UNIVERSITÀ DEGLI STUDI DI TRIESTE

Dipartimento di
Matematica, Informatica
e Geoscienze

MASTER'S DEGREE IN

Geophysics and Geodata

academic year
2026/2027

Ministerial Class LM-79 R
Geophysics

STUDY PROGRAMME
2026/2027 cohort

The Master's Degree in Geophysics and Geodata features a study plan comprising three mandatory courses (marked with '*' in the table), supplemented by an additional ten courses in accordance with the requirements set by the relevant regulations. Students are required to select:

* five courses from Groups 1, 2, or 3.
* three courses on complementary subjects (type C) and
* two elective courses (type D)

The choice is made with the support of the academic tutor who has been associated with each student since they passed the admission interview. This way, the study programme can be focused on one of the following specialisation paths:

⇒ **SOLID EARTH GEOPHYSICS AND GEODYNAMICS**

⇒ **EXPLORATION GEOPHYSICS**

⇒ **SEISMOLOGY AND NATURAL HAZARDS**

⇒ **COMPUTATIONAL GEOPHYSICS**

⇒ **GEOPHYSICAL FLUID DYNAMICS**

The **Appendix** provides examples of study programmes for the five specialisation paths.

Courses are divided into six types of educational activities (*tipologia di attività formativa* – TAF)

A – core subjects
B – advanced concepts and skills
C – complementary subjects
D – elective subjects
E – final examination and language proficiency
F – other educational activities

COMMON CURRICULUM

1st YEAR (60 ECTS)

COURSE	ECTS	DISC.	TYPE
Exploration Seismology*	B	GEOS-04/B	6
Potential Methods*	B	GEOS-04/A	6
Seismology*	B	GEOS-04/A	6
Complementary subject course	C		6
Complementary subject course	C		6
Group 1/2/3 courses – advanced concepts and skills on geology/geophysics/physics	B		30

2nd YEAR (60 ECTS)

COURSE	ECTS	DISC.	TYPE
Complementary subject course	6		C
Limited-choice subject	12		D
Internship	6		F
Final exam/Thesis	36		E

The choice of courses within the Group 1/2/3 courses (geology/geophysics/physics) must meet the minimum requirement for each field:

- advanced concepts in geology – 12 ECTS
- advanced concepts in geophysics – 6 ECTS
- advanced concepts in physics – 12 ECTS

GROUP 1 COURSES
Advanced concepts in geology

COURSE	ECTS	DISC.	TYPE
Complements of Geology	6	GEOS-01/A	B
Marine Geology	6	GEOS-02/B	B
Applied Hydrogeology	6	GEOS-03/B	B
Structural Subsurface Modelling	6	GEOS-02/C	B
GIS applied to Earth Sciences	6	GEOS-02/C	B
Environmental Geochemistry	6	GEOS-01/C	B
Dynamics and Protection of Coastal Areas	6	GEOS-02/B	B
Applied Geomorphology	6	GEOS-03/A	B
Applied Geology 2	6	GEOS-03/B	B
Virtual Outcrop geology	6	GEOS-02/C	B
Hydrogeological Risk	6	GEOS-03/B	B

GROUP 2 COURSES
Advanced concepts in geophysics

COURSE	ECTS	DISC.	TYPE
Seismic Risk	6	GEOS-04/A	B
Electromagnetic Methods in Geophysics	6	GEOS-04/B	B
Interpretation of Reflection Seismic Data	6	GEOS-04/B	B
Integrated Petrophysics	6	GEOS-04/B	B
Geodynamics	6	GEOS-04/A	B
Physics of Atmosphere	6	PHYS-05/B	B
Fluidodinamica geofisica (Geophysical Fluid Dynamics)	6	PHYS-05/B	B

GROUP 3 COURSES
Advanced concepts in physics

COURSE	ECTS	DISC.	TYPE
Complements of Physics	6	PHYS-02/A	B
Laboratory of Data Acquisition and Control	6	PHYS-01/A	B
Advanced Statistics for Data Analysis	6	PHYS-01/A	B
Image Processing in Physics	6	PHYS-06/A	B
Laboratory of Spatial Astrophysics	6	PHYS-01/A	B

