



UNIVERSIDAD  
COMPLUTENSE  
MADRID



Bachelor's Degree  
Sciences

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Chemistry

# Syllabus

COURSE TYPE	ECTS
Compulsory Core Courses	60
Compulsory Courses	126
Elective Courses	36 *
Bachelor's Degree Final Project	18
<b>TOTAL</b>	<b>240</b>

\* Includes 12 ECTS for External Internships.

Offers a bilingual group English-Spanish.

FIRST YEAR	ECTS
Biology	6
Applied Statistics and Numerical Methods	6
General Physics	9
Geology	6
Applied Computer Chemistry	6
Mathematics	9
Basic Laboratory Operations	6
General Chemistry	12

SECOND YEAR	ECTS
Materials Science	6
Chemical Engineering	9
Analytical Chemistry I	9
Physical Chemistry I	12
Inorganic Chemistry I	12
Organic Chemistry I	12

THIRD YEAR	ECTS
Biochemistry	9
Analytical Chemistry III	6
Analytical Chemistry II	9
Physical Chemistry II	12
Inorganic Chemistry II	12
Organic Chemistry II	12

FOURTH YEAR	ECTS
Design and Implementation of a Project in Chemistry	6
Six Electives or four Electives and External Internships	36
Bachelor's Degree Final Project	18

ELECTIVE COURSES	ECTS
Applied Analysis and Quality	6
Bioinorganic Chemistry	6
Environmental Biochemistry	6
Computational Chemistry	6
Metallic Materials: Production and Performance in Service	6
Advanced Methodologies in Analytical Chemistry	6
Spectroscopic Methods Applied to Chemistry	6
Molecular Modelling and Simulation Methods	6
Environmental Analytical Chemistry	6
Solid State Chemistry and Advanced Inorganic Materials	6
Applied Organic Chemistry	6
Applied Physical Chemistry	6
Structural Organic Chemistry	6
Organometallic Chemistry: Applications in Catalysis	6
Organic Synthesis	6
Environmental Technology	6
External Internships	12

PARTICIPATION CREDITS	ECTS
Any course	6

## Knowledge acquired

- Chemical language concerning nomenclature and formulation of elements and compounds.
- Fundamental concepts of chemistry: laws of chemical combination, stoichiometry, composition of matter, atomic structure, periodic properties of the elements, aggregation states and chemical bonds.
- Fundamental concepts of chemical equilibrium, structure and reactivity and their practical applications.
- Instrumental analysis and separation techniques
- Analytical chemistry as a metrological science.
- Chemical bond, structure, properties, obtaining methods and chemical reactions.
- Main topics of coordination, organometallic and solid state chemistry.
- Experimental methods for synthesis and characterization of inorganic compounds.
- Principles of chemical thermodynamics.
- Principles of statistical thermodynamics.
- Quantum mechanics and its application to spectroscopy and to determination of the properties of atoms, molecules and solids.
- Chemical and electrochemical reactions in terms of reaction mechanisms and rate equations.
- Structural bases of organic compounds and their physical, spectroscopic and chemical properties.
- Protocols for synthesis, isolation and purification of organic compounds.
- Structure of biological macromolecules and their determining factors.
- Function and understanding of cells in chemical terms.
- Principles of metabolism and metabolic pathways. Biosynthesis of proteins and nucleic acids.
- Experimental methods in biochemistry and biological chemistry.
- Principles of mechanics and relationships to one and many particles and fluid systems.
- Mathematical fundamentals: variables and functions, differential equations and applied statistics.
- Most relevant processes in the chemical industry.

## Professional opportunities

- Municipal and provincial chemists.
- Chemists for/in public health institutes.
- Customs chemists.
- Chemists for any government agency, or state companies (even indirectly), where this specific function is required.
- Chemists for private companies.
- Clinical analysis.
- Clinical biochemistry.
- Microbiology and parasitology.
- Radiopharmacy.
- (specialist in) Clinical radiophysics.
- University teaching.
- Secondary school teaching.
- Scientific research.





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Grados UCM



## Faculty of Chemical Sciences

Campus de Moncloa  
[quimicas.ucm.es](http://quimicas.ucm.es)

For further information: [www.ucm.es/estudios/grado-quimica](http://www.ucm.es/estudios/grado-quimica)

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