

# Food Microbiology and Biotechnology

## Master of Science

### Curriculum



Dear students

this study guide offers an overview of the Master's programme in Food Microbiology and Biotechnology. 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 is 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 the 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 &

The Study Counsellors of Food Microbiology and Biotechnology

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## **Final degree**

Master of Science (M.Sc.)

## **Prescribed period of study**

4 semesters, compulsory attendance; 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, and of the summer semester from early April until mid-July. All modules consist of compact courses lasting three weeks, with new modules commencing every three weeks.

The specific dates of the compact courses, as well as the semester dates for the respective academic year can be found on the last page of this curriculum.

**PLEASE NOTE:** The structure of the semester is going to change beginning in the winter semester 2014/15 with modules lasting four instead of three weeks. As a result, the number of modules students have to take in one semester are reduced from five to four modules per semester. Accordingly, the credit points awarded for one module are increased from 6 to 7.5.

Students enrolled before the winter semester 2014/15 are advised to complete all compulsory modules by the end of the summer semester 2014. If this is not possible, students either have to take a module awarding 7.5 credits or, if that is not an option, the study counsellors will work out individual solutions with affected students.

## **Contents and aims of the degree programme**

The programme in Food Microbiology and Biotechnology is concerned with the properties, the production processes and the manifold applications of enzymes and microorganisms in the food industry and for bioanalytical purposes.

Microorganisms are especially good producers of enzymes, since they can be cultivated in bio-reactors under controlled, secure and standardised conditions. In comparison to other organisms, such as plants and animals, microorganisms have the highest level of productivity.

Enzyme technology explores enzymatic production processes. For this, knowledge of biochemical methods, including the filtration, purification and characterization of enzymes, enzyme kinetics, the immobilization of enzymes, gene expression and the mutagenesis of recombinant enzymes, is relevant.

The programme in Food Microbiology and Biotechnology is both interdisciplinary and research-oriented. You learn how to independently organise, realise, present and publish fundamental as well as application-oriented research projects. Apart from acquiring the necessary key skills in the theory and practice of enzyme- and biotechnology, alongside the corresponding qualitative and quantitative methods of analysis, you will be able to also take modules from the adjoining Master's programmes in Food Science and Engineering, Clinical Nutrition, Molecular Nutritional Science and Biology.

## **Structure of the programme**

During the course of the two year study programme modules in the amount of 120 credits, including the Master's thesis, have to be completed successfully. This includes six compulsory modules, which impart the fundamentals of food microbiology, enzyme biotechnology and analysis during the first year of studies. In addition, elective modules supplement the course of studies. These are integrated flexibly into the first three semesters, depending on your area of specialisation and courses on offer.

During selected modules, excursions to relevant industry and businesses take place. The course catalogue of elective modules allows you to develop your scientific qualifications to include the areas of food science and engineering, nutritional sciences and biology.

The project work serves to introduce you to working on a scientific project independently and prepares you for your Master's thesis. You are free to choose when you want to complete your project work. However, it must be completed before starting to write the Master's thesis at the latest. The

execution of the project work is done in consultation with a supervisor assigned by the department (postgraduate scientific staff member).

The research and development internship (elective module) may be integrated in the course of your studies on an individual basis. Please contact your supervising professor (see module description) before the internship begins, in order to establish a timeframe and academic requirements. Depending on the duration of the research internship (4, 8 or 12 weeks) you may be awarded credits in the amount of up to three elective modules.

With the completion of your Master's thesis at the end of the fourth semester you demonstrate your ability to do independent scientific work. The Master's thesis may be completed in cooperation with industry.

