS	6.0	No	-
3090-440	Organic Food Systems and Concepts	Zikeli	WS	6.0	No	This module requires a basic understanding of agricultural and environmental sciences.
4908-450	Organic Livestock Farming and Products	Chagunda	WS	6.0	No	Basic knowledge in livestock breeding and husbandry and organic agriculture at BSc level
3090-410	Organic Farming in the Tropics and Subtropics	Zikeli	WS	6.0	No	This module requires basic knowledge in plant and animal production on the level of a Bachelor-degree in agriculture. <i>Limited to 25 participants.</i>
4901-470	Quantitative Methods in Economics	Zeller	WS	6.0	No	Successfully completed courses in statistics at undergraduate level are assumed. <i>Limited to 25 participants.</i>
3103-510	Environmental Modelling	Streck	WS	6.0	No	<i>Participation limited.</i>
3103-410	Plant and Crop Modeling	Streck	WS	6.0	Yes	Basic knowledge of mathematics is helpful (esp. calculus; ordinary differential equations). <i>Participation limited.</i>
4408-490	Sustainable and Advanced "Waste" Valorization Technologies	Kruse	SS	6,0	No	Bioeconomy students with a bachelor/master in engineering. Engineering skills required.
3090-480	Agroforstsysteme Mitteleuropas	Zikeli	SS	6,0	No	<i>Limited to 24 participants. Available in German and English</i>

### Profile 3 – Sustainability assessment in the bioeconomy

#### Objective of this profile: Graduates...

- have a detailed understanding of the concept of sustainability and sustainable development
- are able to assess environmental and economic sustainability quantitatively; and also social risk qualitatively
- have solid methodological competences in the modelling and assessment of biomass-based product systems

#### Possible career fields ...

- Sustainability consulting: as independent consultant and project developer, in sustainability or strategy as well as supply and trade and international sales departments of companies, at policy level, in (international) organisations or on Sustainability financing, e.g. in banks
- Sustainability, Energy and environmental management
- Research at Universities, national or international research institutes or in R&D of companies

Code	Module	Responsible	Sem.	ECTS	Blocked	Participation requirements
3403-480	Bioeconomy Discourses	Lewandowski	WS	6.0	No	-
3403-490	Life-Cycle Sustainability Assessment (LCSA) of Biobased Value Chains	Lewandowski	SS	6.0	No	-
3103-510	Environmental Modelling	Streck	WS	6.0	No	<i>Participation limited.</i>
4904-430	Land Use Economics	Berger	WS	6.0	No	Required: Basic knowledge of Mathematical Programming. Laptop required for computer exercises in class. Please note: Module takes place in the first 7 weeks of the semester.
4904-460	Farm System Modelling	Berger	WS	6.0	No	Required: Proficiency in using spreadsheet applications (MS-Excel or LibreOffice), basics of microeconomics. Recommended: Basic knowledge of agricultural systems. Laptop required for computer exercises in class
3403-460	Nachhaltigkeit und Produktionsökologie von rohstoffliefernden Pflanzen  (taught in German!)	Lewandowski	WS	6.0	No	Grundlegendes Wissen über pflanzenbauliche Maßnahmen wie Bodenbearbeitung, Saatbettbereitung, Düngung und Pflanzenschutz sollten vorhanden sein, ebenso grundlegende Kenntnisse über Pflanzenphysiologie und prinzipielle Verfahren zur Energiegewinnung aus Biomasse und nachwachsenden Rohstoffen.
3103-450	Spatial Data Analysis with GIS	Streck	SS	7.5	Yes	Basic knowledge of descriptive statistics is helpful. Basic computer skills are required. Students who want to prepare for the module may take the ESRI self-study course. <i>Participation limited.</i>
5200-510	Statistical Learning	R. Jung	SS	6,0	No	-
3402-480	Environmental and Ecological Statistics	Piepho	WS	6.0	No	
4903-520	Governance of Sustainable Agri-Food Systems	Birner	WS	6.0	No	
4406-410	Waste Management and Waste Techniques	Hafner (Uni Stuttgart)	WS	6	No	Basic knowledge in natural sciences is helpful to understand the lectures.
4303-410	Analyzing Sustainability in Agri-Food Systems	Seufert	WS	6	No	Students are welcome from a diversity of backgrounds, but you are expected to have some experience (and motivation) in working with analytical methods. Useful background include courses in systems modelling, introductory statistics, quantitative methods, or GIS.

