Universidad Rey Juan Carlos

GUÍA DOCENTE

BIOCHEMISTRY AND MOLECULAR BIOLOGY

(Extinción examen)

GRADO EN INGENIERÍA BIOMÉDICA (INGLÉS) (Plan antiguo) (2291)

CURSO 2026-27

Q2803011B UNIVERSIDAD REY JUAN CARLOS
Fecha firma: 23/11/2026 03:36 | Hash: 8524a2087224761ff4040f791fe96618.

Fecha de publicación: 02-07-2026

Q2803011B UNIVERSIDAD REY JUAN CARLOS
Fecha firma: 23/11/2026 03:36 | Hash: 8524a2087224761ff4040f791fe96618.

I.-Identificación de la Asignatura	
Tipo	OBLIGATORIA
Período de impartición	1 curso, 2Q semestre
Nº de créditos	6
Idioma en el que se imparte	Castellano

II.-Presentación

Q2803011B UNIVERSIDAD REY JUAN CARLOS
Fecha firma: 23/11/2026 03:36 | Hash: 8524a2087224761ff4040f791fe96618.

Biochemistry and Molecular Biology are dynamic and rapidly growing disciplines that studies living beings at the molecular level. So, to study the molecular basis of life through knowledge of the structure and function of biomolecules is necessary to study how the chemical and three-dimensional structures of biomolecules are; types and levels of molecular organization (how biological molecules interact with one another to give rise to supramolecular structures, cells, multicellular tissues and organisms); how cells synthesize and degrade biomolecules; how cells preserve and use energy; The mechanisms of cell signaling and metabolic integration and how genetic information is stored, transmitted and expressed; how the manipulation of the genetic material is carried out by recombinant DNA technology and to design and obtain biotechnological applications in the development of genetically modified organisms (GMOs), with emphasis in the huge development that this scientific field is currently experiencing as a result of the implementation of new technologies, in particular, genetic engineering and bioinformatics.

Relevance of the subject within the degree:

Biochemistry and Molecular Biology is a basic scientific field that provides general training to numerous biomedical careers. Thus, the student will acquire knowledge, including terms and concepts, that can be useful in other subjects of the degree.

Learning outcomes:

This course will try the student to understand the molecular mechanisms that governs the reactions that cells use for the maintenance of their vital functions. Special emphasis will be placed on the study of the proteins structure, and more specifically on the enzymatic action. Also student will have an overview of the fundamentals associated with metabolic pathways (anabolic and catabolic) that allow the assimilation and use of nutrients, as well as an introduction to the various aspects of metabolic regulation.With this subject it is intended that the student will acquire a comprehensive knowledge at the molecular level of fundamental biological processses, through the study of the structure, properties and organization of biomolecules, and the transformations to which they are subjected. Likewise, the student is expected to adquire knowledge about the research techniques used for the study of these biochemical processes. Finally, the course will focus on the main processes involved in the expression of the genetic message: replication, transcription and translation, emphasizing the huge development of this scientific field as a consequence of the implementation of new technologies, in particular genetic engineering and bioinformatics.

Previous knowledge:

For attending this subject students should have basic knowledge of Chemistry and Biology. In addition, it is recommended that the student should have fluency on reading and understanding scientific texts.

Lecturing Method:

1.- On-site theory lectures (45 lectures in the term, and an introduction to the subject by a review of the teaching guide).

2.- Synchronous telematics: Experimentality (Bioinformatics seminar: 4 hours).

3.- On-site: Experimentality; Intensive laboratory classes (3 days, 9 hours).

Due to the online nature of the bioinformatics seminar, it is mandatory to have a computer with a camera and microphone to connect to the Teams software.

Academic behaviour, academic integrity and honesty:

Non-ethic behaviour during seminars and theory and / or practical exams either if they are on-site or telematic (reading of notes and books related to the subject, asking other students or performing the exam on group, asking by mobile access or by smartwach via internet, telephone inquiries via call, SMS or any other type, etc.) are ABSOLUTELY FORBIDDEN. its practices will be penalized by denying the access to the classroom and qualifying the exam as FAIL with a numerical mark of 0.00.

According to the Dictionary of the Spanish Royal Academy, plagiarism consists of "copying in a substantial way other people's works, giving them as own". The plagiarism detected will be punished by qualifying work as FAIL with a numerical mark of 0.00.

The application of these measures does not prevent or cancel the appropriate actions, including the opening of the corresponding sanctioning issue by the academic authorities if necessary, contained in the code of academic conduct.

