Environment, food, health; here at the School of Life Sciences and Facility Management, our expertise in these areas enables us to make a contribution towards solving some of the challenges facing society today.

**We provide disciplinary expertise**
Disciplinary expertise in our five institutes provides a solid basis for helping to resolve the questions posed by our partners and clients. We carry out projects and tasks using a practice-oriented and tailor-made approach. This could be in the context of a specific Bachelor’s thesis which deals with a relatively simpler question, or an interdisciplinary, multi-year research project concerning a more complex topic.

**We operate in an interdisciplinary network**
Synergies are created at the numerous interfaces of our specialist disciplines. Through a unique combination of our competencies, we tackle topics holistically, bridging the confines of the individual institutes. Networking goes beyond the School of Life Sciences and Facility Management. For example, in the area of energy, all eight of the ZHAW’s schools are interlinked. In our international research projects, we work globally with a particular focus on Europe.

**We promote knowledge transfer**
Teaching and research form a unity, and are mutually beneficial. The knowledge acquired in research feeds directly into our teaching, and transfer into industry occurs via projects and the employment of our graduates. The numerous research conferences that we organize or in which specialists participate are a further important means of sharing knowledge. Every year we exchange ideas with hundreds of professionals from all around the world at conferences, conventions and summer schools.

**We work on questions of the future**
Many current questions pertaining to the economy and society can only be tackled and solved together in an interdisciplinary manner, to which we contribute. On the following pages you will find some of the questions that our institutes are currently working on. These include both current and future-oriented matters addressing the question: How can our research make a contribution to the long-term sustainability of our society?

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**Our five institutes**
- Applied Simulation
- Chemistry and Biotechnology
- Facility Management
- Food and Beverage Innovation
- Natural Resource Sciences

**Prof. Dr. Urs Hilber**
Dean of the School of Life Sciences and Facility Management
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Photos left:
Impressions of life sciences
With our high level of technical and methodological expertise, we are part of an international network and work in an industry-oriented way, using state-of-the-art equipment and systems. Our goal is to contribute to answering questions that make a sustainable society possible.

Professional project partners
We implement your project proactively, solution-oriented and on time. We cover the entire value chain, from analysis to market maturity. You benefit from our many years of experience as well as our extensive network. Whether you are looking for an answer to a simple question or need a scientific partner for a complex multi-year project, we will be pleased to support you. On request, we can also take care of administrative tasks, such as project applications with funding agencies.

Comprehensive infrastructure
We have at our disposal laboratory spaces with various security levels, modern technological facilities, as well as gardens and greenhouses. We are constantly modernising and investing in the latest equipment for research and training. In the context of the digital revolution, high-performance computing (HPC) is becoming ever more important – HPC is used in most of our specialist areas. Our world-class infrastructure means we can meet real-world practical needs, thereby offering businesses a platform for innovation, which would not be possible without research partners.

From research to the company
The interface between universities and industry is fertile ground for starting a business; ideas often reach market maturity via spin-offs and/or start-ups. Locally, we are involved in grow, Wädenswil’s support organisation for business start-ups. The ZHAW also runs the ‘Innovation to Business (I2B)’ programme, which offers a point of contact and advice centre for staff and students who are interested in launching their own company.

Subscribe to research news
Find out the latest news about current projects and research results in the newsletter TRANSFER. Read it online or subscribe to the electronic English edition: www.zhaw.ch/en/lsfm/research/projects-and-publications/transfer/

Project insight
Take a look at our work: www.zhaw.ch/en/lsfm/research/projects-and-publications/projects

Prof. Dr. Daniel Baumann
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Collaboration

If you are looking to collaborate, your first port of call is the Technology Transfer Office or you can contact the relevant institute directly. We then clarify together the questions and what form the project could take. Various formats are available, depending on the goal, project duration and budget.

**Services**
Consultancy, measurements and analyses carried out by our experts with tried and tested methods.

**R & D projects**
Complex or interdisciplinary research projects to develop methods and processes to solve practical problems – implemented by our experts.

**Student work**
A simple research or development project in the form of a Bachelor or Master of Science thesis, carried out by our students with highly qualified support.

**Applied basic research**
Development of fundamental principles for applied research, often in collaboration with network partners, supported by foundations, federal agencies, and national and international funding agencies or research networks.