## Profile 4 – Innovation and entrepreneurship in the bioeconomy

### Objective of this profile: Graduates...

- ... understand the potential for innovation and entrepreneurship in the bioeconomic sector.
- ... understand the key principles of interdisciplinary collaboration and project management in the bioeconomy.
- ... are able to integrate their previous educational background and profile knowledge to launch or join a start-up.

### Possible career fields ...

- Entrepreneur: starting an own company
- Technology scouting.
- Innovation management,
- Marketing strategy

Code	Module	Responsible	Sem.	ECTS	Blocked	Participation requirements
5706-450	Qualitative Methods in Business Research	Ebersberger	WS	6.0	No	Linked to Economics of Innovation 1
5706-440	International Innovation Management 1	Ebersberger	WS	6.0	No	
5706-550	International Innovation Management 2	Ebersberger	SS	6.0	No	-
5209-410	Economics of Innovation 1	Pyka	WS	6.0	No	Linked to Qualitative Methods in Business Research
5209-510	Economics of Innovation 2	Pyka	SS	6.0	No	Builds on Economics of Innovation 1
5209-610	Major Seminar Economics of Innovation	Pyka	WS & SS	6.0	b.a.	-
4301-410	Knowledge and Innovation Management	Knierim	WS	6.0	No	-
3403-480	Bioeconomy Discourses	Lewandowski	WS	6.0	No	-
1201-570	Debate Seminar	Wulfmeyer	SS	6,0	No	-



4903-510	Innovations for Sustainable Agri-Food Systems	Birner	SS	6.0	No	B.Sc. in agricultural sciences or related fields, B.Sc. modules covering the basics of agricultural engineering; English language skills
4302-420	Ethical Reflection on Food and Agriculture	Bieling	WS	6.0	No	Letter of motivation <i>Limited to 20 participants.</i>
4903-460	Methods in Interdisciplinary Collaboration	Birner	WS	6.0	No	-
5703-510	Entrepreneurship	Kuckertz	SS	6,0	No	-
5702-440	Major Seminar in Management	Kuckertz	WS	6,0	No	-
4301-470	Agricultural Knowledge Systems and Advisory Services	Knierim	WS	6.0	No	Limited amount of seats for student who accomplish this module as an elective module.

## Profile 5 – Transforming food systems within the bioeconomy

### Objective of this profile: Graduates...

- ... understand food systems from an interdisciplinary point of view and in relation to the bioeconomy
- ... are familiar with upgrading opportunities for food value chains and webs based on by-product utilization, sustainability performance, resource efficiency and circularity
- ... can apply interdisciplinary knowledge to the design of food processing systems and the development of innovative and sustainable food products from dedicated crops (established and novel crops) and residual biomass

### Possible career fields ...

- Marketing strategy development for sustainable food products and systems
- Technology scouting in food systems and for the development of novel and sustainable food products
- Research on the development of novel and sustainable food products and systems, e.g. in R&D departments of companies, universities or research institutions

