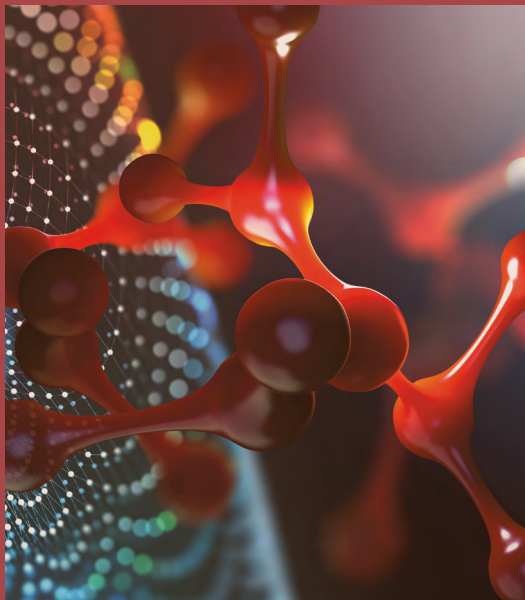
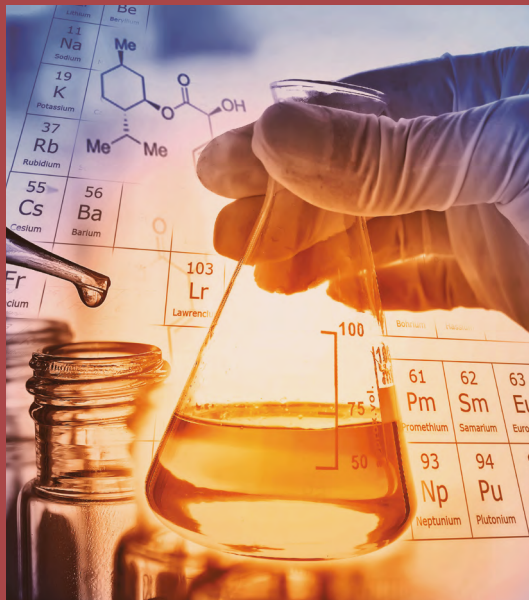




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Double Bachelor's Degree  
Sciences

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Chemistry /  
Biochemistry

# Syllabus

COURSE TYPE	ECTS
Compulsory Core Courses	78
Compulsory Courses	240
Bachelor's Degree Final Project	36
<b>Total</b>	<b>354</b>

FIRST YEAR	ECTS
Biology	12
General Biochemistry	6
Applied Statistics and Numerical Methods	6
General Physics	9
General Biology Laboratory	6
General Chemistry Laboratory	6
Mathematics	9
General Chemistry	12
Techniques of Biochemical Analysis I	6

SECOND YEAR	ECTS
Biosynthesis of Macromolecules	6
Materials Science	6
Enzymology	6
Structure of Biological Membranes	6
Protein and Nucleic Acid Structure	9
Applied Computer Chemistry	6
Laboratory of Biochemistry and Molecular Biology I	9
Laboratory of Biochemistry and Molecular Biology II	6
Regulation of Metabolism	6
Cell Signalling	6
Techniques of Biochemical Analysis II	6

THIRD YEAR	ECTS
Clinical Biochemistry	6
Genetic Engineering	6
Integrated Laboratory of Biomedical Applications	6
Clinical Microbiology, Parasitology and Virology	6
Molecular Pathology	6
Analytical Chemistry I	9
Physical Chemistry I	12
Inorganic Chemistry I	12
Organic Chemistry I	12

FOURTH YEAR	ECTS
Fundamentals of Bioreactors Design	6
Fundamentals of Biochemical Engineering	6
Immunology	6
Integrated Laboratory of Biotechnology	6
Biotechnological Processes	6
Analytical Chemistry II	9
Physical Chemistry II	12
Inorganic Chemistry II	12
Organic Chemistry II	12

FIFTH YEAR	ECTS
Biophysics and Bioinformatics	6
Integrated Laboratory of Biophysics and Bioinformatics	6
Analytical Chemistry III	6
Design and Implementation of a Project in Chemistry	6
Bachelor's Degree Final Project (Chemistry)	18
Bachelor's Degree Final Project (Biochemistry)	18

# Knowledge acquired

- Designation and formulation of chemical compounds.
- Techniques of analysis and separation.
- Bonds, structures, properties, obtaining and chemical reactions.
- Synthesis and characterization of inorganic compounds.
- Fundamentals of Analytical and Inorganic Chemistry.
- Principles of chemical thermodynamics and statistical thermodynamics.
- Quantum mechanics and its application to spectroscopy and the determination of the properties of atoms, molecules and solids.
- Structural bases of organic compounds and their physical, spectroscopic and chemical properties. Protocols for synthesis, isolation and purification of organic compounds.
- Principles of mechanics and relationships in particle and fluid systems.
- Mathematical fundamentals and applied statistics.
- Chemical Industry Processes.
- Biochemical concepts and principles.
- Physical principles involved in a biological process.
- Chemical transformations involved in a biological process.
- Molecular mechanisms of metabolism.
- Transmission of genetic information at the molecular and cellular level.
- Molecular basis of pathologies.
- Recognition of tissues, cells and subcellular organelles.
- Levels of structural organization of the proteins.
- Enzyme kinetics and mechanisms of enzyme regulation.
- Nucleic acids and genome organization.
- Isolation and quantification of biological macromolecules.
- Structure analysis of biological macromolecules.
- Biotechnological applications.



# Professional opportunities

This Joint (dual) Degree is designed to train professionals with a deep knowledge of the chemical basis of biological processes. Therefore, graduates will acquire a very appropriate and attractive educational background in many of the most advanced areas of research and industrial sectors (pharmaceutical, biotechnological, etc.) within the economy of developed countries.

- University teaching.
- Secondary school teaching.
- Scientific research.
- Chemists and biochemists in any institution of government agency, or in monopolies and state-owned companies (even indirectly), where this specific function is required.
- Chemists and biochemists for private firms (RTD, quality control, management, production, etc.).
- Chemical, pharmaceutical, food and biotechnology industries. Energy sector.
- Chemists for hygiene institutes.
- Customs chemists.
- QIR (Clinical Analysis, Clinical Biochemistry).
- Microbiology and parasitology.
- Immunology.
- Radiopharmacy.
- Specialist in Hospital radiophysics.





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## Faculty of Chemical Sciences

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

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

January 2023. Contents of this brochure is subject to changes

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