Zurich University
of Applied Sciences

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**Life Sciences and
Facility Management**

Institute of
Natural Resources Sciences

Come
to Switzerland

Master of Science in Environment and Natural Resources
Zurich University of Applied Sciences
Institute of Natural Resource Sciences in Wädenswil

**Courses taught in English
Spring Semester 2018**

Contact

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Patterns and Trends in Environmental Data (3 ECTS)

Admission criteria

Students should be able to...

- assess the suitability of, select and combine, different theoretical and empirical research methods for a given problem.
- critically assess and validate the results from theoretical and empirical methods.
- analyse data using descriptive and inferential statistics with the aid of specific statistics software.

Learning outcomes

Students will learn...

- to define interesting patterns and trends for their own datasets and how to write scripts to search for these patterns and trends.
- how to employ third-party data processing tools for their own data and how to solve any programming problems with assistance from the Internet community.
- to document identified patterns and trends and critically discuss processes in order to gain a better understanding.
- to use the statistics and visualisation platform R as an efficient and effective interface to other software applications used in the field of Natural Resources (spreadsheets, geographic information systems (GIS), modelling applications, visualisation environments).

Contact: patrick.laube@zhaw.ch

Environmental Ethics (3 ECTS)

Admission criteria

Students should be able to...

- recognise the current environment and landscape as a dynamic image of historical changes.
- explain the impact of anthropogenic activities on the environment and discuss cultural and socio-economic consequences.
- understand „sustainable development" concepts and their main resulting problems, link them coherently together and connect them to current negotiations and measures in place at local, national and international levels.

Learning outcomes

Students will learn to...

- perceive and critically reflect on projects in their field, as well as current issues and debates on ethical dimensions and ways of thinking.
- apply methods for the ethical assessment of complex issues in the relationships between humans, the environment and society.
- recognise their responsibility for societal challenges and perceive these challenges in their personal environment.

Contact: petra.hodgson@zhaw.ch

Environmental Economics (3 ECTS)

Admission criteria

Students should be able to...

- explain the basic principles and workings of the market economy and the interactions between business, politics, law and technology, as well as demonstrate the interrelationships between the economy and the natural environment.
- evaluate the potential and limitations of selected approaches to economic valuation methods, as well as explain and name concrete examples of these approaches.
- apply models and methods from resource economics and interpret relevant scientific studies.
- take a critical stand on political and social discussions concerning objectives and actions designed to promote sustainable development (Agenda 2030, Paris Agreement, etc.).

Learning outcomes

Students will learn to...

- assess the main economic theories of economic and social development in terms of their current relevance, derive conclusions from this understanding and make recommendations for sustainable development policy.
- identify and analyse environmentally and socially counterproductive policy strategies (e.g. „policy of cheap centralised resources"," asymmetric globalisation „) and concretely demonstrate how environmental and social issues can be integrated into the market economy („eco-social market economy"), companies (eco-design, new business models, businesses of the future), economic policy and the world economy.
- competently comment on the latest developments and discussions in the field of Environmental Economics / Ecological Economics and formulate conclusions for their own further work (e.g. „prosperity without growth", „resource-light lifestyles and business models", „new approach to time, time sharing services and time prosperity", „Corporation 2020").

Behavioural Change (3 ECTS)

Admission criteria

Students should be able to...

- name fundamental upstream factors (e.g. attitudes, knowledge and values) and describe their basic principles. If a student does not possess the basic knowledge required, literature for self-study will be recommended.
- name examples from their professional or daily life, in which behavioural changes play a role.
- apply empirical research methods.

Learning outcomes

Students will learn to...

- characterise, classify and differentiate between various approaches to behavioural change (e.g. structurally, situationally and personally focused approaches). They will be able to explain why classical Behavioural Change (BC) intervention approaches, such as information campaigns, often fail to achieve their desired goals and what the fundamental ideas are which form the basis for newer, situational approaches like nudging.
- understand which psychological variables (e.g. creating attention, imparting knowledge, increasing self-efficacy, developing intentions) can influence behaviour and where the limits of this influence are (e.g. habits and habituation, ethical aspects).
- select BC intervention approaches depending on the context and conditions of the intended change in behaviour.
- determine and analyse the target group of a BC intervention (e.g. sociodemographic, psychographic characteristics).
- design and carry out several appropriate BC interventions for different target groups and know what should be considered in the implementation of such interventions (e.g. cost-benefit ratio).
- evaluate and optimise energy concepts based on systems engineering, ecological and economic criteria.

Contact: linda.miesler@zhaw.ch

Remote Sensing for Ecology (3 ECTS)

Admission criteria

Students should be able to...

- explain the basic functions and interrelationships in ecosystems.
- perform simple, stand-alone field recordings in ecosystems.
- explain the theoretical foundations of Geographic Information Systems (GIS).
- carry out basic, spatial ecosystem analyses using GIS.

Learning outcomes

Students will learn to...

- recognise and evaluate the potential of remote sensing for ecosystem assessment and evaluation.
- perform spatio-temporal data and analyses by means of remote sensing (e.g. drone) and GIS.
- interpret and critically assess remote sensing data and products for ecosystem assessment and evaluation.
- integrate remote sensing data and products into their own research or practical projects and carry out such a project.