## Unblocked Edition:

Code	Module	Responsible	Sem.	ECTS	Blocked	Participation requirements
1511-500	Practical Introduction to Programming with Python	Krupitzer	WS	6,0	No	
4302-460	Global Agri-food Systems: Conventional, Organic & Beyond	Bieling	WS	6.0	No	<i>Limited to 70 participants Ab 2024 im SS</i>
4203-460	Sustainability Marketing & Marketing Consulting	Weinrich	SS	6.0	No	Basic knowledge in economics and marketing on BSc level, e. g. 4202-010 Grundlagen der Agrarpolitik und Marktlehre or on MSc level 4101-430 Socioeconomics of Organic Farming.
4902-430	Food and Nutrition Security	Boysen-Urban	WS	6.0	No	Students should be familiar with the basics in microeconomics and macroeconomics. Furthermore, some previous exposure to aspects related to poverty and economic development is assumed.
4302-420	Ethical Reflection on Food and Agriculture	Bieling	WS	6.0	No	Letter of motivation <i>Limited to 20 participants</i>
3090-440	Organic Food Systems and Concepts	Zikeli	WS	6.0	No	This module requires a basic understanding of agricultural production and environmental sciences.
3090-430	Processing and Quality of Organic Food	Zikeli	SS	6.0	No	Understanding of nature sciences like chemistry and biology.
4202-410	Qualitäts- und Umweltmanagement in der Agrar- und Ernährungswirtschaft (taught in German!)	Hess	SS	6.0	No	-
4201-410	Agricultural and Food Policy	Wieck	SS	6.0	No	Students need to have a background in economics at an introductory level (BSc). Furthermore, it is helpful to join the module "Microeconomics" (4202-450).
4605-430	Microbiological Safety within the Feed and Food Production Chain	Hölzle	WS	6.0	No	Students shall have basic knowledge in the biochemistry of carbohydrates, fats and proteins as well as in biology and genetics. For better preparation of the students, an introductory lecture is given for those participants who like to fresh up their knowledge before the module starts.
4302-500	Transformation Studies in Agri-Food Systems	Bieling	WS	6.0	No	<i>Restricted to max. 50 participants</i>

## Blocked Edition:

Code	Module	Responsible	Sem.	ECTS	Blocked	Participation requirements
1504-500	Analysis and Quality Assurance in the Food Production	Jekle	WS	7.5	Block 1	Good scientific basics in organic chemistry, laboratory practice
1507-510	Soft Matter Science II - Food Physics	Weiss	SS	7.5	Block 1	Admission to a Master's program. Basic knowledge in physical chemistry and mathematics. <i>Limited to 50 participants.</i>
1505-450	Online Dairy Science and Technology	Hinrichs	SS	5.0	Block 2	Scientific background and basics in food microbiology, chemistry, engineering, and soft matter science. Participation at Online Dairy Science and Technology is only possible if 1505-440 has not been accomplished. <i>Limited to 10 participants.</i>
1507-450	AgFoodTech	Weiss	WS	6.0	Block 2	
1504-450	Technologie pflanzlicher Lebensmittel (taught in German)	Jekle	SS	7.5	Block 3	<i>Limited to 30 participants.</i>
1509-520	Process Dynamics and Control	Schaum	SS	7,5	Block 3	<i>Limited to 20 participants.</i>
1503-520	Food Process Design I - Efficient Processing and Transport Phenomena	Kohlus	WS	7.5	Block 3	Technical basics, process engineering, physical chemistry or thermodynamics of multiphase systems. <i>Limited to 50 participants.</i>
1503-500	Food Process Design II - Process Integration and Scale up	Kohlus	SS	7.5	Block 3	Knowledge of equivalent to Food Process Design I, e.g. Basics of fluid mechanics, mass and heat transfer, unit operations in food processing. <i>Limited to 24 participants.</i>
1511-400	Computational Thinking	Krupitzer	SS	7.5	Block 4	-
1505-510	Online – Soft Matter Science I – Food Rheology and Structure	Hinrichs / Hitzmann	WS	5.0	Block 3	The module Online - Soft Matter Science I (1505-510) can only be chosen, if Soft Matter Science I (1505-500) is not already completed or about to be completed. <i>Limited to 30 participants.</i>
1507-520	Food Product Development: From Concept Ideation to Product Launch	Weiss	WS+SS	7.5	Block 3   Block 4	<i>Limited to 25 participants.</i>

## Profile 6 –Data Science and Artificial Intelligence in the Bioeconomy

\*with option to achieve the AIDAHO Certificate

### Objective of this profile: Graduates...

- ... understand the necessity of integrating data analytics for the future applications of the Bioeconomy
- ... learn state-of-the-art procedures and methods for data science, machine learning, and artificial intelligence
- ... apply the learned methods for data analytics in the field of Bioeconomy

### Possible career fields ...

- All fields of Bioeconomy in which data needs to be analysed, e.g.,
  - (product) development,
  - strategic management,
  - consulting, or
  - research.