## Course of studies table

|                      |   |                                   |                                 |  |                 |                      |
|----------------------|---|-----------------------------------|---------------------------------|--|-----------------|----------------------|
| 1 <sup>st</sup> Sem. | Scientific Writing and Reporting (1502-500)         | Fermentation Technology 1501-400) | Recombinant Proteins (1506-430) | Chemical Analytical Methods (1302-440) | Elective Module | 1 <sup>st</sup> Sem. |
| 2 <sup>nd</sup> Sem. | Food Microbiology (1501-500)                        | Elective Module                   | Elective Module                 | Elective Module                        | Elective Module | 2 <sup>nd</sup> Sem. |
| 3 <sup>rd</sup> Sem. | Project Work (Compulsory) (1500-530)                | Elective Module                   | Elective Module                 | Elective Module                        | Elective Module | 3 <sup>rd</sup> Sem. |
| 4 <sup>th</sup> Sem. | Master's Thesis Food Microbiology and Biotechnology |                                   |                                 |  |                 | 4 <sup>th</sup> Sem. |

\* Depending on your area of specialization and courses on offer you choose elective modules in the amount of 54 credits. These are integrated flexibly into the course of the first three semesters.

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 partly possible, as long as they conform to the rules set forth in the study and examination regulations.



Detailed information of individual modules and their corresponding courses, as well as the current state of courses on offer may be obtained at <https://www.uni-hohenheim.de/module-catalogue/fmb>

## Elective modules

In addition to the compulsory modules included in the course of studies table, you have to complete elective modules in the amount of 54 credits. These modules can be integrated flexibly into the first three semesters, depending on the availability of modules.

Elective modules on offer:

### Modules of the 1st semester (WS 2013/14)

| Module slot | Module dates                               | Code     | Module title  | Module type |
|-------------|--|----------|---|-------------|
| 1           | 14.10. – 01.11.2013                        | 1502-500 | <b>Scientific Writing and Reporting</b>   | <b>C</b>    |
| 2           | 04.11. – 22.11.2013                        | 1501-400 | <b>Fermentation Technology</b>  | <b>C</b>    |
| 3           | 25.11. – 13.12.2013                        | 1506-430 | <b>Recombinant Proteins</b>   | <b>C</b>    |
| 4           | 16.12. – 20.12.2013<br>07.01. – 17.01.2014 | 1302-440 | <b>Chemical Analytical Methods</b>  | <b>C</b>    |
| 5           | 20.01. – 07.02.2014                        | 1510-400 | Downstream Processing   | E           |
| 5           | 20.01. – 07.02.2014                        | 1403-410 | <i>Biofunktionalität, Toxikologie und Sicherheit von Lebensmitteln</i> (taught in German) | E           |
| 5           | 20.01. – 07.02.2014                        | 1302-420 | <i>Chemie katalytischer Redoxsysteme</i> (taught in German)                               | E           |




## Modules of the 2nd semester (SS 2014)

| Module slot | Module dates        | Code     | Title   | Module type |
|-------------|---------------------|----------|---|-------------|
| 1           | 07.04. – 25.04.2014 | 1501-500 | <b>Food Microbiology</b>  | <b>C</b>    |
| 2           | 28.04. – 16.05.2014 | 1502-490 | Industrial Case Studies - FMB                                   | E           |
| 2           | 28.04. – 16.05.2014 | 1302-450 | Chemistry of Catalytic Redox Systems                            | E           |
| 2           | 28.04. – 16.05.2014 | 1505-440 | Dairy Science and Technology                                    | E           |
| 2           | 28.04. – 16.05.2014 | 1509-500 | Advanced Process Engineering Techniques for Cereal Processing   | E           |
| 2           | 28.04. – 16.05.2014 | 2502-430 | Cellular Microbiology   | E           |
| 3           | 19.05. – 06.06.2014 | 1503-500 | Food Process Design II – Process Integration and Scale-up       | E           |
| 3           | 19.05. – 06.06.2014 | 1402-450 | Nutrient-Gene-Interaction II                                    | E           |
| 3           | 19.05. – 06.06.2014 | 2303-420 | <i>Modulation von Signalkaskaden</i> (taught in German)         | E           |
| 3           | 19.05. – 06.06.2014 | 1502-510 | Enzyme Technology   | E           |
| 3           | 19.05. – 06.06.2014 | 1301-450 | Metal Coordination Chemistry in Biomolecules                    | E           |
| 4           | 16.06. – 04.07.2014 | 1503-540 | Drying, Granulation, Instantisation                             | E           |
| 4           | 16.06. – 04.07.2014 | 1101-430 | Modelling and Simulation of Biochemical Reaction Networks       |             |
| 4           | 16.06. – 04.07.2014 | 1506-500 | Bioethanol and Distilled Spirits                                | E           |
| 4           | 16.06. – 04.07.2014 | 1701-410 | <i>Instrumentelle Analytik und Bioassays</i> (taught in German) | E           |
| 5           | 21.07. – 12.08.2014 | 4902-430 | Food and Nutrition Security                                     | E           |
| 5           | 07.07. – 25.07.2014 | 1508-400 | Advanced Sensory Analysis of Foods                              | E           |

