

## Master of Science in Hydrogeology and Geothermics 2017 - 2018

### General structure of the M Sc in Hydrogeology and Geothermics (120 ECTS)

| Modules  | ECTS       | Status     | Semester |
|--|------------|------------|----------|
| Introductory courses                                 | 8          | obligatory | A1       |
| Processes in hydrogeology and geothermics            | 12         | obligatory | A1       |
| Water-earth systems                                  | 10         | obligatory | A1       |
| Site/resource characterisation                       | 13         | obligatory | S1       |
| Engineering and resource exploitation                | 9          | obligatory | S1       |
| Modelling I  | 8          | obligatory | S1       |
| Resource management                                  | 13         | obligatory | A2       |
| Modelling II   | 9          | obligatory | A2       |
| Master thesis preparation and Master thesis research | 38         | obligatory | A2+S2    |
| <b>Total ECTS of Master</b>                          | <b>120</b> |            |          |

| Modules and courses   | Hours of courses | Semester | ECTS           | Persons in charge  | Evaluation mode       |
|---|------------------|----------|----------------|--|-----------------------|
| <b>Introductory courses</b>   |                  |          | <b>8 ECTS</b>  |  |                       |
| Introduction to hydrogeology and hydrology  | 30               | A1       | 3              | Prof. P. Brunner   | Written exam, 3 hours |
| Introduction to geothermics   | 20               | A1       | 2              | Prof. S. Miller  |                       |
| Mathématiques et statistique  | 30               | A1       | 3              | Profs P. Perrochet and P. Renard                           |                       |
| <b>Processes in hydrogeology and geothermics</b>  |                  |          | <b>12 ECTS</b> |  |                       |
| Hydrodynamique souterraine  | 40               | A1       | 4              | Prof. P. Perrochet   | Written exam, 3 hours |
| Processus de transport  | 20               | A1       | 2              | Prof. P. Perrochet   |                       |
| Hydrochemical and microbial processes   | 40               | A1       | 4              | Prof. D. Hunkeler and Dr S. Wirth                          | Written exam, 2 hours |
| Rock and earthquake mechanics   | 20               | A1       | 2              | Prof. S. Miller  | Written exam, 1 hour  |
| <b>Water-earth systems</b>  |                  |          | <b>10 ECTS</b> |  |                       |
| Alluvial aquifer systems: from quaternary geology to surface water-groundwater interactions | 40               | A1       | 4              | Dr S. Wirth, Profs P. Brunner, D. Hunkeler and M. Schirmer | CA (graded)           |
| Systèmes aquifères fissurés et karstiques   | 40               | A1       | 4              | Prof. B. Valley, Dr P-Y. Jeannin                           | CA (graded)           |
| Field camp I  | 4 days           | A1       | 2              | Drs S. Wirth and G. Preisig                                | CA (pass)             |

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|--|------------------|----------|----------------|--|-----------------|
| <b>Site/resource characterisation</b>  |                  |          | <b>14 ECTS</b> |  |                 |
| Forages, tests hydrauliques, traceurs naturels et artificiels                    | 60               | S1       | 6              | Profs P. Renard, B. Valley and Dr V. Ponsin                  | CA (graded)     |
| Geophysics and remote sensing  | 50               | S1       | 5              | Profs S. Miller and P. Brunner                               | CA (graded)     |
| Field camp II  | 6 days           | S1       | 3              | Profs P. Perrochet, P. Brunner and Drs G. Preisig, V. Ponsin | CA (pass)       |
| <b>Modelling I</b>   |                  |          | <b>7 ECTS</b>  |  |                 |
| Modélisation des réservoirs  | 20               | S1       | 2              | Profs P. Renard and P. Brunner                               | CA (graded)     |
| Modélisation des écoulements et des processus de transport                       | 50               | S1       | 5              | Prof. P. Perrochet and Dr G. Preisig                         | CA (graded)     |
| <b>Engineering and resource exploitation</b>                                     |                  |          | <b>9 ECTS</b>  |  |                 |
| Systèmes géothermiques peu profonds  | 20               | S1       | 2              | Dr V. Badoux   | CA (graded)     |
| Earth energy resources   | 30               | S1       | 3              | Profs S. Miller and B. Valley                                | CA (graded)     |
| Water supply and water treatment   | 20               | S1       | 2              | Prof. P. Brunner   | CA (graded)     |
| Ingénierie géotechnique  | 20               | S1       | 2              | Dr G. Preisig  | CA (graded)     |
| <b>Modelling II</b>  |                  |          | <b>9 ECTS</b>  |  |                 |
| Numerical modelling of hydrochemical processes                                   | 20               | A2       | 2              | Prof. D. Hunkeler  | CA (graded)     |
| Numerical modelling of geomechanical processes                                   | 30               | A2       | 3              | Prof. S. Miller  | CA (graded)     |
| Géostatistique et modélisation inverse   | 40               | A2       | 4              | Profs P. Renard and P. Brunner                               | CA (graded)     |
| <b>Resource management</b>   |                  |          | <b>13 ECTS</b> |  |                 |
| Water resource management in the European context                                | 20               | A2       | 2              | Profs P. Brunner and D. Hunkeler                             | CA (graded)     |
| Water resource management in semi-arid/arid regions and in humanitarian contexts | 20               | A2       | 2              | Prof. P. Brunner and Dr E. Milnes                            |                 |
| Groundwater pollution and remediation  | 30               | A2       | 3              | Prof. D. Hunkeler  | CA (graded)     |
| Urban hydrogeology   | 20               | A2       | 2              | Prof. M. Schirmer  | CA (graded)     |
| Geothermal resources in the European context and worldwide                       | 20               | A2       | 2              | Profs S. Miller and B. Valley                                |                 |
| Economical, political and societal aspects of geothermics                        | 20               | A2       | 2              | Profs S. Miller and B. Valley                                |                 |

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|---|------------------|----------|-----------------|--|-----------------|
| <b>Master thesis preparation and Master thesis research</b>       |                  |          | <b>38 ECTS</b>  |  |                 |
| Literature review, scientific writing and master project proposal | 80               | A2       | 8               | Profs P. Brunner, D. Hunkeler, P. Perrochet, S. Miller, B. Valley, P. Renard | CA (pass)       |
| Master thesis research  |                  | S2       | 30              |  | CA <sup>1</sup> |
| <b>Total of M Sc in Hydrogeology and Geothermics</b>              |                  |          | <b>120 ECTS</b> |  |                 |

### Abbreviations

CA (graded) = marked assignment, following teacher's instructions

CA (pass) = unmarked assignment (accepted/rejected)

CA<sup>1</sup> = marked thesis report + 1-hour-oral exam

A1 = autumn semester 2017

S1 = spring semester 2018

A2 = autumn semester 2018

S2 = spring semester 2019

### Information

Professor in charge : **Prof. P. Perrochet** (pierre.perrochet@unine.ch)

### Exams and regulation

Candidates must be registered in IS-Academia for both courses and exams

**For regulation, please consult the homepage of the Faculty of Sciences, [www.unine.ch/sciences](http://www.unine.ch/sciences) ("règlement d'études et d'examens" and existing directives) or the administrative staff of the Faculty.**

Transitional measures: personal adjusting for students beginning their Master before 2015-16 (please contact the person in charge of the Master).