ETH zürich

MAS SWR
Master of Advanced Studies in Sustainable Water Resources

Institute of Environmental Engineering
Department of Civil, Environmental and Geomatic Engineering (D-BAUG)

The Program

The Master of Advanced Studies in Sustainable Water Resources (MAS ETH SWR) advocates an integrated vision of sustainable water resources management, with a focus on technical training and high level research.
The program highlights the importance of water availability and water scarcity and prepares participants to face the challenges of the future, e.g. climate and land use changes, increased water use and population growth.
Participants acquire skills which will enable them to become leaders in implementing sustainable and environmentally conscious water policies in their home countries.
The program consists of MSc courses at ETH and specialized courses taught by invited experts.
The MAS thesis is supervised by scientific staff at ETH and collaborating institutions. Students' research focuses on topics such as water quality, water quantity, water for agriculture, water for the environment, adaptation to climate change, and integrated water resources management.

Program philosophy

The MAS program is designed to advance the knowledge of water professionals and to generate collaboration between water resources engineers and scientists in Switzerland and abroad.
The philosophy of the MAS is that students propose relevant research topics from their home countries, around which individual study programs are devised, and about which they write their thesis.
The target audience is 10 students per year, the majority of which are international students.

Academic title

Successful graduates in the Master's Program acquire the academic degree Master of Advanced Studies ETH in Sustainable Water Resources (MAS ETH SWR).

Duration

The MAS in Sustainable Water Resources is a full-time 12 month study program beginning in September of every year. A total of 66 credit points (ECTS) must be acquired in order to obtain the MAS degree.

Language of instruction

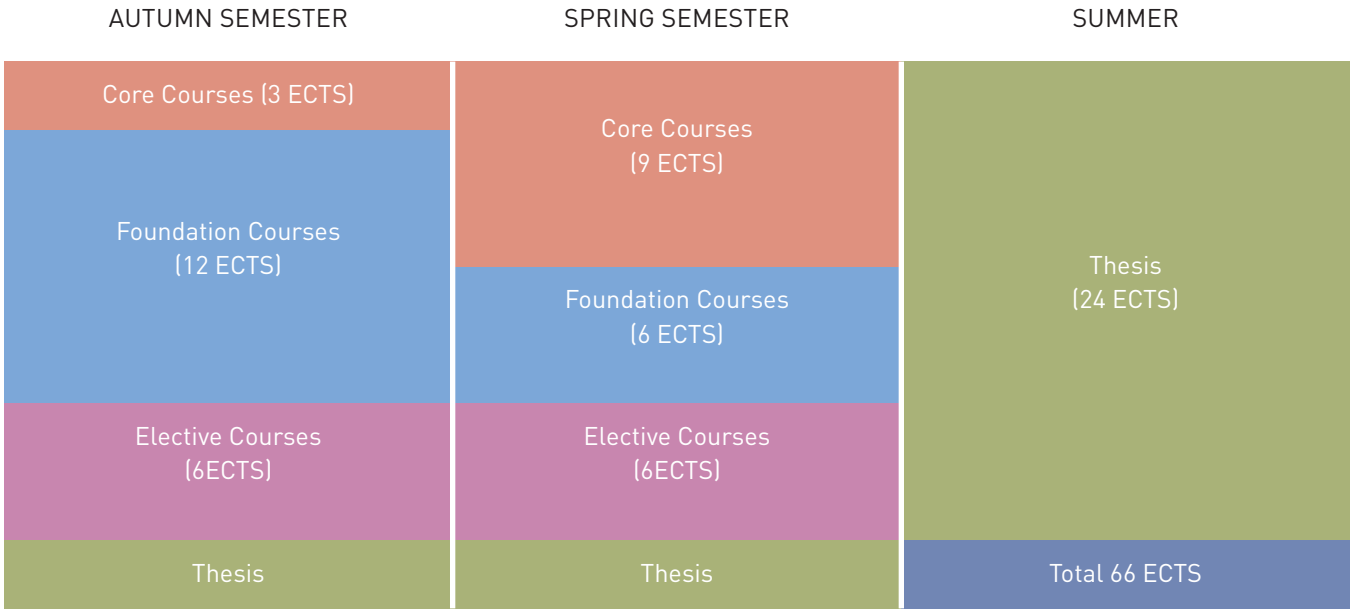
Courses, seminars, and communication with academic advisors are typically held in English. The MAS thesis is also written and defended in English. However, it is possible to take some courses in German and if requested, to write the thesis in German.