GROUP 4 COURSES
Complementary subjects

COURSE	ECTS	DISC.	TYPE
Introduction to Machine Learning	6	IINF-05/A	C
Fluid Dynamics	6	CEAR-01/A	C
Seismic Imaging	6	GEOS-04/B	C
Well-Logging	6	GEOS-04/B	C
Geophysical Data Acquisition and Processing Laboratory	6	GEOS-04/B	C
Water Resources Management and Sustainability	6	GEOS-03/B	C
Remote Sensing	6	GEOS-04/A	C
Geothermics	6	GEOS-04/A	C
Applied Seismology	6	GEOS-04/A	C
Microzonation	6	GEOS-04/A	C
Statistical Methods	9	STAT-01/A	C
Mathematical Optimisation	6	MATH-06/A	C
Probabilistic Machine Learning	6	INFO-01/A	C
Data Management	6	INFO-01/A	C
Algorithmic Design	6	INFO-01/A	C
High Performance and Cloud Computing	9	IINF-05/A	C
Numerical Analysis	6	MATH-05/A	C
Digital Signal and Image Processing	9	IINF-01/A	C

Complements of Mathematics	6	MATH-03/A	C
Environmental Fluid Mechanics	6	CEAR-01/A	C
Hydraulic and Hydrogeological Risk	6	CEAR-01/B	C
Advanced 3-D Spatial Techniques and GIS for Civil and Environmental Monitoring	6	CEAR-04/A	C
Topography and Cartography	9	CEAR-04/A	C
Advanced Internet Technologies	6	IINF-05/A	C
Modelling of Natural and Artificial Energetic Systems	6	IIND-06/B	C
Basi di dati (Databases)	9	IINF-05/A	C

ELECTIVE COURSES

COURSE	ECTS	DISC.	TYPE
Courses explicitly listed in the tables above or consistent with the study programme **	12		D

(**) The evaluation of the consistency with the study programme is carried out by the Education Committee.

PREREQUISITES

There are no prerequisites for any exam.

ASSESSMENT OF LEARNING OUTCOMES

Learning outcomes shall be assessed through exams and practical exercises in the form of written tests and/or interviews. A Geophysics and Geodata graduate will be able to select information and methodologies required for the solution of problems in Earth Sciences, analysing the available data and autonomously formulating the most appropriate procedural schemes for the different cases. This autonomy is assessed both in the discussion of the graduation thesis and in the various interviews students take as part of the final examination of several courses. A Geophysics and Geodata graduate can draw up complete, concise and effective technical and scientific reports and can discuss their methodological and interpretative choices in both written and oral form. Communication skills are assessed through students' exams, internship and graduation thesis. Learning outcomes are assessed through interviews and written exams at the end of each educational activity. A Geophysics and Geodata graduate can autonomously increase their knowledge and skills, by keeping constantly updated in Earth Sciences' technical and scientific developments. The student's capacity for further autonomous learning is assessed through the analysis and discussion of their graduation thesis. Internship and training activities are monitored and evaluated by UniTS tutors. All internships require a short report and presentation of the activitiesy students carried out and the results they achieved.

APPENDIX – EXAMPLES OF STUDY PROGRAMMES FOR THE FIVE SPECIALISATION PATHS

1 – SOLID GEOPHYSICS AND GEODYNAMICS COMMON CURRICULUM

1st YEAR (60 ECTS)

COURSE	ECTS	DISC.	TYPE
Exploration Seismology*	6	GEOS-04/B	B
Potential Methods*	6	GEOS-04/A	B
Seismology*	6	GEOS-04/A	B
Complementary subjects: two courses chosen from Group 4. Recommended choices:			
• Remote Sensing	6		C
• Geothermics	6		C
Group 1/2/3 courses – advanced concepts and skills on geology/geophysics/physics Five courses chosen from: • Group 1 (12 ECTS) • Group 2 (6 ECTS) Geodynamics recommended • Group 3 (12 ECTS)	30		B

2nd YEAR (60 ECTS)

COURSE	ECTS	DISC.	TYPE
Complementary subject (see above)	6		C
Elective course	12		D
Internship	6		F
Final exam/Thesis	36		E

2 – EXPLORATION GEOPHYSICS CURRICULUM COMUNE

1st YEAR (60 ECTS)

COURSE	ECTS	DISC.	TYPE
Exploration Seismology*	6	GEOS-04/B	B
Potential Methods*	6	GEOS-04/A	B
Seismology*	6	GEOS-04/A	B
Complementary subjects: two courses chosen from Group 4 (12 ECTS) Recommended choices:			
• Seismic Imaging	6		C
• Well-Logging	6		C
• Geophysical Data Acquisition and Processing Laboratory			
Group 1/2/3 courses – advanced concepts and skills on geology/geophysics/physics. Five courses chosen from Group 1 (12 ECTS) one course chosen from Group 2 (6 ECTS). Recommended choices:	30		B
• Interpretation of Reflection Seismic Data			
• Integrated Petrophysics			
• Electromagnetic Methods in Geophysics			
• Group 3 (12 ECTS)			

