UNIVERSITY OF HOHENHEIM
FACULTY OF NATURAL SCIENCES

Food Microbiology and Biotechnology

Master of Science

Curriculum

September 2015 | valid as of winter semester 2015/16

Curricula valid before winter semester 2014/15 may be found at www.uni-hohenheim.de/curricula

Dear students

This study guide offers an overview of the Master's program 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**.

Answers to specific questions concerning rules and regulations of the program can be found in the examination regulations at **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 Food Microbiology and Biotechnology

Contents

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 mid-February. The lecture period of the summer semester lasts from early April until the end of July. The program has a modular block structure and all modules consist of compact courses lasting four weeks, with new modules commencing every fifth week.

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

Contents and aims of the degree program

The program 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 program 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 programs in Food Science and Engineering, Clinical Nutrition, Molecular Nutritional Science and Biology.

Structure of the program

During the course of the two year study program modules in the amount of a minimum of 120 credits, including the Master's thesis, have to be completed successfully. This includes compulsory modules in the amount of a minimum of 45 credits, 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 (6 or 12 weeks) you may be awarded credits in the amount of up to two 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.

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 food microbiology and biotechnology, 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	• possess comprehensive and in-depth knowledge of the field of enzyme technology, food microbiology and biotechnology and can clearly communicate its scientific basics, even to laymen. • are able to grasp new and unknown facts and developments in the field of food science and incorporate them into and thereby expand upon already existing knowledge.	• are able to describe the principle of a method in detail from a natural scientific point of view. • quickly comprehend new and unknown facts and developments in the adjoining disciplines of food science, nutritional science as well as biology by drawing on existing knowledge, which is expanded in the process.	• possess critical thinking skills. • are able to work efficiently towards a goal, both independently and as part of a team. • are able to design, coordinate, execute and analyse diverse projects. • possess the ability to correctly and diligently conduct scientific work and you can transfer this attitude to other non-scientific areas of operation. • can take part and contribute to (scientific) discussions as well as moderate them. • know how to deal with contrary opinions in a productive manner. • are able to confidently give presentations • know how to express yourself appropriately in spoken and written form.
Application	• develop new ways to utilise enzymes and microorganisms in the life science industry by connecting theory to praxis. You are familiar with necessary laboratory equipment and can derive application-oriented concepts from experimental work. • are able to utilise your subject-specific knowledge in a problem-oriented manner.	• are able to transfer knowledge to diverse fields of operation. • are able to combine knowledge of the fields of enzyme technology, food microbiology and biotechnology with developments in adjoining disciplines, such as food science or nutritional science in order to develop inter- and transdisciplinary concepts and methods.	
Analysis	• can easily implement existing methods in innovative problem-solving strategies and know how to modifiy existing methods when required to suit a particular problem. • are able to analyse your own methods and strategies and optimise them if necessary.		

Course of studies table

This table represents a recommendation for the ideal course of studies during the four semester Master's program. 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 45 credits. These are integrated flexibly into the course of the first three semesters.

<table>
<tr><th>Semester</th><th>7.5 credits</th><th>7.5 credits</th><th>7.5 credits</th><th>7.5 credits</th></tr>
<tr><td>1st</td><td>Scientific Writing and Reporting (1502-500)</td><td>Fermentation Technology (1501-400)</td><td>Recombinant Proteins (1506-430)</td><td>Chemical Analytical Methods (1302-440)</td></tr>
<tr><td>2nd</td><td>Food Microbiology (1501-500)</td><td colspan="3" rowspan="2">Elective Modules</td></tr>
<tr><td>3rd</td><td>Project Work (Compulsory) (1500-530)
- module may be completed in any module slot -</td></tr>
<tr><td>4th</td><td colspan="4">Master's Thesis Food Microbiology and Biotechnology (1500-410)</td></tr>
</table>

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/fmb.**

Modules

The program in Food Microbiology and Biotechnology consists of compulsory and elective modules. Each module awards 7.5 credits and lasts four weeks (unless specifically stated otherwise). This modular structure allows you to design the course of your studies on an individual basis.

Detailed information on individual modules, their corresponding courses, the current state of modules on offer as well as on how to register for exams may be obtained at **www.uni-hohenheim.de/module-catalogue/fmb**.

For any changes please see the latest version of the curriculum at **www.uni-hohenheim.de/curricula.**

Compulsory modules

Compulsory modules in the amount of a minimum of 45 credits as well as the Master's thesis have to be completed by all students in order to obtain their degree.