## Modules of the 3rd semester (WS 2014/15)

| Module Slot | Module dates                             | Code     | Title  | Module type |
|-------------|--|----------|--|-------------|
| 1           | 13.10. – 07.11.2014                      | 2303-460 | Bioanalysis  | E           |
| 1           | 13.10. – 07.11.2014                      | 1503-510 | Process Driven Product Design: Cereals and Sweets                    | E           |
| 1           | 13.10. – 07.11.2014                      | 1303-410 | Physical Chemistry (Research Internship)                             | E           |
| 1           | 13.10. – 07.11.2014                      | 1507-500 | Advanced Meat Science and Technology                                 | E           |
| 1           | 13.10. – 07.11.2014                      | 1505-420 | <i>Innovative Milchtechnologie</i> (taught in German)                | E           |
| 1           | 13.10. – 07.11.2014                      | 4704-430 | <i>Food Chain Eier und Geflügelfleisch</i> (taught in German)        | E           |
| 2           | 10.11. – 05.12.2014                      | 1102-510 | Applied Statistics for the Life Sciences                             | E           |
| 2           | 10.11. – 05.12.2014                      | 1101-400 | Applied Mathematics for the Life Sciences                            | E           |
| 2           | 10.11. – 05.12.2014                      | 1503-530 | Industrial Case Studies – FSE  | E           |
| 2           | 10.11. – 05.12.2014                      | 1303-420 | Physical Chemistry (Research Internship)                             | E           |
| 2           | 10.11. – 05.12.2014                      | 2501-440 | Protein Expression in Bacteria                                       | E           |
| 2           | 10.11. – 05.12.2014                      | 1504-510 | Plant Foodstuff Technology I   | E           |
| 3           | 08.12. – 19.12.2014<br>07.01.-16.01.2015 | 2303-430 | <i>Molekulare Sinnesphysiologie</i> (taught in German)               | E           |
| 3           | 08.12. – 19.12.2014<br>07.01.-16.01.2015 | 1510-400 | Downstream Processing  | E           |
| 3           | 08.12. – 19.12.2014<br>07.01.-16.01.2015 | 1402-440 | Nutrient-Gene-Interaction I  | E           |
| 3           | 08.12. – 19.12.2014<br>07.01.-16.01.2015 | 1503-520 | Food Process Design I – Efficient Processing and Transport Phenomena | E           |
| 4           | 19.01. – 13.02.2015                      | 2501-450 | <i>Membranbiochemie</i> (taught in German)                           | E           |
| 4           | 19.01. – 13.02.2015                      | 1505-500 | Soft Matter Science I – Food Rheology and Structure                  | E           |
| 4           | 19.01. – 13.02.2015                      | 1502-480 | Mutagenesis and Overexpression of Enzymes                            | E           |

You may choose elective modules of the Food Microbiology and Biotechnology 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 <https://www.uni-hohenheim.de/module-catalogue/fmb>

For any changes please see the latest version of the curriculum at <https://www.uni-hohenheim.de/curricula>

## Examinations

Each module of the Master's programme in Food Microbiology and Biotechnology 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 "pass" or "fail." They do not count towards the final grade point average on the Master's degree certificate.

Types of examinations offered at the University of Hohenheim include 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.