**R & D projects and cooperation**
Research or development projects carried out with external partners, implemented as long-term collaborations, often supported by grants, such as from Innosuisse, Horizon 2020, Eurostars.

**Project forms and costs**
The costs of our services reflect market conditions. We process R&D contracts in the form of projects. These can be of a simple nature, such as Bachelor’s and Master’s theses, or more complex, such as participating in EU projects. The majority of our contracts are directly financed, but we are also involved in EU projects as well as SNSF and Innosuisse projects. We carry out the latter together with business partners. We would be happy to advise you on which project type would best suit your requirements.

(SNSF = Swiss National Science Foundation; Innosuisse = Swiss Innovation Agency)

**Legal certainty**
Whatever the form of collaboration, legal certainty is important for all parties involved. Therefore, as a rule, we conclude contracts in which the project content, the scheduling and the use of results for industry, research and teaching are clearly defined.

Further information concerning collaboration, financing, contractual frameworks and commercial use can be found in ‘Research in Life Sciences and Facility Management’ at www.zhaw.ch/en/lsfm/research/

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How do algorithms improve our quality of life?

Such questions drive us. We think beyond the boundaries of the institutes; practically-oriented, creative, passionate, reflective.
Data analysis, modelling, simulation and optimisation are the focal points of our institute. We develop solutions in the research fields of energy, industry, mobility, urbanisation, demographic change, health and knowledge generation from Big Data.

We reduce complexity and achieve new insights by representing system structures and system behaviours in models, and verifying these in space and time by means of simulation. The expertise of our staff members is based on the following technologies: predictive analytics, data mining, machine learning, bio-inspired modelling, system dynamic modelling, multi-agent modelling, multi-physics modelling, discrete event modelling and knowledge engineering.

Areas of focus:

**Complex biosystems**
- Research and applications in systems biology, medicine, and with complex systems in general
- Fusion of clinical data and modelling of physiology to create diagnostic tools
- Personalised health as an interdisciplinary focus at the institute

**Predictive and bio-Inspired modelling**
- Identification and analysis as well as modelling and simulation of patterns and processes with the aim of optimising, controlling and forecasting complex systems and focusing on macrosystems
- Development of learning algorithms and the exploration of bio-inspired methods
- Predictive analytics and forecasting systems

**Computational life sciences**
- Development and implementation of algorithms that facilitate the understanding of biological processes. Mathematical and computational modelling and simulation in life sciences
- Computational genomics with the aim of applying new methods of bioinformatics to current issues in biotechnology, biomedical research, ecology and agriculture
- Data modelling and information transfer technologies
- Process simulation and process optimisation

For specific projects and more about our competences and research groups, visit: www.zhaw.ch/ias

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Photo left:
aneurysms: project discussion in the field of bio-medical simulation

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Will stem cells replace medications in the future?

Such questions drive us. We think beyond the boundaries of the institutes; practically-oriented, creative, passionate, reflective.
Institute of
Chemistry and Biotechnology

Our institute brings together specific competencies that need to interact more and more in the converging field of chemistry and life sciences. We focus on the concerns of SMEs, as well as commerce and industry in the pharmaceutical, chemical and environmental sectors.

The combination of years of experience and professional expertise gives our institute a depth and completeness that are unique in Switzerland. We work on an industrial scale across the spectrum, from molecules to organisms to sustainable production processes.

Areas of focus:

**Chemical and biotechnological processes and plants**
- Design and planning of chemical and biotechnology plants in the pharmaceutical, food and environmental sectors
- Development and optimisation of chemical and biotechnological processes
- Centre for Biocatalysis and Process Technology, Green Chemistry
- Industrial cell culture technology

**Chemistry and new materials**
- General and inorganic chemistry
- Polymer chemistry, nanotechnology and functional materials (Endowed Professorship for New Materials)

**Biochemistry, micro- and molecular biology, tissue engineering and bioanalytics**
- Biochemistry, tissue engineering, protein purification, protein analysis
- Bioinformatics and enzyme design
- Identification, characterisation and recording of organisms in our collection
- Cloning of recombinant proteins and their post-translational modification
- Molecular biological analysis
- Control of microbial biofilms

**Analytical and physical chemistry**
- Analytical chemistry, environmental analytics, physical chemistry and sensor technology

