



Study Plan

School: Institute for Advanced Studies and Research
Degree: Doctorate
Course: Earth and Space Sciences (cód. 657)

Specialization Atmospheric Physics and Climate

1st Year - 1st Semester

Specialization Atmospheric Physics and Climate

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
FIS12703	Techniques for Observation, Data Acquisition and Processing	*** TRANSLATE ME: Física da Terra e do Espaço ***	4	Semester	104
FIS12662	Seminar on Earth and Space Sciences	*** TRANSLATE ME: Física da Terra e do Espaço/Geologia ***	2	Semester	52
FIS12663	Seminar I (Atmospheric Physics and Climate)	*** TRANSLATE ME: Física da Terra e do Espaço/Física ***	8	Year	208
Thesis					

1st Year - 2nd Semester

Specialization Atmospheric Physics and Climate

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
Thesis					

2nd Year - 3rd Semester

Specialization Atmospheric Physics and Climate

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
FIS12664	Seminar II (Geophysics)	*** TRANSLATE ME: Física da Terra e do Espaço/Física ***	8	Year	208
GEO12665	Seminar III (Geological Processes)	Geology	8	Year	208
Thesis					

2nd Year - 4th Semester

Specialization Atmospheric Physics and Climate

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
Thesis					

3rd Year - 5th Semester

Specialization Atmospheric Physics and Climate

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
Thesis					



**3rd Year - 6th Semester
Specialization Atmospheric Physics and Climate**

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
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**4th Year - 7th Semester
Specialization Atmospheric Physics and Climate**

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
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Thesis

Specialization Geophysics

**1st Year - 1st Semester
Specialization Geophysics**

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
FIS12703	Techniques for Observation, Data Acquisition and Processing	*** TRANSLATE ME: Física da Terra e do Espaço ***	4	Semester	104
FIS12662	Seminar on Earth and Space Sciences	*** TRANSLATE ME: Física da Terra e do Espaço/Geologia ***	2	Semester	52
FIS12663	Seminar I (Atmospheric Physics and Climate)	*** TRANSLATE ME: Física da Terra e do Espaço/Física ***	8	Year	208

Thesis

**1st Year - 2nd Semester
Specialization Geophysics**

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
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Thesis

**2nd Year - 3rd Semester
Specialization Geophysics**

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
FIS12664	Seminar II (Geophysics)	*** TRANSLATE ME: Física da Terra e do Espaço/Física ***	8	Year	208
GEO12665	Seminar III (Geological Processes)	Geology	8	Year	208

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**2nd Year - 4th Semester
Specialization Geophysics**

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
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Thesis



**3rd Year - 5th Semester
Specialization Geophysics**

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
Thesis					

**3rd Year - 6th Semester
Specialization Geophysics**

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
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**4th Year - 7th Semester
Specialization Geophysics**

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
Thesis					

Specialization Geological Processes

**1st Year - 1st Semester
Specialization Geological Processes**

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
FIS12703	Techniques for Observation, Data Acquisition and Processing	*** TRANSLATE ME: Física da Terra e do Espaço ***	4	Semester	104
FIS12662	Seminar on Earth and Space Sciences	*** TRANSLATE ME: Física da Terra e do Espaço/Geologia ***	2	Semester	52
FIS12663	Seminar I (Atmospheric Physics and Climate)	*** TRANSLATE ME: Física da Terra e do Espaço/Física ***	8	Year	208
Thesis					

**1st Year - 2nd Semester
Specialization Geological Processes**

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
Thesis					

**2nd Year - 3rd Semester
Specialization Geological Processes**

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
FIS12664	Seminar II (Geophysics)	*** TRANSLATE ME: Física da Terra e do Espaço/Física ***	8	Year	208
GEO12665	Seminar III (Geological Processes)	Geology	8	Year	208
Thesis					



2nd Year - 4th Semester
Specialization Geological Processes

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
Thesis					

3rd Year - 5th Semester
Specialization Geological Processes

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
Thesis					

3rd Year - 6th Semester
Specialization Geological Processes

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
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4th Year - 7th Semester
Specialization Geological Processes

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
Thesis					



Conditions for obtaining the Degree:

