Bachelor's degree in Biotechnology

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Biotechnology

Interdisciplinary science

Biotechnology is one of the key technologies of the future. It is the interdisciplinary combination of biological, medical and technical sciences. The aim is to produce or analyse useful compounds derived from beneficial microorganisms, animal and plant cells, or their components. Biotechnological methods allow the production of substances that are difficult or impossible to produce by purely chemical methods. Today more and more analytical methods are based on biological principles.

Study programme

Are you interested in natural sciences such as biology, biochemistry and molecular biology? Do you enjoy performing experiments and would you like to develop new products? Are you also fascinated by industrial processes and systems? Then the Bachelor's degree programme in Biotechnology is just the thing for you.

In addition to subject-specific and general educational content, the emphasis in this study programme is placed on independent work, creativity, teamwork, communication, and holistic thinking. These skills are actively encouraged by participation in projects and research assignments from industry.

In preparation for your last year of study you can choose whether to specialise in Biotechnology or Pharmaceutical Technology, the two majors offered in this degree programme. This allows you to focus on your future career orientation – whether in the field of biotechnological processes or the production of drugs.

The study programme is designed to be taken full-time and lasts six semesters. In the third year you can choose from a variety of modules to put together your own individual study plan. In this way you can adapt part of your studies to suit your previous experience, interests and career goals. The study programme can also be completed on a part-time basis. Furthermore, the modular structure enables you to spend a semester studying abroad and take part in student exchanges with our partner universities.

After foundation studies in the first year, you expand your scientific and technical knowledge and skills in the second year. With your specialisation in the third year you can focus on your own particular interests. Through many practical sessions in small groups, you acquire methodological and social competence.

In the fourth semester, as part of your literature review, you also learn how to write scientific publications. In addition, the subsequent semester assignment and Bachelor's thesis promote your ability to work independently on projects with a high degree of self-confidence.

Structure

Biotechnology

Biotechnology has become an indispensable tool in the research and development of new drugs. It brings biological processes into technical procedures and industrial production.

As a graduate who has specialised in Biotechnology, you are equipped to work on the development of analytical processes and new products. You often act as a link between management, university graduates, technical staff and skilled workers, and may take on technical and managerial responsibilities.

Companies in the areas of biotechnology and pharmaceuticals, food and beverages, biomedicine and the chemical, cosmetic and environmental sectors are typical employers.

Biological procedures and industrial production.

Specialisations

Pharmaceutical Technology

A large number of drugs can only be produced using biotechnological processes. In this specialisation you learn how to use pharmaceutical technology in practice, where the disciplines of chemistry, pharmacy and biology meet. The specialisation covers the development and manufacturing of active ingredients, the evaluation of various production processes and the formulation of a drug up to its registration and quality management in the production process.

Graduates have the opportunity to take on specialist and managerial responsibilities.

Educational objectives

Graduates

- develop and implement cultivation processes for microorganisms as well as for plant, animal and human cells;
- produce recombinant proteins, DNA vectors, chemicals and starter cultures;
- characterise microorganisms and mammalian cells;
- carry out projects involving the development of bioprocesses and systems engineering;
- transfer biotechnological laboratory processes into the production environment.

Areas of activity

- Development of bioprocesses
- Molecular and cell biology research
- Bioanalysis
- Engineering, systems engineering
- Production planning and coordination
- Biosafety
- Quality management, certification
- Environmental protection (analyses, risk management)
- Bioenergy
- Research, education and training

Areas of activity

- Development of pharmaceutical production processes
- Development of laboratory procedures to ensure product quality
- Validation and qualification of pharmaceutical developments, processes and systems
- Pharmaceutical production and packaging
- Pharmaceutical production and packaging
- Biomedical research institutions
- Quality management, validation
- Preparation and writing of registration documents
- Education and training

Research, education and training
In the specialisation modules, you solve complex tasks and put the knowledge you have gained to practical use.

Overview

<table>
<thead>
<tr>
<th>1st and 2nd semesters</th>
<th>3rd and 4th semesters</th>
<th>5th and 6th semesters</th>
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<td><strong>Foundation studies</strong></td>
<td><strong>Professional studies</strong></td>
<td><strong>Specialised studies</strong></td>
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</table>

**Science**
- Biology
- Microbiology with practical work
- Molecular biology
- Pharmacology and toxicology
- Cell biology
- Cell culture technology with practical work
- Molecular biology with practical work
- Cell biology with practical work
- Cell culture technology with practical work

**Chemistry with practical work**
- Analytical chemistry with practical work
- Biochemistry with practical work
- Protein purification with practical work

