Study Plan

School: School of Sciences and Technology
Degree: Master
Course: Chemistry (cód. 189)

Specialization Chemistry of Materials

1st Year - 1st Semester
Specialization Chemistry of Materials

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
QUI08460	Development of Advanced Porous Materials	Chemistry	5	Semester	130
QUI08461M	Analysis and Characterisation of Materials	Chemistry	5	Semester	130
QUI08462M	Advanced Organic Chemistry	Chemistry	5	Semester	130
QUI08463M	Separation and Identification of Organic Compounds	Chemistry	6	Semester	156
QUI08465M	Modeling and Simulation in Chemistry	Chemistry	5	Semester	130
MAT07656	Experimental Planning	Mathematics	4	Semester	104

1st Year - 2nd Semester
Specialization Chemistry of Materials

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
QUI08468M	Adsorption in Nanoporous Materials	Chemistry	5	Semester	130
QUI08469M	Principles of Green Chemistry	Chemistry	2	Semester	52
QUI08467M	Homogeneous and Heterogeneous Catalysis	Chemistry	5	Semester	130

1st Year - 2nd Semester
Specialization Chemistry of Materials

Component code	Name	Scientific Area Field	ECTS	Duration	Hours

***** TRANSLATE ME:Optativas Grupo I, II e III *****

Component code	Name	Scientific Area Field	ECTS	Duration	Hours

Group of Options

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
QUI08470M	Chemistry of Polymers	Chemistry	6	Semester	156
QUI08471M	Advanced Carbon Materials	Chemistry	6	Semester	156
QUI08472	Bioapplications of Porous Materials	Chemistry	6	Semester	156
QUI08473M	Electrochemistry and Corrosion	Chemistry	6	Semester	156

Group of Options

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
QUI08475M	Advanced Organic Synthesis	Chemistry	6	Semester	156
QUI08474M	Medicinal Chemistry	Chemistry	6	Semester	156
QUI08476M	Functional Organic and Organometallic Materials	Chemistry	6	Semester	156
QUI08477	Reactivity and Mechanisms	Chemistry	6	Semester	156

Group of Options

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
QUI08478M	Materials for Eletronics and Optics	Chemistry	6	Semester	156
QUI08479	Thermophysical and Thermochemical Properties	Chemistry	6	Semester	156
QUI08480M	Quantum Chemistry	Chemistry	6	Semester	156

2nd Year - 3rd Semester
Specialization Chemistry of Materials

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
QUI08481	Seminar	Chemistry	2	Year	52

Mandatory alternatives

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
Dissertation					
Internship					

2nd Year - 4th Semester
Specialization Chemistry of Materials

Component code	Name	Scientific Area Field	ECTS	Duration	Hours

Mandatory alternatives

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
Dissertation					
Internship					

Conditions for obtaining the Degree:

*** TRANSLATE ME: Para aprovação na componente curricular é necessário a aprovação (através de avaliação ou creditação) das seguintes unidades curriculares:{\}newline

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1º Semestre:{\}newline

6 UC obrigatórias num total de 30 Ects{\}newline

{\}newline

2º Semestre:{\}newline

3 UC obrigatórias num total de 12 Ects{\}newline

2 UC optativas do Grupo I num total de 12 Ects{\}newline

1 UC Optativa dos Grupo I, II ou III num total de 6 ECTS{\}newline

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3º Semestre{\}newline

1 UC obrigatórias num total de 2 Ects{\}newline

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Para obtenção do grau, é necessário também a aprovação na Dissertação ou Relatório de Estágio, com um total de 58 ECTS, no 3.º e 4.º Semestre. ***

Specialization Organic Chemistry

1st Year - 1st Semester
Specialization Organic Chemistry

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
QUI08460	Development of Advanced Porous Materials	Chemistry	5	Semester	130
QUI08461M	Analysis and Characterisation of Materials	Chemistry	5	Semester	130
QUI08462M	Advanced Organic Chemistry	Chemistry	5	Semester	130
QUI08463M	Separation and Identification of Organic Compounds	Chemistry	6	Semester	156
QUI08465M	Modeling and Simulation in Chemistry	Chemistry	5	Semester	130
MAT07656	Experimental Planning	Mathematics	4	Semester	104

