unine
Université de Neuchâtel
Faculté des sciences

MSc in Hydrogeology and Geothermics

Faculty of Science, University of Neuchâtel

Dedicated to water and underground energy ressources as solutions for a sustainable vision

Moving towards sustainable use of subsurface water and energy resources is a major challenge for our society, and for geoscientists in particular. This MSc degree, unique in Switzerland, offers a complete introduction to the current scientific approaches to address this challenge.

The program delivers comprehensive hydrogeological training that covers the relevant physical, chemical, biological and thermal processes, as well as key field investigation techniques.

Prof. in charge of the curriculum
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Version
Study plan dated 04 May 2026
Valid for the academic year 2026-2027

General structure of the program :

The Master in Hydrogeology and Geothermics is a 120 ECTS credits program planned over the span of 2 years. Intense teaching and practical field work over three semesters provide students with core knowledge and specific skills in hydrogeology and geothermics. The fourth semester is devoted to an individual research project, to be carried out internally or in collaboration with external partners.

Semester 1	Semester 2	Semester 3	Semesters 3 and 4
Fundamentals of Hydrogeology and Hydrochemistry	Hydrogeological Systems	Methods II	Master thesis preparation and research
Hydrogeology and Geothermics in the Fields	Methods	Advanced Methods	
Fundamental Skills	Resources Management I	Resources Management II	
	Elective course		
30 ECTS	**27 ECTS** (+3 ECTS elective)	**27 ECTS**	**33 ECTS**

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First year (semesters 1 and 2)

Modules/courses	Duration	Semester	ECTS	Principal Lecturer(s)	Evaluation
Fundamentals of Hydrogeology and Hydrochemistry			**12**		
Introduction to the Hydrosphere	28	A	3	Dr. S. Mhanna	Written, 1 hour
Hydrogeological Processes	28	A	3	Dr S. Tajima	Written, 2 hours
Hydrochemistry	28	A	3	Prof. D. Hunkeler	Written, 1 hour
Quantitative Eco-Hydrogeology	28	A	3	Prof. C. Roques	Written, 1 hour
Hydrogeology and Geothermics in the Field			**9**		
Essais hydrauliques	28	A	3	Prof. P. Renard	CA (graded)
Field Camp I	7 d	A	3	Prof. C. Roques	CA (pass)
Geothermal Field Trip	7 d	A	3	Dr F. Miele	CA (pass)
Fundamental Skills			**9**		
Mathématiques et statistique	28	A	3	Prof. A. Matei	CA (graded)
Scientific Method and Communication	28	A	3	Dr L. Halloran	CA (graded)
Geological Modelling	28	A	3	Prof. C. Roques	CA (graded)
Hydrogeological Systems			**9**		
Systèmes karstiques	28	S	3	Dr P-Y. Jeannin	CA (graded)
Fractured Systems	28	S	3	Prof. B. Valley	CA (graded)
Systèmes aquifères alluviaux	28	S	3	N.N.	CA (graded)
Methods			**9**		
Natural and Artifical Tracers	28	S	3	Prof. D. Hunkeler	Written, 1 hour
Hydrogeophysics and Borehole Geophysics	28	S	3	Prof. B. Valley, Dr K. Holliger	CA (graded)
Introduction to Groundwater Flow Modelling	28	S	3	Prof. P. Brunner, N.N.	CA (graded)

Modules/courses	Duration	Semester	ECTS	Principal Lecturer(s)	Evaluation
Resources Managment I			**9**		
Water Supply in Arid and Humid Regions	28	S	3	Prof. P. Brunner, Dr. E. Milnes	CA (graded)
Contaminants Hydrogeology	28	S	3	Prof. D. Hunkeler	CA (graded)
Introduction à la géothérmie	28	S	3	Prof. B. Valley	Written, 1 hour
Elective course			**3**		

Course selection is made from the indicative list available on Moodle. It is subject to prior approval by the professor in charge of the curriculum, fulfillment of any prerequisites, and the availability of places.
Only Master's level courses are eligible.

Total ECTS First year courses	**60**

Second year (semesters 3 and 4)

Modules/courses	Duration	Semester	ECTS	Principal Lecturer(s)	Evaluation
Methods II			**12**		
Applied Stochastic Hydrogeology	28	A	3	Prof. P. Renard	CA (graded)
Numerical Modelling of Solute and Heat Transport	28	A	3	Dr F. Miele	CA (graded)
Field Camp II	14 d	A	6	Prof. C. Roques	CA (pass)
Advanced methods			**6**		
Remote Sensing	28	A	3	Dr S. Mhanna	CA (graded)
Geological Modelling	28	A	3	Prof. C. Roques	CA (graded)
Resources management II			**9**		
Urban Hydrogeology	28	A	3	Prof. M. Schirmer	CA (graded)
Hydrogeology in Humanitarian and Development Contexts	28	A	3	Dr. E. Milnes	CA (graded)
Systèmes géothermiques peu profonds	28	A	3	Dr V. Badoux	CA (graded)
Total ECTS Second year courses			**27**		
Master thesis preparation and research			**33**		
Seminar and project	90	A	3	Prof. P. Renard	CA (pass)
Master thesis		S	30		CA (graded)
Total ECTS MSc in Hydrogeology and Geothermics			**120**		

Complementary information

Evaluations and regulations

- Course and exam registration in IS-Academia is compulsory for course validation.
- For details regarding Faculty regulations, please consult the *Règlement d'études et d'examens de la Faculté des sciences* and existing directives on the Faculty's webpage (www.unine.ch/sciences).
- Continous assessment evaluations (pass or graded) are specified in the corresponding course description.

Abbreviations and grades

CA = continous assessment
d = days
N.N. = teacher to be designated
A = autumn semester
S = spring semester

Transitional provisions :

- Students that did not entierly validate their first year modules in 2025-2026 or previously, will be contacted by the Faculty secretary in order to establish transitional provisions before the beginning of the 2026-2027 autumn semester.

Learning outcomes

Upon completion of the program, the student is capable of:

Knowledge and understanding:
- Know the basic principles of hydrogeology and geothermal energy.
- Describe the processes of flow, substance and contaminant transport, and heat exchange occurring in the subsurface.
- Identify and characterize the principal types of aquifers.
- Recognize the main issues related to hydrogeology and geothermal energy.

Application of knowledge and understanding
- Design a hydrogeological study based on bibliographical research, data analysis and field work.
- Implement standard investigation methods in hydrogeology and geothermal energy.
- Apply dimensioning approaches for underground structures in relation to hydrogeology and geothermal energy.
- Collect, process and analyze hydrogeological data sets
- Master numerical calculation tools adapted to the fields of hydrogeology and geothermics.
- Develop credible conceptual models of underground flow and transport processes from complex and incomplete data.

Ability to form judgments:
- Assess the quality of hydrogeological data collected in the field.
- Evaluate scientific or technical articles, research projects or reports in the fields ofhydrogeology and geothermal energy.
- Choose the most appropriate method from among several, considering the regulatory, formal, and economic contexts.

Communication skills:
- Write a scientific or technical report adapted to the target audience, in French or English, integrating your own measurements and putting them into perspective with prior knowledge.
- Present hydrogeological data in the form of maps, diagrams or other appropriate representations.
- Present results relating to hydrogeology and geothermal energy clearly and appropriately to the target audience, either orally or using other appropriate media.
- Communicate with experts in related fields.

Learning skills:
- Develop a project, from conceptualization to report, addressing a specific question in the field of hydrogeology and geothermal energy.
- Search, structure, and synthesize available information, and integrate it in relation to data that you acquired.