2nd YEAR (60 ECTS)

COURSE	ECTS	DISC.	TYPE
Complementary subject (see above)	6		C
Elective course	12		D
Internship	6		F
Final exam/Thesis	36		E

3 – SEISMOLOGY AND NATURAL HAZARDS COMMON CURRICULUM

1st YEAR (60 ECTS)

COURSE	ECTS	DISC.	TYPE
Exploration Seismology*	6	GEOS-04/B	B
Potential Methods*	6	GEOS-04/A	B
Seismology*	6	GEOS-04/A	B
Complementary subjects: two courses chosen from Group 4 (12 ECTS) Recommended choices:			
• Applied seismology	6		C
• Microzonation	6		C
Group 1/2/3 courses – advanced concepts and skills on geology/geophysics/physics Five courses chosen from: • Group 1 (12 ECTS) • Group 2 (6 ECTS) Seismic Risk recommended • Group 3 (12 ECTS)	30		B

2nd YEAR (60 ECTS)

COURSE	ECTS	DISC.	TYPE
Complementary subject (see above)	6		C
Elective course	12		D
Internship	6		F
Final exam/Thesis	36		E

4 – COMPUTATIONAL GEOPHYSICS COMMON CURRICULUM

1st YEAR (60 ECTS)

COURSE	ECTS	DISC.	TYPE
Exploration Seismology*	6	GEOS-04/B	B
Potential Methods*	6	GEOS-04/A	B
Seismology*	6	GEOS-04/A	B
Complementary subjects: two courses chosen from Group 4 (12 ECTS) **Recommended choices:** • Introduction to Machine Learning • Seismic Imaging • Statistical Methods • Mathematical Optimisation • Probabilistic Machine Learning • Data Management • Algorithmic Design • High Performance and Cloud Computing • Numerical Analysis • Digital Signal and Image Processing • Advanced Internet Technologies • Basi di dati (Databases)	6 6		C C
Group 1/2/3 courses – advanced concepts and skills on geology/geophysics/physics **Five courses chosen from Group 1 (12 ECTS).** **Recommended choices:** • GIS applied to Earth Sciences • Virtual Outcrop Geology **One course chosen from Group 2 (6 ECTS).** **Recommended choice:** • Seismic Imaging **Group 3 (12 ECTS) Recommended choices:** • Laboratory of Data Acquisition and Control • Advanced Statistics for Data Analysis • Image Processing in Physics	30		B

2nd YEAR (60 ECTS)

COURSE	ECTS	DISC.	TYPE
Complementary subject (see above)	6		C
Elective course	12		D
Internship	6		F
Final exam/Thesis	36		E

5 – GEOPHYSICAL FLUID DYNAMICS CURRICULUM COMUNE

1st YEAR (60 ECTS)

COURSE	ECTS	DISC.	TYPE
Exploration Seismology*	6	GEOS-04/B	B
Potential Methods*	6	GEOS-04/A	B
Seismology*	6	GEOS-04/A	B
Complementary subjects: two courses chosen from Group 4 (12 ECTS) Recommended choices: • Fluid Dynamics • Well-Logging • Water Resources Management and Sustainability • Environmental Fluid Mechanics • Physics and Modelling of Turbulent Flows • Hydraulic and Hydrogeological Risk	 6 6	 	 C C
Group 1/2/3 courses – advanced concepts and skills on geology/geophysics/physics. **Five courses chosen from Group 1 (12 ECTS).** **Recommended choices:** • Marine Geology • Applied Hydrogeology • Dynamics and Protection of Coastal Areas • Hydrogeological Risk **One course chosen from Group 2 (6 ECTS).** **Recommended choices:** • Physics of Atmosphere • Fluidodinamica Geofisica (Geophysical Fluid Dynamics) • Group 3 (12 ECTS)	30		B

2nd YEAR (60 ECTS)

COURSE	ECTS	DISC.	TYPE
Complementary subject (see above)	6		C
Elective course	12		D
Internship	6		F
Final exam/Thesis	36		E

UNIVERSITÀ DEGLI STUDI DI TRIESTE

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For further info on the degree programmes

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