## Examination periods:

| semester                | Examination period (EP) |
|-------------------------|-------------------------|
| winter 2013/14 (1st EP) | 03.02.2014 – 22.02.2014 |
| winter 2013/14 (2nd EP) | 24.03.2014 – 05.04.2014 |
| summer 2014 (1st EP)    | 21.07.2014 – 09.08.2014 |
| summer 2014 (2nd EP)    | 22.09.2014 – 11.10.2014 |
| winter 2014/15 (1st EP) | 09.02.2015 – 28.02.2015 |
| winter 2014/15 (2nd EP) | 30.03.2015 – 10.04.2015 |

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 Science.

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

| Grades            | German                   | English      |
|-------------------|--------------------------|--------------|
| 1,0<br>1,3        | <i>sehr gut</i>          | very good    |
| 1,7<br>2,0<br>2,3 | <i>gut</i>               | good         |
| 2,7<br>3,0<br>3,3 | <i>befriedigend</i>      | satisfactory |
| 3,7<br>4,0        | <i>ausreichend</i>       | sufficient   |
| > 4,0             | <i>nicht ausreichend</i> | fail         |

## Extending the period of study

Whilst the standard period of study is four semesters, the programme does not require students to complete their studies within that time. There

are ways and reasons to naturally extend the period of study. However, please note that the maximum period of study is 6 semesters.

### **Before modules are completed**

If students have yet to complete their regular modules, excluding the Master's thesis, it is possible to take an *Urlaubssemester* (semester on leave). During this time students are free to spend a semester abroad, take courses and examinations at a host university. Completed modules can be accredited by the University of Hohenheim and thus contribute towards the degree. It is also possible to complete a prolonged 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 students with the necessary flexibility to plan their studies on an individual basis. This need not necessarily extend the period of study. 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 students have successfully completed their last module, with only the master's thesis left, they have six months before they are required to begin working on their thesis. However, the maximum period of study is 6 semesters, which cannot be extended. Students may, of course, opt to start writing their thesis right away. These six months provide students 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 **[exchange.uni-hohenheim.de](http://exchange.uni-hohenheim.de)**.

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

## **Language course – UNlcert III**

UNlcert 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 recognized language certificate. This UNlcert 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.

For further information please visit [\*\*www.natur.unihoenheim.de/languagecourse\*\*](http://www.natur.unihoenheim.de/languagecourse).

## **Occupational fields**

The Master’s programme in Food Microbiology and Biotechnology qualifies you for a position of responsibility in industry and science:

- Research and development, project management, quality assurance in the
  - Biotech industry
  - Food industry
  - Cosmetics industry
  - Chemicals industry
  - Pharmaceutical industry
- Production of starter cultures and enzyme producers
- Federal and State Research Centers
- Science journalism and publishing houses
- Business consultancy

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.



## Important Dates

### Semester dates 2013 - 2015

| Semester       | Start of lectures | End of lectures | Holidays                |
|----------------|-------------------|-----------------|-------------------------|
| Winter 2013/14 | 14.10.2013        | 01.02.2014      | 23.12.2013 - 06.01.2014 |
| Summer 2014    | 07.04.2014        | 19.07.2014      | 10.06.2014 - 14.06.2014 |
| Winter 2014/15 | 13.10.2014        | 07.02.2015      | 22.12.2014 - 06.01.2015 |
| Summer 2015    | 13.04.2015        | 25.07.2015      | 26.05.2015 - 30.05.2015 |

### Compact course dates

| Winter semester 2013/14 |  | Summer semester 2014 |                     |
|-------------------------|--|----------------------|---------------------|
| Course slot             | Dates                                      | Course slot          | Dates               |
| 1                       | 14.10. - 01.11.2013                        | 1                    | 07.04. - 25.04.2014 |
| 2                       | 04.11. - 22.11.2013                        | 2                    | 28.04. - 16.05.2014 |
| 3                       | 25.11. - 13.12.2013                        | 3                    | 19.05. - 06.06.2014 |
| 4                       | 16.12. - 20.12.2013<br>07.01. - 17.01.2014 | 4                    | 16.06. - 04.07.2014 |
| 5                       | 20.01. - 07.02.2014                        | 5                    | 07.07. - 25.07.2014 |