1st Year - 2nd Semester
Specialization Organic Chemistry

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
QUI08468M	Adsorption in Nanoporous Materials	Chemistry	5	Semester	130
QUI08469M	Principles of Green Chemistry	Chemistry	2	Semester	52
QUI08467M	Homogeneous and Heterogeneous Catalysis	Chemistry	5	Semester	130

1st Year - 2nd Semester
Specialization Organic Chemistry

Component code	Name	Scientific Area Field	ECTS	Duration	Hours

***** TRANSLATE ME:Optativas Grupo I, II e III *****

Component code	Name	Scientific Area Field	ECTS	Duration	Hours

Group of Options

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
QUI08474M	Medicinal Chemistry	Chemistry	6	Semester	156
QUI08475M	Advanced Organic Synthesis	Chemistry	6	Semester	156
QUI08476M	Functional Organic and Organometallic Materials	Chemistry	6	Semester	156
QUI08477	Reactivity and Mechanisms	Chemistry	6	Semester	156

Group of Options

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
QUI08470M	Chemistry of Polymers	Chemistry	6	Semester	156
QUI08471M	Advanced Carbon Materials	Chemistry	6	Semester	156
QUI08472	Bioapplications of Porous Materials	Chemistry	6	Semester	156
QUI08473M	Electrochemistry and Corrosion	Chemistry	6	Semester	156

Group of Options

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
QUI08478M	Materials for Eletronics and Optics	Chemistry	6	Semester	156
QUI08479	Thermophysical and Thermochemical Properties	Chemistry	6	Semester	156
QUI08480M	Quantum Chemistry	Chemistry	6	Semester	156

2nd Year - 3rd Semester
Specialization Organic Chemistry

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
QUI08481	Seminar	Chemistry	2	Year	52

Mandatory alternatives

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
Dissertation					
Internship					

2nd Year - 4th Semester
Specialization Organic Chemistry

Component code	Name	Scientific Area Field	ECTS	Duration	Hours

Mandatory alternatives

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
Dissertation					
Internship					

Conditions for obtaining the Degree:

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1º Semestre:{\}newline

6 UC obrigatórias num total de 30 Ects{\}newline

{\}newline

2º Semestre:{\}newline

3 UC obrigatórias num total de 12 Ects{\}newline

2 UC optativas do Grupo II num total de 12 Ects{\}newline

1 UC Optativa do Grupo I, II ou III num total de 6 ECTS{\}newline

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3º Semestre{\}newline

1 UC obrigatórias num total de 2 Ects{\}newline

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Para obtenção do grau, é necessário também a aprovação na Dissertação ou Relatório de Estágio, com um total de 58 ECTS, no 3.º e 4.º Semestre.{\}newline

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Conditions for obtaining the Degree:

*** TRANSLATE ME: ESPECIALIZAÇÃO EM QUÍMICA DOS MATERIAIS:{\}newline

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

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1º Semestre:{\}newline

6 UC obrigatórias num total de 30 Ects{\}newline

{\}newline

2º Semestre:{\}newline

3 UC obrigatórias num total de 12 Ects{\}newline

2 UC optativas do Grupo I num total de 12 Ects{\}newline

1 UC Optativa dos Grupo I, II ou III num total de 6 ECTS{\}newline

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3º Semestre{\}newline

1 UC obrigatórias num total de 2 Ects{\}newline

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Para obtenção do grau, é necessário também a aprovação na Dissertação ou Relatório de Estágio, com um total de 58 ECTS, no 3.º e 4.º Semestre.{\}newline

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ESPECIALIZAÇÃO EM QUÍMICA ORGÂNICA:{\}newline

