

First year

Core subjects

Subject	Description	Period/Language
1434 Biosynthesis of Macromolecules and their Regulation (5.0 ECTS credits)	Nucleic acid and protein synthesis mechanisms and their regulation.	2nd semester
1435 Instrumental Techniques in Biochemistry and Biology (6.0 ECTS credits)	Integrated laboratory approach to advanced biochemical experimentation and instrumentation. Foundations and applications of instrumental techniques in biochemical and biological experimentation.	Annual
1436 Analytical Biochemistry (5.0 ECTS credits)	Integrated laboratory approach to advanced experimentation and instrumentation. Methods and techniques in biochemical and clinical analysis.	2nd semester
1437 Methods and Techniques in Molecular Biology (5.0 ECTS credits)	Integrated laboratory approach to experimentation in advanced molecular biology. Techniques for in vitro handling of cells, cell cultures.	2nd semester
2301 Cell Biology (5.0 ECTS credits)	Cell biology techniques. Organization of the eukaryotic cell. Molecular structure of the cell. Cell physiology. Cell cultures.	2nd semester
2303 Enzymology (5.0 ECTS credits)	Mechanism of enzymatic reactions. Enzyme kinetics. Enzyme activation and inhibition: allosteric and cooperative effects. Experimental techniques and enzyme technology. Enzyme analysis.	1st semester
2310 Structure of Macromolecules (5.0 ECTS credits)	Theoretical and experimental approaches to chemical and physical properties of proteins, nucleic acids, polysaccharides and macromolecular complexes.	1st semester

Compulsory subjects

Subject	Description	Period/Language
1438 Biochemistry and Molecular Biology Complements (6.0 ECTS credits)	Foundations of biochemistry and molecular biology for access from Biology, Pharmacy, Medicine, Chemistry and Veterinary Science.	1st semester

Second year

Core subjects

Subject	Description	Period/Language
1553 Industrial Biochemistry and Biotechnology (3.5 ECTS credits)	Industrially involved biochemical processes.	2nd semester
1558 Metabolism Regulation (5.0 ECTS credits)	Description of metabolic pathways, their integration and regulation. Intermediary metabolism of carbohydrates, lipids, amino acids and nucleotides.	1st semester
1559 Microbial Biotechnology (3.5 ECTS credits)	Microbiological processes of industrial interest. Bioreactors. Organisms. Fermentation conditions. Primary and secondary metabolites. New products and applications.	1st semester

Second year

Core subjects

Subject	Description	Period/Language
2300 Biophysics (5.0 ECTS credits)	Biophysical analysis of biological processes at a cellular and molecular level: bioenergetics, transport, bioelectrical phenomena.	1st semester
2304 Genetic Engineering (5.0 ECTS credits)	Molecular genetics. Techniques of study and modification of genetic bases.	1st semester
2306 Clinical Biochemistry and Molecular Pathology (5.0 ECTS credits)	Alterations at a molecular level. Applications to clinical diagnosis.	1st semester
2311 Immunology (5.0 ECTS credits)	Introduction to immunology and immunocytochemistry: cellular and molecular aspects of immune reactions. Integration of the immune response in the organism.	2nd semester

Compulsory subjects

Subject	Description	Period/Language
1574 Biochemistry and Molecular Biology of Development (3.5 ECTS credits)	Biochemistry and molecular biology of the gene. Mechanism of cell differentiation. Mutagenesis.	2nd semester
1576 Food Biochemistry (3.5 ECTS credits)	Food composition. Modifications of components during treatment and storage.	2nd semester
1577 Biochemistry and Molecular Biology of Nutrition (3.5 ECTS credits)	Biochemistry and molecular biology of nutrition; basic aspects and alterations. Molecular nutrition and control of gene expression by nutrients.	2nd semester