Tuition fees

The tuition fees are 5'000 Swiss Francs (approximately 4'600 Euro), not including living expenses. The fees are payable in two parts: the first half is due in October, the second half is due in April.

Infrastructure

Students are enrolled at ETH Zurich and are entitled to the use of all academic facilities, including student computer rooms, excellent libraries with electronic access to journals, discounted meals in student cafeterias, as well as access to sport and leisure facilities.



Program structure and content

Each student designs his/her study program according to individual professional needs. The study program is subject to approval by the MAS director, Prof. Paolo Burlando.
Study programs are interdisciplinary and are defined based on students' selected research topics.
Credit requirements and program structure (including coursework and research) are shown in the table above, where one course is generally equivalent to 3 ECTS (European Credit Transfer and Accumulation System).

The MAS curriculum includes the following:
Core MAS courses 3 ECTS (autumn semester) and 9 ECTS (spring semester), that are designed specifically for the MAS students, feature invited experts and link research to practice.
Foundation courses 12 ECTS (autumn semester) and 6 ECTS (spring semester), selected from MSc courses at the Institute of Environmental Engineering.
Electives 6 ECTS each semester, selected from MSc courses in Environmental Engineering, Environmental Systems Science, or from other ETH departments.
A **thesis** of 24 ECTS, topic to be approved by the MAS program director.

Thesis

(24 ECTS)

MAS students complete a 24 ECTS thesis during their studies at ETH Zurich. The research should address a relevant water resources problem in the student's home country, or the topic can be selected from ongoing research projects at the ETH Zurich Institute of Environmental Engineering.

Examples

- "Modelling future scenarios of the Nosara River Basin (Costa Rica) runoff regime using a distributed hydrological model"
- "Investigating extreme rainfall variability in the Catamayo-Chira river basin, Southern Ecuador - Northern Perú"
- "Evaluation of hydrological alterations of the Betania dam on the Magdalena River (Colombia)"
- "An assessment of Water Management Options in the Lower Kafue Catchment that could Optimize the Productive Use of Water in the Mazabuka District in Zambia"
- "Characterization of runoff components in the Rhonegletscher catchment for the definition of stream-habitat categories in present and future hydrological conditions"

Core courses

(12 ECTS)

The core courses have been designed specifically for the MAS program. They offer the students an opportunity to learn from and interact with experts who have worked internationally on water and sustainability issues. Most courses are limited to 16 students, which allows for interactive class discussions and debates.

The following core courses must be attended:

- **Water Resources Seminars**
(autumn semester, 3 ECTS)
This seminar course features invited experts from a wide range of disciplines who present their experiences working with water related topics in international settings.
The seminars challenge students to evaluate water resources and water resource management in new ways.
Selected topics include: water & sanitation, urban water management, water resources & agriculture, water hazards (floods), water & climate change, water & business, and nature as infrastructure.

- **Sustainability & Water Resources**
(spring semester, 3 ECTS)
This course offers students the opportunity to learn about sustainability and water resources in a multi-disciplinary fashion, with a focus on case studies from around the world. Selected topics include: sustainability issues in water resources, the EU water framework directive, mining in Latin America, environmental flows, and water quality issues.

- **Participatory & Integrated Water Resources Planning**
(spring semester, 3 ECTS theory and 2 ECTS lab)
This course develops basic knowledge and skills for modelling, planning and managing water resources systems in a balanced and sustainable way. The emphasis is on the operational aspects of water management, including: introduction to participatory decision-making, modelling of the multiple stakes and socio-economic processes, introduction to dynamic and stochastic optimization approaches. Theoretical concepts are reinforced in the lab component of the course.

- **Water Governance: Challenges and Solutions**
(spring semester, 1 ECTS)
This course features invited experts with backgrounds in international relations, law, politics, and diplomacy. Through theoretical input and case studies, students learn about the realities of water conflicts and the intricacies of cooperation and diplomacy. Specific topics include: water conflict management, legal frameworks, and hydrodiplomacy.

