



**Life Sciences and
Facility Management**

Institute of
Natural Resource Sciences

Study in **Switzerland**

BSc in Natural Resource Sciences

Zurich University of Applied Sciences
Institute of Natural Resource Sciences in Wädenswil



Courses taught in English Spring Semester 2022



Contact

Elena Rios Thalmann | Mobility Advisor IUNR
studienberatung-ui.lsfm@zhaw.ch

Zurich University of Applied Sciences
Institute of Natural Resource Sciences
Grüentalstrasse 14
Postfach
CH 8820 Wädenswil
Switzerland

Phone +41 58 934 55 93

Web www.zhaw.ch/iunr/bachelor/en

Exchange Programme for International Students

The Institute of Natural Resource Sciences in Wädenswil, Switzerland is responding to the great environmental challenges of our time with a modern, multi-faceted degree programme with significant practical relevance. A degree programme tailored to your individual interests and career goals that leverages interdisciplinary learning activities and modern learning methods. Experts in their fields show you how to apply knowledge and develop solutions. Our green campus near the lake of Zurich with its modern laboratories and facilities is here to welcome you.

In the Bachelor's degree programme in Natural Resource Sciences, there are five specialisations: Organic Agriculture and Horticulture, Renewable Energies and Ecological Engineering, Nature Management, Urban Ecosystems, and Environmental Systems and Sustainable Development. From these specialisations there are different courses available for international students.

Courses

In the spring semester, the Institute of Natural Resource Sciences offers a wide range of courses and tutorials taught in English (described in this brochure) that allow incoming students to focus on their field of interest. Furthermore, thanks to the close involvement of researchers in the study programme, we can provide a high degree of practical relevance. Excursions, project weeks and specialisation modules lead by external experts complement classroom studies and allow you to work on current, real world issues. In semester assignments and Bachelor's theses, you will work independently on real problems in collaboration with a company or organisation. A welcoming atmosphere with friendly and helpful students, teachers and collaborators will make your stay both pleasant and memorable. And last but not least, the programme is completely paperless!

More Information

Programme	www.zhaw.ch/iunr/bachelor/en
Courses	www.zhaw.ch/iunr/bachelor/modules
Schedules	www.zhaw.ch/lsvm/bachelor/schedules
Institute	www.zhaw.ch/en/lsvm/institutes-centres/iunr www.zhaw.ch/iunr/about-us

Course descriptions



Applied Ecology 2 (4 ECTS)

In cold, snowy winters, red deer are fed with hay or silage in certain regions. To understand why this makes no biological sense for wild animals, requires detailed knowledge of the physiological characteristics of the species. In this module, you will gain the necessary ecological and biological wildlife knowledge to effectively manage wildlife and use natural habitats sustainably. We will discuss different factors that determine and influence animal populations, including behavioural and physiological aspects. An introduction to bioacoustics is also included in the course.

Focal points:

- Ecological and evolutionary fundamentals in wildlife biology
- Population biology and dynamics
- Habitat and space requirements for survival and reproduction
- Selected behavioural and physiological topics
- Introduction to bioacoustics

Stefan Suter

stefan.suter@zhaw.ch



Basics of Renewable Energies and Ecological Engineering 3 (6 ECTS)

The first topic covered in the module is building physics, namely thermal insulation for enhancing comfort, minimizing energy losses, and preventing damage to buildings. You will learn about the U-value, heat flows in a building, and patterns in heating and cooling demand. The second topic is heating, ventilation and air conditioning (HVAC) systems, focusing on energy efficiency. Here you will learn how to decide which systems are best suited for sustainable buildings. You will become familiar with the main functions and components of HVAC systems, sanitary installations, and domestic hot water (DHW) systems. External specialists will explain how to design low energy buildings, including details about the Minergie labels. Finally, you will develop a case study for low energy buildings, using the Polysun simulation tool to calculate the specifications for the technical installations.