Optional subjects

Second cycle

Subject	Description	Period/Language
0622 Analytical Separation Techniques (5.0 ECTS credits)	Introduction to separation methods. Non chromatographic methods. Chromatographic methods.	Annual
1356 Methods and Techniques in Cell Biology (5.0 ECTS credits)	Light and electron microscopy. Cytochemistry. Immuno-cytochemistry. In situ hybridization techniques. Separation techniques and cell cultures. Cell fractioning and component analysis. Methods to study cell receptors and signal transduction systems. Application of DNA recombinant technology to cell biology.	1st semester
1360 Methods and Techniques in Plant Physiology (3.5 ECTS credits)	Water. Mineral nutrition. Photosynthesis. Transpiration and respiration. Growth and growth regulators. Differentiation and in vitro propagation.	2nd semester
1361 Methods and Techniques in Microbiology (5.0 ECTS credits)	Microbiological methods. Microbiological media and culture techniques. Microbial growth control. Microbial identification.	1st semester
1363 Methods and Techniques in Genetics (3.5 ECTS credits)	Analyses of genetic data. Mapping and location of genes. Sequencing applications, RFLP, finger printing, VNTR, RAPD, and protein polymorphism.	2nd semester

Optional subjects

Second cycle

Subject	Description	Period/Language
1366 Virology (5.0 ECTS credits)	Definition, history and groups of viruses. Origin of viruses. Valuation and culture. The viral particle. Bacteriophages: cycle and specificity of infection. T4 phage model and other non-attenuated viruses. Attenuated viruses. Bacteriocines. Plant viruses. Insect pathogen viruses. Animal viruses (RNA, DNA and retrovirus).	2nd semester
1554 Methods and techniques in Animal Physiology (3.5 ECTS credits)	The need for animal experimentation. Physiological and pathological animal model design. Application to the study of the physiology of the organs and systems. Graphic recording methods in physiology.	1st semester
1555 Advanced Biophysical Methods (3.5 ECTS credits)	Advanced biophysical methods and techniques applied to the study of biological macromolecules.	2nd semester
1556 Advances in Biochemistry and Molecular Biology (3.5 ECTS credits)	Evolution of thinking in biochemistry. Latest relevant advances in biochemistry and molecular biology. Research seminars.	1st semester
1557 Membrane Biochemistry (3.5 ECTS credits)	Structure-function relationship. Membrane bioenergetics. Biogenesis. Artificial membranes.	2nd semester
1580 Ecological Biochemistry (3.0 ECTS credits)	Secondary metabolism. Chemical relationships between species. Polluting processes and toxicologic effects.	
1585 Biochemistry and Molecular Biology of Cancer (3.5 ECTS credits)	Carcinogenesis mechanisms. Oncology research techniques. Oncogenes and anti-oncogenes. Metastasis mechanisms.	1st semester
1586 Biochemistry and Vegetable Molecular Biology (3.5 ECTS credits)	Molecular bases of biochemical processes and vegetable development.	
1587 Animal biotechnology (5.0 ECTS credits)	Cell culture applications. Transgenic animals. Monoclonal antibodies. Obtention of recombinant proteins. Synthetic vaccinations.	
1588 Microbiological Analysis (5.0 ECTS credits)	Clinical samples. Food samples. Environmental samples.	1st semester
1590 Phylogeny and Evolution of Genes and Genomes (3.5 ECTS credits)	Structure and dynamics of genes. Evolutionary changes in nucleotide sequences. Phylogenetic methods. Macroevolution. Evolutionary rates and the molecular clock. Multigene families. Genome size, organization and evolution.	2nd semester
1591 Human Genetics (3.5 ECTS credits)	Hereditary diseases. Carrier diagnosis. Prenatal diagnosis. Gene mapping. Human genome. Human population genetics.	2nd semester
1592 Molecular Genetics (5.0 ECTS credits)	Organization of the genome in prokaryotes and eukaryotes. Mutation and repair of genetic material. Recombination. Transposable elements. Gene expression. Genome of organules. Genetic variability and molecular evolution.	1st semester
1593 General Neuro-endocrinology (3.5 ECTS credits)	Neurosecretion. Main neurosecretory regions. Endocrine regulation of behaviour and metabolism. Methods of study.	1st semester