Contact: michael.doering@zhaw.ch

Aquaculture Systems (3 ECTS)

Admission criteria

Students should be able to...

- design, construct, manage and operate examples of complex biological/ecological circulatory systems.
- analyse and model interactions between the technical equipment in such systems and higher organisms/microorganisms.
- name the most important laws of physics, chemical reactions and (micro) biological processes in aquatic environments.

Learning outcomes

Students will learn to...

- discuss the latest drivers, challenges and opportunities of various forms of aquaculture and aquaponics at regional and global levels.
- differentiate between various aquaculture systems (including aquaponics) and identify their characteristics.
- understand and quantitatively evaluate an aquaculture (aquaponic) system concept.
- explain the most important factors for animal welfare (fish, crabs) and how to take them into account.

Contact: dominik.refardt@zhaw.ch

Agriculture for the Future (3 ECTS)

Admission criteria

Students should be able to...

- describe the concept of „good agricultural practice" and transfer this to practical examples (plant protection, biodiversity, nutrient cycling, resource conservation, etc.).
- present individual strategies that contribute to the improvement of the environmental sustainability of agricultural systems.
- identify sustainability conflicts within the food value chain and design solutions with a view to sustainable production and supply chains.
- define the requirements for a sustainable food system in terms of food security, rural development and conservation of resources, and analyse trends, relationships and trade-offs, as well as their political, economic and environmental drivers and instruments.

Learning outcomes

Students will learn to...

- anticipate the factors and conditions which affect the design of sustainable agricultural systems.
- design and evaluate specific scenarios for the development of future agriculture in an international environment.
- independently develop future models for agricultural systems based on scientific studies and recognised methods, and estimate the effect of these models on all dimensions of sustainability.

Contact: johannes.fahrentrapp@zhaw.ch

Natural Resource Management in Mountain Areas (3 ECTS)

Admission criteria

Students should be able to...

- theoretically derive, apply and reflect on the concept of sustainability, as well as mediate and implement solution-oriented approaches to specific development processes.
- theoretically derive basic, natural and social science knowledge about regions in mountain areas.
- reflect on and abstract knowledge from past experiences of concrete development projects, then adapt and transfer this knowledge to other regions.
- develop communication and participation methods, then adapt and apply them to different problems.

Learning outcomes

Students will learn to...

- analyse the transdisciplinary relationships between resource management in mountain areas and their impact on society, and incorporate them into solution-oriented, creative concepts and implementation activities.
- elucidate scientific discourse on the management of natural resources in mountain areas, including political, economic and environmental factors, and understand the different points of view.
- classify and evaluate various existing development tools and apply them to practical and /or regionally focused issues.
- evaluate scientific methods, develop individual approaches and apply them in concrete examples (research projects, regional development projects).

Contact: stefan.forster@zhaw.ch

Natural Resource Management in Urban Areas (3 ECTS)

Admission criteria

Students should be able to...

- interpret the city as a complex ecosystem, and understand and evaluate abiotic, biotic and human ecological subsystems and their interactions.
- determine challenges to urban regions (resource scarcity, food systems, biodiversity, climate change), and explain solutions for sustainable development and utilisation of resources.
- apply the concept of ecosystem performance to issues in urban habitats.

Learning outcomes

Students will learn to...

- analyse requirements for, influencing factors on and conflicting objectives to the sustainable management of urban habitats.
- examine and evaluate concepts, tools and measures (green infrastructure, smart city, green building, urban agriculture) for increasing urban ecosystem performance.
- plan, implement and assess selected management concepts in the fields of biodiversity, ecosystems, waste and water.
- plan, implement and assess soil, air and culture for improving living and environmental conditions in urban areas.

Contact: vicente.carabias@zhaw.ch

Natural Resource Management in Emerging Economies (3 ETCS)

Admission criteria
Students should be able to...
- justify global conflicts in terms of resource use and evaluate different solutions.
- apply models and methods from resource economics and interpret relevant scientific studies.
- take a critical stand on political and social discussions concerning objectives and actions that support sustainable development (Agenda 2030, Paris Agreement, etc.).

Learning outcomes
Students will learn to...
- establish the positive and negative effects of existing natural resources on the development of a country, considering various theories of development (Development Economics), and analyse the various causes (e.g. natural resource curse).
- analyse and critically evaluate instruments and governance approaches to sustainable development and resource use in developing and emerging countries.
- situate and critically evaluate the role of international cooperation and its actors and forms in the context of natural resources.

Contact: N.N.

Tutorial in Research Unit 2 (6 ETCS)

Admission criteria
Students should be able to...
- explain and competently represent the knowledge acquired in Tutorial 1.
- explain the specific research methods and commonly used project management tools from the Research Methods module.

Learning outcomes
Students will learn to...
- critically question and apply the specific methods learnt in the Research and Methods module.
- perform in-depth analysis of the technical knowledge acquired in Tutorial 1.
- implement solutions to specific topic-related issues and plan, organise and independently run a small project using common project management tools (milestones, deliverables, PERT and Gantt charts).
- analyse and present project results, as well assume project management responsibilities.

Contact: angela.martuccisiefert@zhaw.ch

Welcome
to Switzerland!