Code	Module	Responsible	Sem.	ECTS	Blocked	Participation requirements
<b>Basics:</b>						
4407-480	Introduction to Machine Learning with Python	Stein & Krupitzer	SS	7,5	By arrangement (online)	No prior programming skills are assumed. The necessary basic concepts of Python programming are taught in the first third of the course.
5107-410	Introduction to Applied Data Science	Dimpfl	WS	6	No	-
<b>Methodological In-Depth Lectures:</b>						
5211-740	Time Series Econometrics	R. Jung	SS	6	No	Every 2 years only; advanced knowledge of econometrics obligatory.
5200-510	Statistical Learning	R. Jung	SS	6	No	Only for students who have NOT yet taken the module "5200-410 - Introduction to Statistical Learning".
3201-590	Combining Ecological Models and Data	Schurr & Pagel	SS	6	No	Participants need a basic understanding of population dynamics and experience with the programming language R as acquired in the module Landscape Ecology (3201-560) or equivalent courses.
4201-430	Applied Econometrics	Wieck	WS	6	No	For this module you must have a solid background in statistics and a good understanding of microeconomics. Successfully completed courses in both of these subjects at the undergraduate level are essential and assumed.

3402-420	Quantitative Methods in Biosciences	Piepho	WS	6	No	A first course in statistics
4407-470	Artificial Intelligence for Agriculture	A. Stein	SS	6	No	<i>Limited to 20 participants.</i>
4407-510	Intelligente Robotik für die Landwirtschaft (taught in German!)	A. Stein	WS	6	No	Module "Introduction to Machine Learning with Python" should be completed before. <i>Limited to 15 participants.</i>
1509-510	Industry 4.0 Technologies	Schaum	SS	7,5	Block 2	Basic knowledge of programming is useful but not required.
<b>Application Seminars:</b>						
4407-490	Bildanalyse mit Deep Learning (in German!)	Stein	WS	6	No	Vor Belegung des Moduls wird ein erfolgreicher Abschluss der Module 4407-480 "Introduction to Machine Learning with Python" und 4407-440 "Einführung in die Künstliche Intelligenz" empfohlen. Teilnehmerzahl auf 16 Personen beschränkt.
1505-430	Projects in Bioeconomic Research - Applied Project (focus on Data Science and Artificial Intelligence required)	Krupitzer	WS	7,5	By arrangement	-
1511-400	Computational Thinking	Krupitzer	SS	7,5	Block 4	-
1511-500	Practical Introduction to Programming with Python	Krupitzer	WS	6	No	-

**\*Please note:** While accomplishing this profile, you can parallelly achieve the **AIDAHO Certificate**. For this, you need to take both basic modules, Introduction to Machine Learning with Python and Introduction to Data Science with R. Moreover, you need to choose one methodological module as well as an application seminar. Additionally, you need to complete the extracurricular course "Tools for AI & Data Science". Further information on the Certificate can be found **at <https://ai-daho.uni-hohenheim.de/en>**.

## Master's thesis

The Master's thesis is intended to show that you are able to work independently on a topic in the field of the bioeconomy within a fixed period of time by applying scientific methods. Thesis work includes a literature review, compilation of new and original data derived from either field or laboratory work or a systems analysis and modelling as well as a period of write-up. In addition, students should reflect (preferably in a separate chapter of the thesis) the impact of their topic on different aspects along the biobased value chain.

The Master's thesis examination consists of a written part (thesis) as described above and, if applicable, an oral defense (colloquium). Whether a colloquium is part of the Master's thesis or not is decided by your supervisor. In the colloquium, you must defend the essential arguments, methods and results of your thesis. The colloquium lasts approximately 30-45 minutes. The written part of the Master's thesis has to be completed within a period of six months. It is usually written during the fourth semester. The Master's thesis can be carried out either at the University of Hohenheim or at one of our partner universities. For detailed information on the process check section "Master's thesis" on [www.uni-hohenheim.de/en/bioecon-pa-en](http://www.uni-hohenheim.de/en/bioecon-pa-en).

## Writing your Master's thesis outside the University of Hohenheim

If you would like to write your Master's thesis externally, the examination committee must approve. In this case, the topic must be selected in cooperation with a Hohenheim supervisor. **Please follow the following steps before you start with your external thesis:**

1. Contact the professor heading the department corresponding to your desired thesis topic to seek approval to write your thesis outside of the University of Hohenheim. Discuss your thesis as well at the institution at which you would like to conduct your research with the professor. Further, the professor at Hohenheim has to agree to the thesis topic proposed by the external supervisor. If your supervisor at the external institution is not a full-time scientific staff member of the University of Hohenheim, ask another professor to be your second supervisor.