Indications about the functioning of the subject addressed to students taking this course at the Alcorcón campus.

Students enrolled in the Alcorcón campus (25% option) will attend online the theory classes of the onsite group (Fuenlabrada), using the *Teams* videoconference tool.

Regarding the experimentality (Lab practices and bioinformatics), students who have passed it in previous years will be kept the mark achieved, not needing to retake the experimentality activities. Students who have not passed it will have to take the activities, attending the call of the presential group (Fuenlabrada).

Regarding the group work, as it is a continuous evaluation, the mark obtained by the students in previous calls will not be kept. Students will form groups and will perform a work as defined later in this teaching guide. The powerpoint or video resulting from the work will be sent to the teacher via email for evaluation.

Regarding the tutorials, the same procedure will be followed as for the face-to-face group.

Q2803011B UNIVERSIDAD REY JUAN CARLOS
Fecha firma: 23/11/2026 03:36 | Hash: 8524a2087224761ff4040f791fe96618.

III.-Resultados de Aprendizaje

CB1. Proven knowledge and understanding of an area of study based on general secondary education and at a level which, although supported by advanced text books, also includes certain aspects that imply knowledge from the forefront of the field of study.
CB2 . That students are able to apply their knowledge to their work or vocation in a professional manner and have the skills that are typically demonstrated through the preparation and defense of arguments and problem solving within their field of study.
CE01 . Understand or acquire the principles of bioelectrical fundamentals, anatomy, physiology or pathophysiology needed to identify the most appropriate processing technologies for a given problem in biomedical engineering
CE29. Understand the principles of functioning of an organism from the cellular level through the tissue level to the biological system level.
CE30. Understand the of the molecular bases of genetics and proteins, the concepts of microbiology, pharmacology and proteomics and their applications in biomedicine.
CE32. Understand the fundamental concepts of molecular biology involved in the structure, organization and transmission of genes in living organisms, and the basis of epigenetics and metagenetics

- Leyenda para las titulaciones no adaptadas al RD 822/21: **CB** - competencias básicas, **CG** - competencias generales, **CE** - competencias específicas, **CT** - competencias transversales.
- Leyenda para las titulaciones adaptadas al RD 822/21: **CON** - conocimientos, **COM** - competencias, **HAB** - habilidades.

Q2803011B UNIVERSIDAD REY JUAN CARLOS
Fecha firma: 23/11/2026 03:36 | Hash: 8524a2087224761ff4040f791fe96618.

IV.-Contenido

IV.A.-Temario de la asignatura

THEORY

MODULE I. BIOMOLECULES

Unit 01. "Biomolecules". Water as a fundamental biomolecule: Suitability of the aqueous environment for living beings. Physico-chemical properties of water. Hydrogen bonds and other weak interactions. Water ionization; pH concept. Dissociation of weak acids and weak bases: buffer solutions or buffers. Buffers of physiological interest. Biomolecules as building blocks: carbohydrates, lipids, amino acids and nucleic acids. Classification, structure, biological function and properties.

Unit 02. "Amino acids and peptides". Peptide bond. Biochemical and molecular bases of protein folding. Levels of structural organization of proteins. Denaturation of proteins. Relationship between structure and biological function: alosterism and cooperativity. Definition of enzymes. Activation energy. Specificity of the enzymatic reaction: enzyme-substrate complex.

MODULE II. SUPRAMOLECULAR ORGANISATION

Unit 03. "Biological membranes: structure and function. Phenomena of transport through biological membranes". Composition and structure. Asymmetry of the membrane. Dynamics and membrane fluidity. Membrane functions. Diffusion. Permeability. Selective permeability. Balance of Gibbs-Donnan. Membrane potential. Types of transport through the membrane: Simple and facilitated dissemination. Active primary, secondary transport and translocation of groups.

Unit 04. "Cell signaling and signal transduction". Hormones and neurotransmitters. Chemical nature and classification of hormones and neurotransmitters. Transduction mechanisms; membrane receptors, G proteins, second messengers. Receptors with enzymatic activities.

MODULE III. BIOENERGETICS AND METABOLISM

Unit 05. "Introduction to metabolism". Thermodynamics of biochemical processes. Coupled reactions. High-energy molecules. Central role of ATP in cellular energy. Biological oxidation-reduction reactions. NAD(P)H and reducing power in biochemical processes. Metabolic pathways: anabolic, catabolic and amphibolic. Main mechanisms of metabolic regulation.