**Pharmaceutical drug research and drug development**
- Organic chemistry, medicinal chemistry, drug design and development, SAR
- Pharmaceutical technology, galenics of biotechnologically produced drugs (drug delivery intra- and intercellular)
- Phytopharmacy
- Quality management and approval

**Cell biology and tissue engineering**
- Tissue engineering, 3D models for drug development, Competence Centre TEDD, bioprinting
- Cultivation of mammalian cells and cell biological diagnostics

For specific projects and more about our competences and specialist centres, visit: www.zhaw.ch/icbt

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Photo left:
Concentration required:
taking samples from a stainless steel bioreactor in bioprocess technology

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How can FM lower health care costs?

Such questions drive us. We think beyond the boundaries of the institutes; practically-oriented, creative, passionate, reflective.
Institute of Facility Management

The objectives of our institute are strategic conceptions and developments for the management of healthy living and working spaces, in addition to needs-based services using innovative technologies. With application-oriented research and development, the future of Facility Management (FM) is being shaped in close cooperation with business and research partners. The approach is programmatic, innovation-oriented, cooperative, practical, structured, and with an international perspective. Four strategic research fields form the basis of this: Workplace Management, FM in Healthcare, Digital FM and Sustainability in FM.

Areas of focus:

**Strategies in FM**
- Interplay of people, technology, the built environment and processes
- Provision, management, modification and utilisation of facilities, taking into account function, optimal resource allocation, and the best possible value preservation
- Foundations for the management and provision of facility services with equal consideration of social, economic and environmental aspects
- Development of innovative, workable concepts, standards and instruments

**Business skills in FM**
- Management of the working environment over the entire life cycle (conception, planning, provision, management, administration, evaluation and optimisation)
- Supporting working activities, health and well-being of employees, in line with organisational strategies
- Developing workplace strategies that look at management and change processes as well as buildings and technologies

**Hospitality and service management**
- Advising on and implementing topics in the field of non-medical support services of inpatient health care institutions at the interfaces to outpatient care
- Concepts for the effectiveness and efficiency of all support services, focusing on improving the image of the whole company as well as optimisation and integration
- Supporting future issues at the strategic level (holistic, networked, systematic, economic)

**Real estate management**
- Development, adaptation and implementation of digital technologies and methods, e.g. virtual design, construction and operation, mixed reality, computer aided facility management (CAFM), linked data and data-driven FM
- Optimising the productivity and quality of assets and services by complementing, improving or replacing innovative approaches
- Helping to shape the digital transformation for solutions at the level of organisations, people, products and processes (holistic thinking)
- Analysing real estate over its entire life cycle
- Finding solutions to optimise facilities and improving management processes in collaboration with owners, users and operators

For specific projects and more about our competence groups and network, visit: www.zhaw.ch/ifm

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Photo left: Examining a working environment; project discussion in the field of workplace management

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How do we get more goodness into our food?

Such questions drive us. We think beyond the boundaries of the institutes; practically-oriented, creative, passionate, reflective.
Institute of Food and Beverage Innovation

Enjoyable, healthfull, safe and sustainable food from the raw material to the consumer – this is the guiding principle of our institute. Our staff are characterized by their system-oriented, technological and analytical competence, in addition to their practical orientation and transdisciplinarity. In order to meet the complexity of sustainable development in the food sector, we consider the entire value chain in four dimensions: the environment, societal concerns, industry and health.

In our three research centres, we offer application-oriented research, development and service with the following four main focuses.

Areas of focus:

Food technology and packaging
- Redesigning, optimisation and the development of food production processes with improved product quality
- Alternative and non-thermal preservation techniques
- Functional ingredients
- Intelligent packaging systems
- Sustainability and energy intensity in food processes
- Holistic innovation management in the product development process

Beverage technology and flavour research
- Origin and analysis of desirable and undesirable flavours and ingredients
- New extraction and manufacturing technologies
- Identification of raw material selection parameters, process control and yield optimisation of value-determining ingredients

Food quality, safety and quality management
- Methods to ensure the quality and safety of food
- New or optimised biological processes (e.g. functional cultures) and processing technologies
- Alternative and rapid detection methods for pathogenic micro-organisms
- National and international regulations and standards in the context of food law and quality management
- Food perception (including sensory testing)

Consumer diet and consumer behaviour
- Analysis of dietary patterns and habits
- Target group-oriented nutrition concepts (e.g. in the context of demographic change)
- Nutrition concepts for preventative purposes and health promotion; food for a personalised diet

For specific projects and more about the competences of our research groups, visit: www.zhaw.ch/ilgi

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Photo left:
On the taste trail; development work on a new chocolate process
How do we balance ecological, social and economic interests?