2. If the professor agrees to your proposed thesis work, you need to petition the examinations board in a formal letter for its approval. Please include the following information in your petition:

- **Title** of your proposed thesis and an **exposé**
- The **reason** for conducting your thesis work at an external facility
- Name of your **external supervisor**
- Name of your **supervisor at Hohenheim**.

Once the examinations board has approved your petition, your supervisor may assign your topic and you must register the thesis immediately with the Examinations Office.

### **Submitting your Master's thesis**

The Master's thesis must be submitted in electronic form (in .pdf file format) to the Examinations Office by the deadline. In addition to the digital version, the submission of printed copies may be requested by the supervisor. Along with these documents, you have to submit a written declaration of originality, declaring to be the sole author of the submitted work and that all sources and aids have been indicated as such. Additional information can be found at: **[www.uni-hohenheim.de/en/examinations-office-final-thesis](http://www.uni-hohenheim.de/en/examinations-office-final-thesis)**.

## **Examinations**

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Every module of the Master's program in Bioeconomy is completed with an examination. Types of examinations offered at the University of Hohenheim include written and oral examinations, protocols of practical courses, reports, preparation and presentation of contributions to seminars, and colloquia.

For every examination you decide to take, you need to register online via HohCampus at **<https://hohcampus.verw.uni-hohenheim.de>** during the exam registration period. When registering for the examination, the students must note whether it is a compulsory, semi-elective, elective, or additional module. This classification can be changed once at the end of the program by submitting a request to the Examination's Office.

Coursework may be a prerequisite for taking a module examination. Please see the module description at [www.uni-hohenheim.de/en/module-catalogue](http://www.uni-hohenheim.de/en/module-catalogue) for detailed information on the specific requirements for individual examinations.

Detailed information on the valid examination regulations, deadlines, examination dates, your transcript of records, etc. may be obtained from the examinations office or online at [www.uni-hohenheim.de/en/examination](http://www.uni-hohenheim.de/en/examination).

## Registration

**Examinations of non-block modules** are usually held in two examination periods that follow the lecture period. For the current exam registration periods, please see [www.uni-hohenheim.de/en/semester-dates](http://www.uni-hohenheim.de/en/semester-dates). You may choose whether to take the examination in the first or second examination period. If you decide to withdraw from an examination you have time until seven days before the examination takes place. You are *not* automatically registered for the following examination date. If you are not notified of the date, please contact the examinations office or the professor in charge of the module.

**Examinations of blocked modules** are usually held at the end of the respective block. For blocked modules, registration must be completed at the latest seven days before the examination takes place. If you decide to withdraw from an examination you have previously registered for, you are not automatically registered for the following examination date. If you are not notified of the date, please contact the examinations office or the professor in charge of the module.

Coursework may be a prerequisite for taking an examination. Please see the respective module description at [www.uni-hohenheim.de/en/module-catalogue](http://www.uni-hohenheim.de/en/module-catalogue) for detailed information on the specific requirements for taking an examination.

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/en/examination](http://www.uni-hohenheim.de/en/examination).

## Examination resits

It is possible to resit an examination twice for a total of five modules (compulsory, semi-elective or elective). For all other modules, it is possible to resit the examination once. It is not possible to resit an examination which has already been passed. If you fail an examination you signed up for, you need to register for the second



trial as well. Examination resits for non-block modules are usually scheduled for the following examination period. Examination resits for blocked modules take place either in the following examination period or are scheduled by the professor in charge. In some cases, the resit date has not been set at the time of notification. If this is the case, please check the resit dates with the professor or the examinations office.

## Grading system

The examination result is expressed in grades according to the grading table below. A minimum grade score of 4.0 (D) is required to pass and complete the module. Some modules are not graded but are assessed as either "pass" or "fail". These modules do not contribute to the overall grade.