Foundation courses (18 ECTS)

Foundation courses provide MAS students with a strong theoretical background in environmental engineering topics. Students attend graduate level courses relevant to their proposed research topics, selected from MSc courses taught at the Institute of Environmental Engineering. Sample courses include Hydrology II, Fluvial Systems, Water Resources Management, Watershed Modelling, Groundwater, Systems Analysis and Mathematical Modeling in Urban Water Management, Infrastructure Systems in Urban Water Management, Advanced Environmental Assessments, etc.

MAS student class 2015/2016 at Zurich's wastewater treatment plant (D. Molnar)

Elective courses (12 ECTS)

Elective courses serve to broaden specialized knowledge and to gain further insight and skills useful for the successful completion of the research thesis. These courses are selected from MSc courses in Environmental Engineering, in Environmental System Science, and other ETH departments. The courses emphasize different aspects of water and Climate, Snow and Ice, Ecology and Ecosystems, Policy, and more.

Excursions

As an important component of the MAS program, students are introduced to a selection of Swiss research activities through excursions. Dependent on student interests, excursions may take place to the following locations:

- Hydropower and fluvial systems (Maggia valley)
- Sediment transport and mountain rivers (Alptal valley)
- EAWAG, Swiss aquatic research center (Dübendorf)
- Wastewater treatment plant (Zurich)

MAS student class 2013/2014 at Maggia Valley (C. Góez)

MAS student class 2015/2016 at EAWAG (D. Molnar)

Some of our invited experts

Stuart Orr
Head, Water Stewardship
WWF International, Switzerland

Stuart Orr is currently the Water Practice lead at WWF and has a background in business and academic research. He has worked on a broad spectrum of water issues helping to support WWF in devising and testing new approaches to conservation through engaging business and finance, the water-food-energy nexus, economic incentives and water-related risk. Recent projects have been in Kenya, Suriname, Bhutan/Nepal, Zambia, Mekong, and Turkey.

Michael McClain
Ecohydrology
IHE Delft, Netherlands

Dr. McClain's activities focus on catchment hydrology and water quality, flow-ecology relationships, environmental flows, and land-water interactions. He promotes the practice of ecohydrology to support integrated water resources management and sustainable development, advising governmental authorities and leading major research and development projects in Africa and South America. He has also worked with USAID in Asia.

Tobias Siegfried
Founder & Partner
hydrosolutions, Switzerland

Dr. Siegfried is an expert on transboundary water issues in Central Asia. His specific expertise is in the mathematical modeling of coupled systems models. At hydrosolutions, Dr. Siegfried's work focuses on global water challenges related to climate, agriculture, energy, and institutions. He is also one of the leaders behind hydrosolutions' iMoMo Project (Innovative Technologies for Monitoring, Modeling and Managing Water).

Jaime Amezaga
School of Civil Engineering and Geosciences & Institute for Sustainability (dual affiliation)
Newcastle University, UK

Dr. Amezaga is an expert on topics related to the European Water Framework Directive and mining in Latin America. He is an engineer with a broad interest in understanding and interacting with the social side of complex technical, environmental and natural resources challenges. His research projects focus on policy and institutional analysis in sustainable water, land use and energy management and typically include stakeholder involvement.

Trevor Clements
Water Resources Director
Tetra Tech Inc., USA

Mr. Clements is a consultant with broad experience in promoting sustainable water use in the USA. He is a company leader in advocating a paradigm shift towards comprehensive watershed management and integrated ("One Water") water planning, working with public and private clients to develop and implement sustainable and resilient practices including green infrastructure and low impact development.

Andrea Castelletti
Department of Electronics, Information and Bioengineering
Politecnico di Milano, Italy

Prof. Castelletti is an expert on participatory and integrated water resources planning. His research focuses on new methodologies and tools to expand the scope of current management practices across sectors and to the river basin level. Through modeling and optimization theories, he characterizes human and natural processes and designs adaptive decisions in light of current and projected societal, economic, and environmental needs.

Studying at ETH Zurich

Courses at ETH are intensive and demanding. Nevertheless, students find time to enjoy an active student life.