Unit 06. " Metabolism of carbohydrates". The glycolytic pathway: Phases, enzymatic reactions and energy efficiency. Anaerobic pathways of glucose utilization: lactic and alcoholic fermentation. Gluconeogenesis: gluconeogenic substrates. Specific enzymes of the gluconeogenic pathway. Coordinated gluconeogenesis-glycolysis regulation. Metabolism of glycogen.

Unit 07. " Oxidative stages in the catabolism of glucose ". Mitochondria: structure and function. PDH multienzyme complex. Krebs cycle. Performance. Regulation. Amphibolic nature of the cycle and anaplerotic pathways. Electron transport chain. Oxidative phosphorylation. Chemosmotic hypothesis. ATP synthase complex. Decoupling of oxidative phosphorylation: thermogenesis. Respiratory control.

Unit 08. "Lipid metabolism". Digestion and absorption of lipids. Mobilization and transport of fatty acids. Activation and transport to the interior of the mitochondria. Beta-oxidation. Formation and use of ketone bodies. Biosynthesis of fatty acids. Control of the metabolism of fatty acids. Biosynthesis of triglycerides.

Unit 09. "Protein metabolism". Digestion and absorption of protein from the diet. Protein replacement. General mechanisms of amino acid degradation. Cycle of urea. Biosynthesis of amino acids**.**

MODULE IV. EXPRESSION OF GENETIC INFORMATION

Unit 10. "Replication, repair and recombination of genomes". Chromosomal structure: circular and linear genomes. Functional units of DNA: genes. Mechanisms of replication: *cis* and *trans* elements, DNA polymerases. Replication fork. Telomere replication in eukaryotic chromosome. Mutations and repair mechanisms. Recombination. Reverse transcriptase and complementary DNA.

Unit 11. "Transcription." Types of transcribed RNA and RNA polymerases. Transcription mechanism: initiation, elongation and termination of the synthesis of the primary transcript. Elements that act in cis and elements in trans. Formation of the transcription complex in eukaryotes. Control of gene expression in prokaryotes: positive and negative regulation in bacterial operons. The Lac operon: negative control by repressor and positive by CAP protein. Other operons. Regulation in eukaryotes: signals, stages and mechanisms.

Unit 12. "Translation." Characteristics of the genetic code. tRNA and second genetic code. Ribosomes Initiation, elongation and termination of the translation. Inhibitors of protein synthesis. Control of the translation. Processes of post-translational maturation of proteins.

Unit 13. "Introduction to Genetic Engineering". Transgenic organisms and their applications. The Genome Project and the "in silico" cloning: computer tools frequently used in research. Concepts of Genomics and Proteomics.

EXPERIMENTALITY.

1.-SEMINARS

Q2803011B UNIVERSIDAD REY JUAN CARLOS
Fecha firma: 23/11/2026 03:36 | Hash: 8524a2087224761ff4040f791fe96618.

Seminar I. “Protein Lab”: Protein separation and purification techniques: solubility, precipitation, chromatographic techniques, electrophoresis, ultracentrifugation and quantification. Virtual purification of proteins with enzymatic activity. Analysis of the information contained in an amino acid sequence. Alignment of amino acid sequences of known proteins: predicting the function of new proteins and use in molecular evolution studies. Introduction of online computing resources

Seminar II. "Catalysis and regulation of enzymatic activity". Enzymatic kinetics. Model of Michaelis-Menten. Determination of parameters Vmax and Km. Coenzymes and cofactors of the enzymatic reaction. Effect of pH and temperature on the catalytic activity of enzymes. Enzymatic inhibition: types and characteristics. Allosteric regulation and regulation by covalent modification. Other forms of regulation: proenzymes or zymogens. Isozymes.

Seminar III. "Recombinant DNA technology”. The technology of recombinant DNA: definition of DNA clone. Restriction enzymes. DNA ligase. Cloning vectors. Plasmids: characteristics and types. Protein expression vectors. Vectors based on lambda phage (Fagos): characteristics and applications. Methods of nucleic acid analysis: Hybridization in solid support. Polymerase Chain Reaction (PCR). DNA sequencing. Genomic and cDNA libraries. Production of recombinant proteins of therapeutic and industrial value.

2.-LAB PRACTICES.

Practice 1: Bacterial transformation with exogenous DNA.

Practice 2: Fractional protein precipitation: obtaining fractions and quantitative determination of proteins.

Practice 3: Determination of the kinetic parameters Km and Vmax of the enzyme DOPA Oxidase for the substrate L-DOPA: 3.1 Preparation of the enzyme extract. 3.2. Measurement of enzyme activity. 3.3 Determination of the type of inhibition exerted by hydroxybenzoic acid (4-HBA) and the kmap and Vmaxap kinetic parameters in the presence of the inhibitor.