*** TRANSLATE ME: Área de Especialização em Física da Atmosfera e do Clima: {\ }newline

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Para aprovação na componente curricular nesta especialização deste programa de doutoramento é necessário a aprovação (através de avaliação ou creditação) das seguintes unidades curriculares:

{\ }newline

1.º Ano

1.º Semestre

3 UC Obrigatórias num total de 14 ECTS {\ }newline

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2.º Ano

2 UC Obrigatórias num total de 16 ECTS

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Para obtenção do grau, é necessário a aprovação na tese num total de 166 ECTS {\ }newline

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Area de Especialização em Geofísica: {\ }newline

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Para aprovação na componente curricular nesta especialização deste programa de doutoramento é necessário a aprovação (através de avaliação ou creditação) das seguintes unidades curriculares: {\ }newline

{\ }newline

1.º Ano

1.º Semestre

3 UC Obrigatórias num total de 14 ECTS {\ }newline

{\ }newline

2.º Ano

2 UC Obrigatórias num total de 16 ECTS

{\ }newline

Para obtenção do grau, é necessário a aprovação na tese num total de 166 ECTS

Área de Especialização em Processos Geológicos: {\ }newline

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Para aprovação na componente curricular nesta especialização deste programa de doutoramento é necessário a aprovação (através de avaliação ou creditação) das seguintes unidades curriculares: {\ }newline

{\ }newline

1.º Ano

1.º Semestre

3 UC Obrigatórias num total de 14 ECTS {\ }newline

{\ }newline

2.º Ano

2 UC Obrigatórias num total de 16 ECTS

{\ }newline

Para obtenção do grau, é necessário a aprovação na tese num total de 166 ECTS ***

Program Contents

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Techniques for Observation, Data Acquisition and Processing (FIS12703)

Study of different remote sensing ground based instruments and their physical principles (RADAR, LIDAR, Spectroscopy, Photometry, Interphotometry). Satellite remote sensing sensors. Physical principles of remote sensing. Passive and active systems. In situ monitoring systems. Meteorological instruments and radiosounding systems. GPS (GDSN) differential. Seismometers, geophones, georesistivimeters, gravimeters, magnetometers. Local, regional and Global observation network. Acquisition, recording data processing and interpretation in order to setup interpretative models for different geophysical phenomena.



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Seminar on Earth and Space Sciences (FIS12662)

General

- Research in communication sciences: interdisciplinary and research paradigms.
- Research and source criticism: literature research, indexing and referencing norms.
- Development of scientific reading skills: reading sheets, summaries, keywords.
- The production of the manuscript: academic writing and the importance of source identification.

Specific

Due to the specific objectives of this course content will vary from year to year. However, the program will provide advanced knowledge in the areas of Earth and Space, in particular in the following areas: Observation systems, detection and monitoring techniques of the earth and space; Solar and Planetary Physics; Seismology and seismic risk; Geophysical Prospecting.

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Seminar I (Atmospheric Physics and Climate) (FIS12663)

To provide students with advanced knowledge in the field of Atmospheric and Climate Sciences, in particular in the following areas:

- Main techniques for remote sensing of the atmosphere.
- Relevant atmospheric processes, physical processes of the atmosphere and their coupling with the oceans and the surface of the Earth; Atmospheric modeling.
- Current issues of Climate and natural and anthropogenic climate change.
- Flows; Constructional theory; Laws of scale; Applications.
- Atmospheric electricity and its interaction with local meteorology;

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Seminar II (Geophysics) (FIS12664)

To provide students with advanced knowledge in the area of Internal and Applied Geophysics, in particular in the following fields:

- Seismology;
- Earthquake Source and Ground Strong Motions Modelling;
- Crustal Deformation Monitoring and Modelling;
- Rheology of the Earth;
- Energy Transfer Phenomena through Earth's Systems;
- Potential Fields Methods (Gravity and Magnetism geophysical methods).

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Seminar III (Geological Processes) (GEO12665)

To provide students with advanced knowledge in the area of Geological Processes, in particular in the following fields:

- Orogenic processes;
- Transpressive regimes; from kinematics to the dynamics;
- Non conventional Isotopes;
- Micro-analytical techniques in Earth-Sciences;
- Modelling of the Crustal Deformation;
- Seismotectonics ;
- Rheology of the Earth;
- Geochronology of the Orogenic Processes.