Compulsory modules of the 1st semester (WS 2015/16)

Slot	Module dates	Code	Module title
1	12.10. - 06.11.2015	1502-500	Scientific Writing and Reporting
2	09.11. - 04.12.2015	1501-400	Fermentation Technology
3	07.12. - 22.12.2015 07.01. – 15.01.2016	1506-430	Recombinant Proteins
4	18.01. - 12.02.2016	1302-440	Chemical Analytical Methods

Compulsory modules of the 2nd semester (SS 2016)

Slot	Module dates	Code	Module title
1	04.04. - 29.04.2016	1501-500	Food Microbiology

Compulsory modules of the 3rd semester (WS 2016/17)

Please note: This module may also be completed in another semester and in any module slot.

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

Elective modules

In addition to the compulsory modules of the program in Food Microbiology and Biotechnology, you have to complete elective modules in the amount of a minimum of 45 credits. Elective modules provide you with the opportunity to specialise in an area that corresponds to your personal and professional interests. These modules may be integrated flexibly into the first three semesters, depending on their availability.

You may choose elective modules of the Food Microbiology and Biotechnology program, of other natural science Master's programs of the University of Hohenheim or of other degree programs 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.

Elective modules also include internships. For more information on internships, please see page 10.

Elective modules of the 2nd semester (SS 2016)

Please note: The elective modules listed in the first module slot take place at the same time as the compulsory module "Food Microbiology" (see page 7). However, only the compulsory module "Food Microbiology" must be completed in order to graduate.

Slot	Module dates	Code	Module title
1	04.04. - 29.04.2016	1507-510	Soft Matter Science II – Food Physics
1	04.04. - 29.04.2016	2303-430	*Molekulare Schalter bei Signalproteinen* (taught in German)

Slot	Module dates	Code	Module title
2	02.05. - 13.05.2016 23.05. – 03.06.2016	1505-440	Dairy Science and Technology
2	02.05. - 13.05.2016 23.05. – 03.06.2016	1302-450	Chemistry of Catalytic Redox Systems
2	02.05. - 13.05.2016 23.05. – 03.06.2016	1509-500	Advanced Process Engineering Techniques for Cereal Processing
2	02.05. - 13.05.2016 23.05. – 03.06.2016	2502-430	Cellular Microbiology
2	02.05. - 13.05.2016 23.05. – 03.06.2016	1402-450	Cellular Signaling
2	02.05. - 13.05.2016 23.05. – 03.06.2016	2303-420	*Modulation von Signalkaskaden* (taught in German)
3	06.06. - 01.07.2016	1503-500	Food Process Design II – Process integration and Scale-up
3	06.06. - 01.07.2016	1504-430	*Technologie Pflanzlicher Lebensmittel II* (taught in German)
3	06.06. - 01.07.2016	1502-510	Enzyme Technology
3	06.06. - 01.07.2016	1301-450	Metal Coordination Chemistry in Biomolecules
4	04.07. - 29.07.2016	1503-540	Drying, Granulation and Instantisation
4	04.07. - 29.07.2016	1506-500	Bioethanol and Distilled Spirits
4	04.07. - 29.07.2016	1101-430	Modelling and Simulation of Biochemical Reaction Networks
4	04.07. - 29.07.2016	1701-410	*Instrumentelle Analytik und Bioassays* (taught in German)
4	04.07. - 29.07.2016	1405-400	*Nutrigenomik* (taught in German)
4	04.07. - 29.07.2016	1508-400	Advanced Sensory Analysis of Foods Whether or not this module will take place will be announced at short notice!
any	may be completed anytime	1500-020	Free Project Work
any	may be completed anytime	1500-520	Project Work (Elective)

Slot	Module dates	Code	Module title
any	may be completed anytime	1303-420	Physical Chemistry (Research Internship)
	TBD	1000-040	UNIcert III English for Scientific Purposes

Elective modules of the 3rd semester (WS 2016/17)