Focal points:

- Building physics
- Renewable Heating Systems
- Cooling and Ventilation

Markus Hubbuch

markus.hubbuch@zhaw.ch

Note: The Water, Energy, Wastewater module (4 ECTS) is an ideal complement to this module. Together these two modules provide a comprehensive knowledge in the field of 'energy and buildings'.



Designing Sustainable Food Systems (2 ECTS)

Our existing food system is currently unable to sustainably feed the world's population. Environmental pollution and soil degradation, as well as efficient distribution of food, avoidance of food waste and fair trade relations are among the most urgent challenges for humankind. The question is, how can food value chains be designed to help address these issues?

This module consists of two parts. The first is an eLearning course that helps develop an understanding of sustainability in the global food system, the role food value chains play and the UN's Sustainable Development Goals (SDGs). In the second part, you will analyse an existing food value chain, locate sustainability hotspots and outline possible strategies to tackle these challenges.

Focal points

- Sustainability in the context of food systems
- Basics of food value chain design
- The Sustainable Development Goals (SDGs)
- Value chain mapping and analysis
- Individual work

Sonja Trachsel

sonja.trachsel@zhaw.ch



Deutsch für Fremdsprachige German as a Foreign Language (2 ECTS)

Der Deutschkurs richtet sich an fremdsprachige Studierende und Mitarbeitende der ZHAW (Niveau A1 bis C1), die ihren Wortschatz und ihre Ausdrucksfähigkeit (schriftlich und mündlich) verbessern sowie ihre Grammatikkenntnisse vertiefen möchten. Je nach Sprachniveau und Gruppengrösse werden inhaltliche Schwerpunkte gesetzt und individuelle Bedürfnisse und Anliegen berücksichtigt.

The German course is aimed at foreign language students and ZHAW staff (levels A1 to C1) who want to improve their vocabulary and expressiveness (written and oral) and strengthen their grammar skills. The content focus is defined based on the language level and the size of the group, taking individual needs and concerns into account.

Ajner Velijoska

xvel@zhaw.ch



English for Environmental Engineers 2 (2 ECTS)

The principal aim of this module is to develop students' research and presenting skills, which will help prepare them for scenarios that they are likely to encounter in their future careers. In addition to this, they will learn about the conventions of writing job applications in English and have the opportunity to practice this skill in realistic study related practice tasks.

Focal points:

- Presenting skills
- Job applications in English
- Reading & Listening
- Vocabulary development

Darren Mace

darren.mace@zhaw.ch



Environmental Analysis (4 ECTS)

This module examines topics from the minor in Field Diagnostics and Analytics in greater depth. In a field diagnostic and analytical metaproject, students will use relevant knowledge and skills from the Field Diagnostics, Molecular Analysis and Chemical Analysis specialisations. This will allow the students, depending on the focus of their project, to apply data logging, monitoring, diagnostics and environmental analysis methods. Ultimately, the results from this metaproject will be combined to create an interdisciplinary report. The metaproject takes place in week 23, with eight blocks of lectures on several related topics during the spring semester.

Focal points:

- Field Diagnostics
- Molecular and Microbial Analysis
- Chemical Analysis and Ecotoxicology

Monika Hutter

monika.hutter@zhaw.ch



Environmental Heat (4 ECTS)

This module explores environmental heat and its potential uses. Such heat can be extracted from the outside air, from shallow geothermal energy, or using waste heat from industrial or commercial processes. Since heat pumps are usually involved in the exploitation of these heat sources, they will be one of the main focuses of the module.

Heat can also be generated by burning wood. In Switzerland, 32% of the land area is covered by forests, which means that this resource can be used in a sustainable manner. Therefore, wood fired boilers and measures to minimize emissions will also be taught.

The second half of the module is dedicated to shallow geothermal energy, its origin, its energy potential, and the different ways in which it can be used. The design and calculation of specifications for borehole heat exchangers will therefore be an important component of the module.