**Technology**
- Operating technology
- Introduction to biotechnology
- Physics with practical work
- Bioprocess technology with practical work
- Biostatistics
- Bioprocess engineering with practical work
- Measurement and automation technology with practical work
- Sterile technology
- Environmental biotechnology with practical work
- Application of environmental microbiology with practical work
- Biomass and bioenergy
- Bioprocess informatics
- Bioprocess technology with practical work
- Biostatistics
- Project planning

**Society and communication**
- English
- Culture and society
- English
- Quality management
- Personnel leadership
- Quality management in BT

**Mathematics**
- Informatics with practical work
- Mathematics

**Independent study**
- Literature review
- Practical semester work
- Practically based Bachelor’s thesis

**Specialisations**
- Biotechnological processes
- Biotechnological practical work
- Pharmaceutical technology with practical work
- Pharmaceutical microbiology
As a physics laboratory technician, I am fortunate to be able to combine my technical and biological knowledge with my studies. On a scientific level, the content of my studies enables me to understand the functional mechanisms and processes involved in the production of extracts and creams from natural substances.

Mona

Prospects

Educational objectives

After graduation, you are able to solve practical biotechnological tasks and take on specialist and managerial duties. You know how to use chemical, microbiological, molecular-biological and immunological methods to quantitatively and qualitatively evaluate organisms and molecules.

You are also able to develop complete biotechnological and pharmaceutical processes. Furthermore, as a biotechnology graduate, you take into account the relevant ethical, regulatory, social, ecological and economic environment. You have the skills to evaluate and communicate results from research, development and production. Not only are you equipped with practical know-how from your studies; you are also aware of how to expand your specialist knowledge continuously and to network in your field.

Career prospects

Biotechnology offers many exciting work opportunities and steady growth is predicted for the industry. In addition to large international companies, many small and medium-sized enterprises (SMEs) and start-up companies are finding a place in the market.

Typical applications and industries
- Pharmaceutical industry
- Research institutions
- Bioanalytical laboratories
- Engineering companies
- Hospitals
- Cosmetic industry
- Suppliers and equipment manufacturers (laboratory and diagnostic equipment)
- Environmental agencies
- Licensing and supervisory authorities
- Planning, consulting and service companies

Master’s degree/ Continuing education

After successfully completing your Bachelor’s degree at the ZHAW in Wädenswil, you can opt for study for the research-based and practically-oriented Master of Science in Life Sciences degree. Pharmaceutical biotechnology is offered as a specialisation. A Master’s degree enhances your career opportunities, particularly in international companies.

www.zhaw.ch/lsfm/master-lifesciences/en

Continuing education

The Institute offers customised continuing education courses in the laboratories of the individual research groups. Of course, you can also attend practice-oriented continuing education courses or study programmes (MAS, DAS, CAS) at a university of applied sciences or traditional university. Taking part in specialist conferences, e.g. at the Institute of Chemistry and Biotechnology, is a further opportunity to expand your knowledge and broaden your professional networks.

Full information in German:
www.zhaw.ch/icbt/weiterbildung

Conferences

Participation in conferences presents good opportunities to keep abreast of the latest developments in knowledge and new technologies while providing opportunities for professional networking.

www.zhaw.ch/icbt/en
My knowledge of biotechnology also helps me in my work as an officer in the voluntary fire service. In this role, I can use what I know about biological and chemical substances to make efficient decisions in the field, for example to ensure the safety of my colleagues or to maintain buildings.

Alwinder

Biotechnology Student

Important information

Conditions for acceptance

The study programme is multidisciplinary and students come from a broad variety of educational backgrounds.

- Candidates with a vocational baccalaureate and an apprenticeship or a higher education diploma in a field related to biotechnology (e.g. technical, chemical, biological, medical and pharmaceutical professions) can begin their studies directly.
- Candidates with a vocational baccalaureate and an apprenticeship or higher education diploma in a field other than biotechnology are required to have one year’s work experience in biotechnology. Six months of general work experience in the laboratory sector is recognized, meaning a further six-month internship would still be required for admission.
- Candidates with an academic baccalaureate (Maturität) or professional baccalaureate (Fachmaturität) must have completed 12 months’ work experience in a biotechnological field. Professional and/or subject area experience may be recognized by the programme director «sur dossier».
- Secondary school leavers in possession of an academic baccalaureate can directly enter the new, practice-integrated study model. This study programme takes four years, and includes a company internship.

For information on further admission options (e.g. foreign qualifications), please contact the programme director.

Dates

The study programme begins mid-September. The registration deadline is 30 April.

Support from the ZHAW

If you do not have the relevant work experience, you can take a two-month laboratory introduction course here at the ZHAW. This prepares you for the internship in industry, which you need for admission to the Biotechnology degree programme. It begins and ends in July each year.

If you have a technical qualification and have not yet worked in a laboratory, or your laboratory experience was several years ago, our laboratory start-up course will prepare you for the study programme. It lasts three weeks (four days each) and is held in August. After completing this course you can commence the study programme in September.