Slot	Module dates	Code	Module title
1	17.10. – 11.11.2016	2303-460	Bioanalysis
1	17.10. – 11.11.2016	1503-510	Process Driven Product Design: Cereals and Sweets
1	17.10. – 11.11.2016	1303-420	Physical Chemistry (Research Internship)
1	17.10. – 11.11.2016	1507-500	Advanced Meat Science and Technology
1	17.10. – 11.11.2016	1505-420	*Innovative Milchtechnologie* (taught in German)
2	14.11. – 09.12.2016	1102-510	Applied Statistics for the Life Sciences
2	14.11. – 09.12.2016	1101-400	Applied Mathematics for the Life Sciences
2	14.11. – 09.12.2016	1503-540	Industrial Case Studies
2	14.11. – 09.12.2016	1303-420	Physical Chemistry (Research Internship)
2	14.11. – 09.12.2016	2501-440	Protein Expression in Bacteria
2	14.11. – 09.12.2016	1504-420	*Technologie Pflanzlicher Lebensmittel I* (taught in German)
2	14.11. – 09.12.2016	2301-430	*Molekulare Sinnesphysiologie* (taught in German)
3	12.12. – 23.12.2016 09.01. – 20.01.2017	1510-400	Downstream Processing
3	12.12. – 23.12.2016 09.01. – 20.01.2017	1503-520	Food Process Design I – Efficient Processing and Transport Phenomena

Slot	Module dates	Code	Module title
3	12.12. – 23.12.2016 09.01. – 20.01.2017	2303-410	*Rekombinante Expression von Signalmolekülen* (taught in German)
4	23.01. – 17.02.2017	2501-450	*Membranbiochemie* (taught in German or English depending on the language skills of the participating students)
4	23.01. – 17.02.2017	1505-500	Soft Matter Science I – Food Rheology and Structure
4	23.01. – 17.02.2017	1502-480	Mutagenesis and Overexpression of Enzymes
4	23.01. – 17.02.2017	1403-420	*Grundlagen des Alterns und altersbedingte Erkrankungen* (taught in German)
any	may be completed anytime	1500-020	Free Project Work
any	may be completed anytime	1500-520	Project Work (Elective)
	TBD	1000-040	UNIcert III English for Scientific Purposes

Internship

As part of the curriculum you have the opportunity to do an internship and be awarded credits. An internship may be done at a national or international research center or at a research and development department of a company in Germany or abroad that is related to the life sciences: the food, pharmaceutical as well as their supplying industries, in the sector of plant design and engineering, as well as process technology.

You have to find an internship placement on your own; however, the Internship Office (**uhoh.de/praktikum**) and the CareerCenter (**uni-hohenheim.de/careercenter**) are able to offer assistance. Prior to beginning your internship you also need to choose a supervisor related to the subject-area of your placement. The supervisor decides whether the internship placement is appropriate and also assesses the mandatory internship report. Please be aware that while internships may, of course, last longer than six or twelve weeks, respectively, no additional credit

can be awarded. We nevertheless encourage you to complete a prolonged internship in order to gain experience.

There are two internship modules:

Slot	Module dates	Code	Module title
any	can be completed anytime	1500-420	Internship FMB (Industrial placement) (6 weeks, 7,5 ECTS)
any	can be completed anytime	1500-430	Internship FMB (Industrial placement) (12 weeks, 15 ECTS)

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**.

For more information on the Language Center and all other language courses please visit **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 program 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.

Examinations

Each module of the Master's program 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."

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, as well as colloquia.

Examinations take place at the end of every module. You have to register for every exam online. The dates for module examinations are set by the party responsible for the respective module. Other assignments, such as protocols, reports, presentations, etc. are to be handed in during the lecture period.

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 English-language Master's programs 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**.

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 recognized 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 program in Food Microbiology and Biotechnology as a whole.

Extending the period of study

Whilst the standard period of study is four semesters, the program 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*). Dur-

ing 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 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 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**

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 program. 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**.

For further information on internships please visit the website of the Internship Office at **uhoh.de/praktikum**.

Career prospects

The Master's program 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.

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/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 program in general, please send an email to your academic counsellors at **counselling-fmb@uni-hohenheim.de**.