Grades		German	English
1.0	A	<i>sehr gut</i>	very good
1.3	A-		
1.7	B+	<i>gut</i>	good
2.0	B		
2.3	B-		
2.7	C+	<i>befriedigend</i>	satisfactory
3.0	C		
3.3	C-		
3.7	D+	<i>ausreichend</i>	sufficient
4.0	D		
5.0	F	<i>nicht ausreichend</i>	fail

## Overall grade

The overall grade for the Master's program in Bioeconomy is calculated as the weighted average of all grade scores achieved in all modules, including the Master's thesis. The module grades and the grade of the Master's thesis are weighted on the basis of the credits awarded for each completed module. The result is rounded mathematically to one decimal place. Results above 4.0 (D) are always rounded up to 5.0 (F).

## Recognition of credits obtained abroad

Students may spend one semester of the second year abroad to gain additional experience and enhance their professional profile. Credits obtained at another university during an exchange period can be recognized by the University of Hohenheim and thus contribute towards your degree, provided the awarding institution is equivalent to a German university and the competencies acquired do not exhibit substantial differences to those of the Bioeconomy program as a whole. More information can be obtained at [www.uni-hohenheim.de/en/office-of-international-affairs](http://www.uni-hohenheim.de/en/office-of-international-affairs).

## Cheating and plagiarism

If you attempt to influence the result of an examination by cheating or using forbidden aids the respective examination is assessed with "fail" (5.0). This expressly includes plagiarism, i.e. the use of content taken from the internet or other sources without properly quoting or indicating the source.

Teaching staff may require you to attach a declaration of originality to written examinations or assignments and demand them to be handed in in digital form. Please ask the respective supervisor before submitting your work.

## Course evaluation

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The quality of courses and modules is evaluated by the students of all study programs on a one- or two-year basis, depending on the faculty administering the module. These evaluations are always anonymous. The lecturers are notified of the results and asked to discuss them with the students at the end of their course or module.

## EBU-Label

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The European Bioeconomy University has developed a common qualification supplement, the "EBU label", that will be granted to master students on bioeconomy-relevant study programs offered at the six EBU partner universities. It aims to upgrade existing disciplinary university curricula at master level by incorporating inter- and transdisciplinarity, cross-sectoral collaboration and sustainability competences. The EBU qualification supplement will be granted to students who fulfil the following criteria:

- Enrolment in **M.Sc. Bioeconomy**;
- Self-reflection **report on** your own **T-shaped skills profile** consisting of disciplinary and interdisciplinary expertise, hard and soft skills as well as sustainability competences;
- **Master thesis** with an explicit link to the bioeconomy through inclusion of a chapter describing the relevance of the thesis results to the bioeconomy;
- Supervision and co-supervision by academics from **two different EBU universities**;
- Participation in the '**EBU Student Journey**' or in an exchange semester at an EBU partner university.
- **Additional activities** (e.g. participation in the MOOC "Concepts of sustainable bioeconomy", soft-skills trainings etc.)

Detailed information can be obtained in the module description of the according module "Bioeconomy at European Level: EBU Label" (3403-510) or at [https://european-bioeconomy-university.eu/ education/ebu-label/](https://european-bioeconomy-university.eu/education/ebu-label/)

## Language courses

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

For more information on German language courses and all other language courses please visit [www.uni-hohenheim.de/en/language-center](http://www.uni-hohenheim.de/en/language-center).

## Extending the period of study

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The standard period of study is four semesters. However, you are not required to complete your studies within that time. There are ways and reasons to extend the period of study. **The maximum period of study is seven semesters!**

### Extending the period of study before all 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 recognized 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 (see page 10 for more information on internships).

A semester on leave provides you with the necessary flexibility to design the course of your studies on an individual basis. This does not necessarily extend your period of study as examinations completed during an exchange semester, for example, can be fully recognized. For further information on reasons for being granted a semester on leave please visit [www.uni-hohenheim.de/en/semester-on-leave](http://www.uni-hohenheim.de/en/semester-on-leave).

### **Extending the period of study after all 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 seven semesters, which cannot be extended. You may, of course, also 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. However, neither of these activities can be recognized since all credits necessary to complete your degree have already been accumulated.

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

## **Career prospects**

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Your interdisciplinary expertise leads to many excellent job opportunities in various areas both nationally and internationally:

Professional (project management) positions...