Living in Zurich

Zurich is a fantastic city, offering a high quality of life and diverse recreational and cultural activities. Its proximity to lakes and mountains makes Zurich an especially attractive place to live. The city has an international metropolitan flair and is considered the business capital of Switzerland.

The Academic Sport Association Zurich (ASVZ) offers ETH Zurich students an extensive range of sport activities. Enrolled students can take part in most courses free of charge.

ETH faculty, Institute of Environmental Engineering

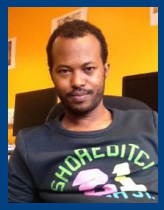
Paolo Burlando
Director, MAS in Sustainable Water Resources
ETH Zurich, Switzerland

In addition to being director of the MAS program, Prof. Paolo Burlando is Professor and Chair of Hydrology and Water Resources Management. His research activities are in the fields of water resources planning and management, rainfall field analysis, hydrologic extreme forecasting and prediction, global change and water resources, water resources in mountainous regions, as well as hydrology and ecology interactions in mountain floodplains. Prof. Burlando teaches courses in Hydrology and Water Resources Management.

Peter Molnar
Titular Professor of Hydrology and Fluvial Systems
ETH Zurich, Switzerland

Prof. Molnar is a Titular Professor of Hydrology and Fluvial Systems. His research activities focus on developing simple and complex models for river basins, analysing their response to stochastic climatic forcing, as well as measuring and quantifying change across scales. Special focus is devoted to rainfall analysis/modelling and fluvial systems: sediment cascades, braided rivers, step-pool streams, river networks and ecohydrological processes in riparian zones. Prof. Molnar teaches courses on Fluvial Systems and Watershed Modelling.

Alumni



"The MAS program was one of the best academic experiences of my life. I learned very useful subjects in water resources engineering that boosted my chances to enrol in a prestigious EU PhD scholarship to continue research in water resources. Besides the academia, the culture and life experiences that I shared among fellow students and the program coordinator remain always memorable".

Tesfaye Tarekegn (Ethiopia)
Flood & Coastal Risk Management Officer
Environment Agency, UK

"The MAS program meant to me both a challenge and a great experience! I could significantly improve my technical knowledge and acquire a broader perspective on water resources issues in a very stimulating and up-to-date environment"

Anna Costa (Italy)
PhD student
ETH Zurich, Switzerland

"Participating in the MAS was a great experience that allowed me to meet new people, expand my knowledge, and connect with research networks worldwide. Unforgettable!"

Juan Cabrera (Peru)
Lecturer
National University of Engineering (UNI) Lima, Peru

"Being a student of the MAS in Sustainable Water Resources at ETH Zurich was a fantastic experience for me. I gained a lot of knowledge on Water Resources Engineering, met wonderful classmates and tutors and got prepared for my future professional career."

Georgios Tsekouras (Greece)
Catastrophe Risk Analyst
Chubb Limited, UK

"MAS SWR is an intense program, but it helps you to accomplish a huge jump in your professional formation. I lived this experience and have the most wonderful memories from that period and people involved."

Gustavo Alonso (Cuba)
Assistant Professor and Head of Agrophysic Research Unit
Agrarian University of Havana (UNAH), Cuba

"The MAS has a high technical level that prepared me to tackle the water resources and sustainability challenges of my region. Moreover, living in Zurich gave me the unique opportunity to meet people from all over the world, to know new cultures and to make friends for life. It was definitely a life changing experience"

Catalina Goez Arango (Colombia)
Professional Business Operations
Empresas Públicas de Medellín (EPM), Colombia

Contact

Dr. Darcy Molnar
MAS Coordinator
ETH Zurich
Institute of Environmental Engineering
Stefano-Franscini-Platz 5
8093 Zurich, Switzerland
Phone: +41 44 633 4954
Email: darcy.molnar@ifu.baug.ethz.ch
info-mas@ifu.baug.ethz.ch

www.mas-swr.ethz.ch

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www.ethz.ch

→ Institute of Environmental Engineering
http://www.ifu.ethz.ch/

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→ ETH Student Association
https://vseth.ethz.ch

→ Sport
www.asvz.ch

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