Such questions drive us. We think beyond the boundaries of the institutes; practically-oriented, creative, passionate, reflective.
Institute of Natural Resource Sciences

We are committed to the sustainable use of natural resources and to habitats for people, animals and plants. Future-oriented urban and rural development requires the consideration and evaluation of ecological, social and economic interests. As pioneers in the development of sustainable solutions, we have an interdisciplinary and science-based approach to our work on current and future socially-relevant issues.

In three centres and six research areas, we provide application-oriented research, development and services. The focus is on topics at the interfaces between society, environment and technology.

Areas of focus:

**Organic agriculture**
- Establishing plant health, agricultural biodiversity and geography of food as focal points of applied research

**Ecological engineering**
- Use of renewable energy sources, impact assessment, energy and resource efficiency, methods of production, and processing with minimal use of water and fertiliser
- Detection of environmental impacts on soil and water

**Integrative ecology**
- Basic knowledge of how ecosystems function and change, and ecological succession
- Elaborating and developing solutions and methods for human-environment relations and environmental decision-making

**Landscape and tourism**
- Influences and impact of leisure and tourism on landscape development with respect to resource consumption as well as spatial and regional development

**Sustainability communications**
- Detection, exploration and communication of environmental issues
- Examining the links between andragogy, environmental education and communication theory, and linking expertise from the fields of science, the environment, clean technology and sustainable development

**Urban green spaces**
- Analysis and development of green spaces in cities and urban areas from the perspective of plant usage, urban ecology, health and open space management

For specific projects and more about our competences and research groups, visit: [www.zhaw.ch/iunr](http://www.zhaw.ch/iunr)

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Photo left: Ecohydrology in the field; calibrating a flow meter to investigate the lake bed

Prof. Dr. Rolf Krebs
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Collaboration with educational and research institutions, both at home and abroad, is of critical importance to us. In Wädenswil we benefit from close proximity to Agroscope, the federal centre of excellence for research in the agriculture and food sector. In addition, we have a lively exchange across Switzerland and across national borders, and work in close cooperation with other universities of applied sciences, traditional universities and public authorities. Our focus is on collaboration with institutions in European countries.

A selection of our partners

The following **funding institutions** support our projects:

- Federal departments, state secretariats and federal offices such as the Federal Office for Defence Procurement (Armasuisse), the Federal Office for the Environment (FOEN), the Swiss Federal Office of Energy (SFOE), the Swiss Agency for Development and Cooperation (SDC) and the State Secretariat for Education, Research and Innovation (SERI)
- Innosuisse – Swiss Innovation Agency
- Swiss National Science Foundation (SNF)
- Swiss Institute of Bioinformatics (SIB)
- Swissuniversities
- Swiss Competence Center for Energy Research (SCCER) such as Biomass for Swiss Energy Future (BIOSWEET) or the Competence Center for Research in Energy, Society and Transition (CREST)
- Horizon 2020
- Euro Stars
- European Cooperation in Science and Technology (COST)
- Foundations such as Gebert-Rüf and Mercator

We are active in the following national and international **networks**:

- National Thematic Networks (NTN) such as the Association for Network Logistics, Swiss Biotech and Swiss Food Research
- biotechnet Switzerland
- Foodplus Switzerland
- Swiss Technology Transfer Association (swiTT)
- SPIRE
- IBH Internationale Bodensee Hochschule
- Industrial networks such as Cleantech Switzerland, Toolpoint and Energie-Experten

The experts in our institutes are members of numerous **professional associations**, both national and international. Visit the individual homepages of the institutes to learn more about our networks.
We maintain an intensive exchange of ideas with project partners and our research networks. Furthermore, our institutes are advised by numerous experts from industry as well as from professional associations and advisory boards. In this way, we ensure a practical orientation and a high standard of quality in research and education.