Focal points:

- Potential of environmental heat
- Heat pumps
- Wood as energy resource for heat
- Shallow and an overview on deep geothermal energy
- Design and calculation of borehole heat exchangers

Markus Hubbuch

markus.hubbuch@zhaw.ch



Remote Sensing (4 ECTS)

Satellites, planes and drones are surveying the earth's surface with increasing frequency and at ever higher resolutions. Remote sensing deals with the processing, evaluation and analysis of the data that is collected, which is available to science and industry in ever larger volumes. Applications include land use analysis, natural hazard management and biodiversity research, urban planning and energy consulting.

This module teaches the physical, theoretical and conceptual fundamentals of remote sensing as well as developing the essential skills of processing remote sensing data and evaluating products using this technology.

Focal Points:

- Fundamentals of satellite, aircraft and drone-based remote sensing
- Processing of independently collected, freely available worldwide remote sensing data
- Analysis of optical, multispectral and three-dimensional remote sensing data
- Analysis, evaluation and interpretation of remote sensing data for environmental sciences (process research, vegetation analysis, land use / land cover)
- Dealing with uncertainty and inaccuracy in remote sensing data

Johann Junghardt

johann.junghardt@zhaw.ch



Molecular Biodiversity Analysis (4 ECTS)

In recent years, molecular biological tools for species identification, analysis of biodiversity, and disease diagnosis have gained huge practical significance in several areas of natural resource sciences, such as ecology and (plant) pathology. The aim of this module is to become acquainted with these methods and procedures as well as to examine their practical significance and applications.

The module also provides an overview of how these procedures are applied in nature conservation, environmental protection, agriculture and ecotechnology. Students will develop their ability to apply different analysis methods and evaluate results. The module is continuously adapted to include current topics in the field, therefore some changes may be made to the content.

Focal points:

- State of the art of molecular analysis and diagnosis
- DNA extraction, amplification and sequencing techniques
- Molecular identification of organisms
- Biodiversity and community analysis
- Plant biotechnological procedures

Theo Smits

theo.smits@zhaw.ch



Semester Assignment 1 (4 ECTS)

The ability to write according to scientific principles is a decisive factor for academic and professional success. Scientific work has been transformed by the advent of digital media and educational reforms. However, the fact that academic research forces students to work independently remains. In their semester assignments, students learn how to independently examine and document practical work using prescribed methods or processes, either individually or in pairs. They learn how to plan, execute and evaluate a practical research project, perform literature research, analyse data and write according to scientific standards. Topics for assignments can be selected from our internal Complexis database.

Focal points

- Literature research and collecting, evaluating and interpreting the relevant data
- Planning and carrying out scientific experiments
- Composing a structured, scientific report
- Clearly presenting procedures and solutions with compelling visual presentation
- The ability to work independently and in teams

Florian Bauer

florian.bauer@zhaw.ch



Semester Assignment 2 (6 ECTS)

The ability to write according to scientific principles is a decisive factor for academic and professional success. Scientific work has been transformed by the advent of digital media and educational reforms. However, the fact that academic research forces students to work independently remains. In their semester assignments, students learn how to independently examine and document practical work using prescribed methods or processes, either individually or in pairs. They learn how to plan, execute and evaluate a practical research project, perform literature research, analyse data and write according to scientific standards. Topics for assignments can be selected from our internal Complexis database.

Focal points:

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Florian Bauer

florian.bauer@zhaw.ch



Vegetation Analysis and Plant Systematics (4 ECTS)

Vegetation and flora play an important role in ecological research, nature conservation and land use management. This module consists of two courses: (1) “Plant systematics” provides a basic understanding of modern systematics of flowering plants (angiosperms). This greatly facilitates the assignment of unknown plants to a genus or family, which, in turn, significantly accelerates the overall identification process. (2) “Vegetation analysis” provides a conceptual understanding of and methodological tools needed to analyse vegetation patterns in space and time and their underlying drivers. All project steps are practiced, including developing research questions, devising a suitable sampling design, performing field sampling and statistical analysis, presenting and interpreting the results.