Important Dates

Semester dates 2015– 2017

	Start of lectures	End of lectures	Holidays
Winter 2015/16	12.10.2015	06.02.2016	23.12.2015 - 06.01.2016
Summer 2016	04.04.2016	16.07.2016	16.05.2016 - 21.05.2016
Winter 2016/17	17.10.2016	04.02.2017	23.12.2016 – 07.01.2017
Summer 2017	03.04.2017	15.07.2017	06.06.2047 – 10.06.2017

Module schedule

Winter semester 2015/16		Summer semester 2016	
Slot	**Dates**	**Slot**	**Dates**
1	12.10. - 06.11.2015	**1**	04.04. - 29.04.2016
2	09.11. - 04.12.2015	**2**	02.05. - 13.05.2016 23.05. – 03.06.2016
3	07.12. - 22.12.2015 07.01. – 15.01.2016	**3**	06.06. - 01.07.2016
4	18.01. - 12.02.2016	**4**	04.07. - 29.07.2016

For your notes

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Contact

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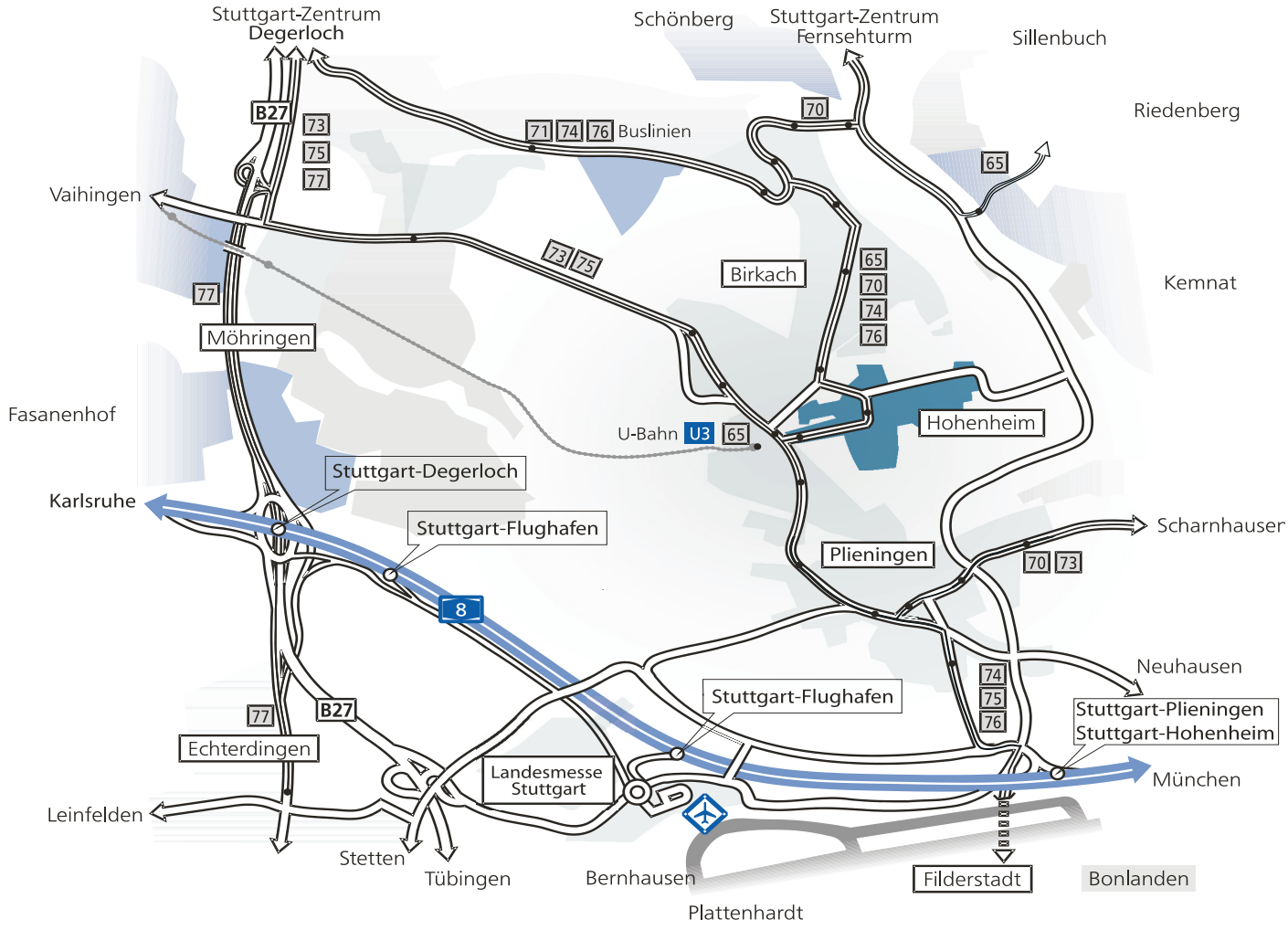
Location of the University

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.



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