### Advisory Board of the Institute of Chemistry and Biotechnology
- Prof. Dieter Beckmann, Institute for Bioprocessing and Analytical Measurement Techniques
- Dr. Gunter Festel, Owner of FESTEL CAPITAL
- Prof. Dr. Christian Hinderling, Director of the ZHAW Institute of Chemistry and Biotechnology
- Dr. Erich Hochuli, formerly of F. Hoffmann-La Roche Ltd.
- Eva-Maria Kupsch, Dow Europe GmbH
- Dr. Jan Lucht, scienceindustries, Business Association Chemistry Pharma Biotech
- Dr. Ferruccio Messi, Cell Culture Technologies LLC
- Dr. Hans-Peter Meyer, HES-SO University of Applied Sciences Western Switzerland
- Dr. Thomas Münch, Givaudan Schweiz AG
- Dr. Martin Riediker, expert at CTI (Commission for Technology and Innovation), now called: Innosuisse – Swiss Innovation Agency
- Dr. Philippe Steiert, CSEM, Swiss Center for Electronics and Microtechnology
- Markus Tanner, Werthenstein Biopharma GmbH
- Dr. Plus Waldmeier, Head of Synthesis & Process Research Group, F. Hoffmann-La Roche Ltd.
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### Advisory Board of the Institute of Facility Management
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- Renate Gröger, Director of Operations, University Hospital Zurich
- Prof. Dr. Tore Haugen, Centre for Real Estate and Facility Management, University of Science and Technology (NTNU)
- Prof. Dr. Antje Junghans, Director of the ZHAW Institute of Facility Management
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- Daniel Zbinden, Head of Energy Contracting, EKZ

### Advisory Board of the Institute of Food and Beverage Innovation
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- Dr. Thomas Büeler, Head of Innovation and Process Intelligence, Emmi Management AG
- Prof. Michael Kleinert, Director of the ZHAW Institute of Food and Beverage Innovation
- Dr. Michael Beer, Vice Director, Head of Food and Nutrition, Federal Office of Public Health
- Dr. Thomas Büeler, Head of Innovation and Process Intelligence, Emmi Management AG
- Prof. Michael Kleinert, Director of the ZHAW Institute of Food and Beverage Innovation

### Advisory Board of the Institute of Natural Resource Sciences
- Prof. Jean-Bernard Bächtiger, former Director of the ZHAW Institute of Natural Resource Sciences
- Ursin Ginsig, Manager of Eberhard Recycling AG
- Christian Guggisberg, Managing Director, Gastro Star AG
- Karin Hindenlang, Managing Director, Wildnispark Zürich
- Prof. Dr. Rolf Krebs, Director of the ZHAW Institute of Natural Resource Sciences
- Dr. Tove Larsen, Member of the Board of Directors, EAWAG
- Dr. Dr. h.c. Raimund Rodewald, Managing Director, Swiss Foundation for Landscape Conservation
- Dr. Matthias Stolze, Member of the Executive Board, Research Institute of Organic Agriculture (FiBL)
The ZHAW at a glance

The Zurich University of Applied Sciences (ZHAW) has eight specialist schools under its roof. Our experts conduct applied research in Wädenswil, Winterthur and Zurich. Together, we conduct several hundred research and service projects every year. This wealth of experience brings many benefits to our partners:

- Advice on the various funding options for innovation projects
- Understanding of the culture of companies and organisations
- Direct transfer to companies through the founder organisations grow (Wädenswil) and Technopark® Winterthur
- Committed researchers who pass on their findings in teaching and further education
- Professional project management
- Assistance in matters related to the protection of intellectual property (e.g. patents or confidentiality agreements)

R & D online
News about research and development at the ZHAW on the blog: http://blog.zhaw.ch/forschungssupport/

on Twitter: @ZHAW_FE_Support

ZHAW-Newsletter R & D
www.zhaw.ch/research
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 employs more than 600 people. The educational programme comprises five Bachelor’s and three Master’s degree programmes as well as a broad range of further training and education courses.

With our expertise in life sciences and facility management, we make an important contribution to meeting social challenges and to improving quality of life in the areas of environment, food and health. Five research-strong institutes in the fields of chemistry and biotechnology, food and beverage innovation, natural resource sciences, applied simulation and facility management make this contribution in the form of research, development and services.

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www.zhaw.ch/en/lisfm/research/

Pay us a visit!