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

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1º Semestre:{\}newline

6 UC obrigatórias num total de 30 Ects{\}newline

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2º Semestre:{\}newline

3 UC obrigatórias num total de 12 Ects{\}newline

2 UC optativas do Grupo II num total de 12 Ects{\}newline

1 UC Optativa do Grupo I, II ou III num total de 6 ECTS{\}newline

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3º Semestre{\}newline

Program Contents

Back
Development of Advanced Porous Materials (QUI08460)

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Analysis and Characterisation of Materials (QUI08461M)

Back
Advanced Organic Chemistry (QUI08462M)

Back
Separation and Identification of Organic Compounds (QUI08463M)

Back
Modeling and Simulation in Chemistry (QUI08465M)

Back
Experimental Planning (MAT07656)

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Adsorption in Nanoporous Materials (QUI08468M)

Back
Principles of Green Chemistry (QUI08469M)

Back
Homogeneous and Heterogeneous Catalysis (QUI08467M)

Introduction to homogeneous and heterogeneous catalysis. Organometallic compounds in homogeneous catalysis: fundamental concepts, organometallic reactions and catalytic cycles.
Homogeneous catalysis in heavy chemistry and fine chemicals. Study of some important cases. Heterogeneous Catalysis: deactivation and preparation of catalysts. Catalytic activity of porous materials. Kinetics and mechanisms of heterogeneous catalysis. Introduction to catalytic reactors.
Asymmetric catalysis: fundamental concepts and important reactions. Asymmetric organocatalysis. Application of enzymes. Asymmetric heterogeneous catalysis.

Back
Chemistry of Polymers (QUI08470M)

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Advanced Carbon Materials (QUI08471M)

Short Program:
1: Presentation. 2: Structure. 3: Reactivity. 4: Precursors. 5: Textural Characterisation. 6: Chemical Characterisation. 7: Carbon Black. 8: Activated Carbon. 9: Carbon Membranes and Molecular Sieves. 10: Carbon Fibres and Composites. 11: Carbon in Metallurgy. 12: Fullerenes, Nanotubes and Graphene. 13: Carbon in Electrochemistry and Catalysis. 14: Diamond.
The theoretical program is complemented by a short laboratory project carried out in a block in the middle of the semester and by problems classes.

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Electrochemistry and Corrosion (QUI08473M)

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Advanced Organic Synthesis (QUI08475M)

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Medicinal Chemistry (QUI08474M)

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Functional Organic and Organometallic Materials (QUI08476M)

Basic concepts of functional molecular materials: perspective of organic and organometallic compounds. Synthetic methods of organometallic and organic functional materials. Description of organometallic and organic materials for application in chemistry, physics and biology/medicine. Chemical sensors: fullerenes, macrocyclic compounds, polymeric and supramolecular architectures. Application in physics: drivers and molecular switches, LEDs, liquid crystals, luminescent materials, molecular nonlinear optoelectronic materials, photochromic materials, materials for solar panels, photovoltaic systems and optical recording, etc.). Application in biology and medicine: sensors, binding to DNA, anti-carcinogenic agents, degenerative diseases, etc.).

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Materials for Eletronics and Optics (QUI08478M)

Materials with important electrical and magnetic properties for technological applications.
HTS: state of the art.
Ion conductors; fuel cells, electrodes and electrolytes.
Applications of dielectric materials.
Nanomaterials: effect "nano"in the properties and applications of traditional compounds under study.
Materials used in solar energy conversion, including materials with photoelectrochemical activity and photocatalytic activity.
Chemistry and technology of materials for optoelectronics and photonics. State of the art.
Devices and materials for optoelectronics. Liquid crystals. Photoconductors. Luminescent materials. Nonlinear optical properties. Data transmission. Magneto-optical recording.

Back

Quantum Chemistry (QUI08480M)

Reviews of quantum mechanics concepts. Postulates of quantum mechanics. Time independent perturbation theory. The hydrogen atom. The helium atom. Slater determinants. The Hartree-Fock method. The Koopman's theorem. Electronic correlation. The electron spin and the Pauli principle. Many-electron atoms. Homonuclear diatomic molecules. Ab-initio methods and the Density Functional Theory.

Seminar (QUI08481)