Focal points:

- Vegetation analysis: sampling design, relevé methods, analysis and interpretation of vegetation data
- Plant systematics: characteristic traits of the 20 most important plant families in Switzerland, traditional keys to the flora of Switzerland, modern identification tools

Jürgen Dengler

juergen.dengler@zhaw.ch



Water, Energy, Wastewater (4 ECTS)

Availability of water is one of the most crucial and pressing issues for the survival of humankind in the future. The production, transport and treatment of water are all linked to energy issues. This close relationship is called the water-energy-nexus.

This module focuses on the use of water for hydropower and domestic purposes, as well as its treatment before being discharged into rivers and streams. You will learn to size small and medium hydropower plants and evaluate sites for their hydropower potential. In addition, you will also perform the basic engineering steps to design and size a domestic wastewater treatment plant for a city or community. This will provide you with a deep insight into two of the most relevant water related environmental engineering topics.

Focal points:

- Conceptual links between water and energy
- Water treatment processes
- Basic design issues in wastewater treatment systems
- Hydropower resources and basic design issues in hydropower plants
- Ecological implications of hydropower

Fridolin Tschudi

fridolin.tschudi@zhaw.ch

Note: The Basics of Renewable Energies and Ecological Engineering 3 module (6 ECTS) is an ideal complement to this module. Together these they provide comprehensive knowledge in the field of 'energy and buildings'. Compulsory exercises in both modules enable students to combine learning from both.



Writing Clinic

The courses taught in English enable students to become more competent, effective users of the English language. The Writing Clinic contributes to this by assisting students with any English language needs they have during the courses and provides help with writing in English. In particular, students have the opportunity to improve their written texts and general writing ability in individual face-to-face sessions. Online help can also be provided.

Jason Roger Parry

jasonroger.parry@zhaw.ch



After Work Courses

These courses are open for all students and workers from ZHAW. The courses are provided free of charge and encourage social contact, artistic skills. They take place in your spare time.

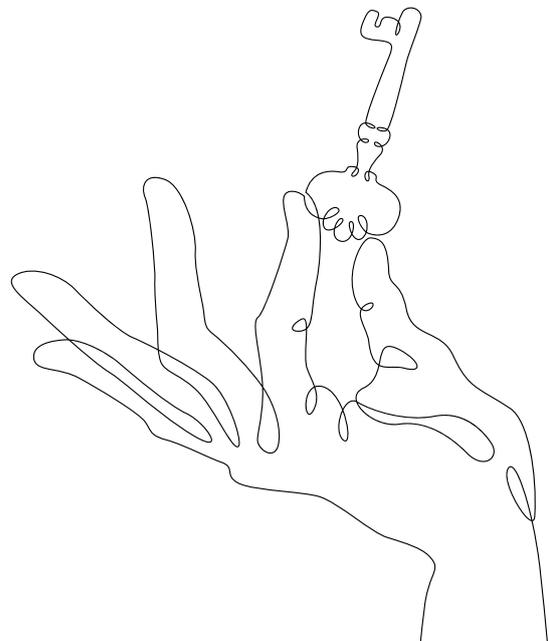
Focal Points:

- Sports
- Art and Culture (Painting, Theatre, Singing, Garden)
- Languages (Spanish, French, Italian, German)
- Erasmus Student Network and Student Associations

Further details: www.zhaw.ch/en/lsfm/study/studiweb/leisure-time

Caroline Ruckstuhl

caroline.ruckstuhl@zhaw.ch





Definitely, this exchange semester is going to be one of the most unforgettable experiences of my life. I have had a lot of fun, meeting Swiss people and other exchange students, as well as getting to know Swiss culture, and learning Swiss German. Studying at the ZHAW was really nice, I had great moments with classmates and teachers. I learned and enjoyed it a lot.

Elisa Huang Lin

BSc Exchange Student,
Spring Semester 2020