International exchange

Would you like to complete part of your studies abroad? The ZHAW offers you this opportunity. An exchange semester, an internship, a summer school, a study trip or a language stay offer you many advantages: you get to know a different culture and language, a different education and research system while gaining experience for your future profession.

The ZHAW’s School of Life Sciences and Facility Management is linked with over 70 partner universities in 15 European countries as part of the Swiss-European Mobility Programme (SEMP); the transitional solution established by the Federal Council for the EU Erasmus+ programme. Students are encouraged to write their Bachelor’s thesis at one of our partner institutes abroad. International summer schools are also organized annually.

In addition to the information available on the Internet, the biotechnology study advisors or the International Relations Office (IRO) will be happy to provide you with further information and answer your questions.

www.zhaw.ch/en/lsfm/international/en

www.zhaw.ch/en/lsfm/study
After graduating, you will be able to solve complex biotechnological tasks and take on management responsibility.

| Degree programme | Biotechnology  
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<tbody>
<tr>
<td>Specialisations</td>
<td>Biotechnology, Pharmaceutical Technology</td>
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<tr>
<td>Title</td>
<td>ZFH Bachelor of Science in Biotechnology</td>
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<tr>
<td>Duration</td>
<td>Full-time (six semesters), part-time (individually planned). Part-time studies are integrated into full-time studies and last 4 to 6 years depending on individual workloads. For more information visit: <a href="http://www.zhaw.ch/icbt/bachelor-biotechnologie">www.zhaw.ch/icbt/bachelor-biotechnologie</a> (See Study Programme)</td>
</tr>
<tr>
<td>Start of studies</td>
<td>Mid-September (week 38); one week earlier for all new 1st semester students (week 37)</td>
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<td>Workload</td>
<td>180 ECTS credits (1 credit represents 25 to 30 hours of work)</td>
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<tr>
<td>Preparation</td>
<td>Preliminary courses in mathematics, chemistry, physics, biology and plant knowledge. Details at: <a href="http://www.zhaw.ch/lsfm/bachelor">www.zhaw.ch/lsfm/bachelor</a> (Information in German)</td>
</tr>
<tr>
<td>Support services</td>
<td>Laboratory Start-up course and Laboratory Introduction internship. Details at: <a href="http://www.zhaw.ch/lsfm/bachelor">www.zhaw.ch/lsfm/bachelor</a> (Information in German)</td>
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<tr>
<td>Campus</td>
<td>Waldanswil on Lake Zurich (25 km from Zurich)</td>
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<tr>
<td>Tuition fees</td>
<td>Semester fees: CHF 720 (subject to change) plus study materials, membership of the ASVZ sports association and individual living expenses. An additional fee of CHF 500 per semester is also applicable for all students who travel to Switzerland for study purposes and do not have a permanent Swiss residence when commencing their studies.</td>
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<tr>
<td>Conditions of acceptance</td>
<td>Candidates with a vocational apprenticeship (relating to biotechnology) and a federally recognised vocational baccalaureate, a technical baccalaureate or a higher vocational education diploma can commence their studies directly. Candidates with an academic baccalaureate, a technical baccalaureate or a higher education diploma must have 12 months of work experience in a field related to biotechnology before commencing their studies. We will be happy to advise you.</td>
</tr>
<tr>
<td>Important Information</td>
<td>The biotechnology programme is &quot;paperless.&quot; Candidates with an academic baccalaureate can also enter the programme via PiBS (Practice-Integrated Bachelor’s programme). Trial study days are also possible.</td>
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<tr>
<td>Information events</td>
<td>Four times per year, in March and October. Details at: <a href="http://www.zhaw.ch/lsfm/veranstaltungen">www.zhaw.ch/lsfm/veranstaltungen</a></td>
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<tr>
<td>Study advisor</td>
<td>Susanne Dombrowski <a href="mailto:studienberater.bt.1sfm@zhaw.ch">studienberater.bt.1sfm@zhaw.ch</a></td>
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Study and research in Wädenswil: practically-oriented, creative, passionate and reflective

The ZHAW is one of the leading Swiss universities of applied sciences. The School of Life Sciences and Facility Management currently has around 1500 students and over 600 employees. Its study and continuing education options include five Bachelor's and three Master's degree programmes as well as a broad selection of continuing education courses.

Our expertise in life sciences and facility management in the areas of the environment, food, health and society enables us to make a vital contribution to solving social challenges and improving quality of life. Our success is based on five dynamic institutes with extensive competence in the disciplines of chemistry and biotechnology, food and beverage innovation, natural resource sciences, applied simulation, and facility management.

Contact

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Student guidance: studienberater.bt.lsfm@zhaw.ch

www.zhaw.ch/en/lsfm/study

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