- in production, marketing and research & development departments of companies selling products based on biological resources and biotechnological processes (i.e. food industry, bioenergy sector and manufacture of further biobased consumables)
- research organisations
- Start-ups
- Organisations supporting biobased value chains (including consulting companies and organisations)

- Ministries, agencies and international organisations supporting the bioeconomy (incl. international development organisations)

With an above-average degree you also have the option of pursuing further academic qualifications by obtaining your doctorate at a university in Germany or abroad. This provides a path to leading positions in research and development or, if you are interested in economics, into management positions at international companies.

If you want to enter the job market outside academia, we would like to advise you 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. For more information please visit [\*\*www.uni-hohenheim.de/en/career-entry\*\*](http://www.uni-hohenheim.de/en/career-entry).

## **Completing your studies**

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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.

## **Semester dates**

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For detailed information on the semester dates please visit [\*\*www.uni-hohenheim.de/en/semester-dates\*\*](http://www.uni-hohenheim.de/en/semester-dates).

## Teaching staff

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Professors at the University of Hohenheim have extensive experience in international research. Students also benefit from Hohenheim's active links with academic partners worldwide. Guest speakers from partner universities as well as research, development and policy institutions cover additional topics and enrich the curriculum.

The following professors offer compulsory and semi-elective modules and are thus closely linked to the Master's program in Bioeconomy. However, if you have any questions about the program, it is best to contact Ms. Svenja Schuhmacher at **bioeconomy@uni-hohenheim.de**.

### Faculty of Agricultural Sciences

- **Prof. Dr. Regina Birner**, Institute of Agricultural Economics and Social Sciences in the Tropics and Subtropics, Department of Social and Institutional Change in Agricultural Development (490c)
- **Prof. Dr. Andrea Knierim**, Institute of Social Sciences in Agriculture, Department of Communication and Advisory Services in Rural Areas (430a)
- **Prof. Dr. Iris Lewandowski**, Institute of Crop Science, Department of of Biobased Resources in the Bioeconomy (340b)

**Prof. Dr. Christian Lippert**, Institute of Farm Management, Department of Production Theory and Resource Economics (410a)

- **Jun.-Prof. Dr. Ramona Weinrich**, Institute of Agricultural Policy and Markets, Department of Consumer Behavior in the Bioeconomy
- **Prof. Dr. Christian Zörb**, Institute of Crop Science, Quality of Plant Products (340e)

### Faculty of Natural Sciences

- **Prof. Dr. Rudolf Hausmann**, Institute of Food Science and Biotechnology, Department of Bioprocess Engineering (150k)
- **Prof. Dr. Jörg Hinrichs**, Institute of Food Science and Biotechnology, Department of oft Matter Science and Dairy Technology (150e)
- **Jun.-Prof. Dr. Christian Krupitzer**, Institute of Food Science and Biotechnology, Department of Food Informatics (150l)
- **Prof. Dr. Jochen Weiss**, Institute of Food Science and Biotechnology, Department of Food Material Science (150g)

## Faculty of Business, Economics and Social Sciences

- **Jun.-Prof. Dr. Franziska Schünemann**, Institute of Economics, Department of Economics, esp. Bioeconomy (520M)
- **Prof. Dr. Benjamin Jung**, Institute of Economics, Department of Economics, esp. International Economics (520E)

## FAQ

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### Whom can I contact with questions regarding my studies?

Your first point of contact is Ms. Svenja Schuhmacher, coordinator of the Master's program in Bioeconomy. Her contact information is on the first page of this curriculum.

### I want to go abroad. What do I have to do?

The Office of International Affairs (AA) is happy to provide you with information and will guide you through the process of organising a stay abroad. For detailed information, please visit their website at [www.uni-hohenheim.de/en/office-of-international-affairs](http://www.uni-hohenheim.de/en/office-of-international-affairs).

### I have completed all modules required for my degree, what happens now?

Once you have successfully completed all required modules, you will be issued your degree certificate. However, please keep the following in mind:

- Your degree certificate cannot be issued until you have completed all exams and all of your grades have been entered into the system. Once all grades have been entered into the system, you may exmatriculate yourself and do not need to re-register for the following 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.

**University of Hohenheim**

**Faculty of Natural Sciences**

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[www.uni-hohenheim.de/bioeconomy-master-studium](http://www.uni-hohenheim.de/bioeconomy-master-studium)