Optional subjects

Second cycle

Subject	Description	Period/Language
1594 Neuro-pharmacology and Biology of Neuroreceptors (3.5 ECTS credits)	Principles and general pharmacological mechanisms. Biology of neuroreceptors.	1st semester
1595 Neurophysiology (5.0 ECTS credits)	Comparative structure of the nervous system. Embryology and evolution. Main functional blocks of the nervous system. Sensory and motor systems. Limbic system. Homeostatic functions. Higher functions.	1st semester
1597 Plant Production Technology (5.0 ECTS credits)	The physical environment: potential production of natural communities, forests and crops. Plant production, climate and soil. Technology of production: mineral nutrition and fertilisers. Crops and harvesting. Plant protection and diversity: conservation of genetic resources, propagation and multiplication of plants.	2nd semester
1598 Toxicology (3.5 ECTS credits)	Toxicity. Toxic phenomenon phases. Toxicity evaluation. Analytical toxicity.	2nd semester
1599 Research Project in Biochemistry and Molecular Biology (7.0 ECTS credits)	Research project. Design and development of a research project related to biochemistry and molecular biology under the guidance of a lecturer. Writing up and defending the research project.	Annual
1623 Molecular Endocrinology (3.5 ECTS credits)	Extracellular and intracellular signal networks. Hormones. Receptors. Interactions between intracellular communication pathways.	
1624 Reactor Design (3.5 ECTS credits)	Reactors in which industrially interesting biochemical processes are developed. Biological reactor engineering.	2nd semester
1625 Extended Study of Molecular Pathology (5.0 ECTS credits)	Biochemical mechanisms responsible for the development of diseases in humans and molecular biology techniques for their study, diagnosis and therapy.	2nd semester
2280 Medical Physics (5.0 ECTS credits)	Dosimetry. Biological effects of radiation. Radiologic protection. Instrumentation in medical physics. Evaluation of protection measures. Use of non-ionising radiation.	1st semester
2320 Data Analysis (3.5 ECTS credits)	Extended study of multivariate statistics. Factorial analysis. Automatic classification. Proximity analysis. Data analysis. Purifying and collecting data.	1st semester
2321 Structural Determination (5.0 ECTS credits)	Application of spectroscopic techniques to the determination of structures of chemical compounds.	Annual
2322 Advanced Organic Chemistry (6.5 ECTS credits)	Synthesis methods. Reaction mechanisms. Natural products.	Annual
2323 Advanced Physical Chemistry (6.5 ECTS credits)	Quantum chemistry and its application to spectroscopy. Transport and surface phenomena. Catalysis. Macromolecules in solution.	Annual
2325 Information Technologies (5.0 ECTS credits)	Technologies of conservation and recuperation of information. Construction of bibliographic, numerical, textual and factual databases.	1st semester

Optional subjects

Second cycle

Subject	Description	Period/Language
4819 Advanced Organic Chemistry (7.0 ECTS credits)	Synthesis methods. Reaction mechanisms. Natural products.	Annual
4820 Advanced Physical Chemistry (7.0 ECTS credits)	Quantum chemistry and its application to spectroscopy. Transport and surface phenomena. Catalysis. Macromolecules in solution.	Annual
4822 Structural Determination (5.0 ECTS credits)	Application of spectroscopic techniques to the determination of the structures of chemical compounds.	Annual
4841 Separation methods (5.0 ECTS credits)	Discontinuous methods. Chromatographic methods.	2nd semester
4848 Bio-inorganic Chemistry (5.0 ECTS credits)	Essential elements. Metal proteins. Bio-inorganic chemistry of nucleic acids. Toxicity. Inorganic biochemistry in medicine. Radiopharmacy.	1st semester
4850 Chemistry of Natural Products (5.0 ECTS credits)	Introduction to the chemistry of secondary metabolites. Shikimate route. Acetate route. Mevalonate route. Mixed metabolites. Secondary metabolism and ecology.	2nd semester

Optional subjects

First and Second cycle

Subject	Description	Period/Language
1294 (5.0 ECTS credits)		
1296 Applied Bio-Computer science (3.5 ECTS credits)		1st semester
1378 Land Ecology (3.5 ECTS credits)		1st semester