Q2803011B UNIVERSIDAD REY JUAN CARLOS
Fecha firma: 23/11/2026 03:36 | Hash: 8524a2087224761ff4040f791fe96618.

Q2803011B UNIVERSIDAD REY JUAN CARLOS
Fecha firma: 23/11/2026 03:36 | Hash: 8524a2087224761ff4040f791fe96618.

V.- Actividades formativas, metodología y método de evaluación

Las actividades formativas, las metodologías docentes y los sistemas de evaluación se adecúan al proceso de extinción de la asignatura, teniendo en cuenta que esta materia se encuentra en el segundo curso o posteriores. Por ello, la asignatura no tiene docencia, pero el alumnado tiene derecho a ser evaluado. La adecuación es la siguiente:

El personal docente facilitará los materiales de aprendizaje y/o bibliografía a través de Aula Virtual. Las actividades de evaluación se modificarán para que el estudiante pueda desarrollarlas, teniendo en cuenta que se elimina el componente presencial, salvo en la realización de exámenes durante las convocatorias oficiales. Esta adecuación es la misma para todas las convocatorias de evaluación.

Los sistemas de evaluación se adecúan al proceso de extinción de la asignatura. Las actividades de evaluación mediante las que se desarrollan los sistemas de evaluación previstos en la memoria verificada del título se aplicarán de modo que el alumnado pueda atenderlas adecuadamente. Esta adecuación es la misma para todas las convocatorias de evaluación. Por tanto, las actividades de evaluación podrán programarse durante las convocatorias oficiales (ordinaria, extraordinaria y adelantada).

El uso de herramientas basadas en inteligencia artificial está prohibido en cualquier ejercicio y prueba de evaluación de la asignatura salvo que el profesor lo indique de forma explícita en el enunciado o en el material de esta. En caso de que esté permitido, se darán indicaciones precisas de qué usos están permitidos y cuáles no.

V.A.B.- Descripción de la metodología de las actividades de evaluación y su ponderación

Q2803011B UNIVERSIDAD REY JUAN CARLOS
Fecha firma: 23/11/2026 03:36 | Hash: 8524a2087224761ff4040f791fe96618.

Los sistemas de evaluación aplicados en esta asignatura son los siguientes:

VII.-Assessment methods
VII.A.-Assessment weighting
Continuous ordinary assessment:
The distribution and characteristics of the assessment tests are those described below. Only in exceptional case and for special reasons may the teacher add changes to the Guide. These changes will require the prior consultation with the Subject Head and the prior and explicit authorisation of the Degree Programme Coordinator, who will notify the Vice-Rector?s office in charge of Academic Affairs of the modifications made. In any case, the changes proposed must take into account the stipulations of the verified report. In order for these changes to take effect, they must be duly communicated at the start of the course to the students using Aula Virtual.
The combination of activities that are not re-assessable cannot exceed 50% of the subject grade and, in general, cannot have a minimum grade (except for the case of laboratory or clinical work placements, where duly justified), and tests which exceed 60% of the subject weighting cannot be added. Extraordinary assessment: Students who do not manage to pass the ordinary assessment, or who did not attend, will be subject to completion of an extraordinary assessment to verify their acquisition of the skills established in the guide, only for activities that are re-assessable.

Description of the tests for assessment and their weights.
Procedure for the evaluation of the subject of BIOCHEMISTRY AND MOLECULAR BIOLOGY:
1.-Regular evaluation:
1.1.-Theory exams:
The theory exams evaluates knowledge and adquisition of related competences about the subject. First theory partial exam (mid-term) evaluates the whole module I and part of module II; Second theory partial exam (ordinary call) evaluates part of module II and the whole module III. Together, the exams accounts for the ordinary call. Both exams consists of a multiple choice test on the theoretical contents reviewed at units of the subject related to the specific modules. For each question only one of the answer options is correct. Wrong answer subtracts score (the grading criteria for each exam will be set out in the exam instructions). The minimum mark to pass this exam and consider tasks as adquired is 5,00 (in an scale of 0,00 to 10,00). If any or both of the partial exams are qualified as fail, the student should attend the extraordinary call to re-evaluate the partial or partials that failed on the ordinary call. Then, if theory part of the subject is qualified as Fail, whole subject will be qualified as Fail. The first theorý partial exam call will be announced by the "Novedades" channel of the Virtual Classroom platform. The ordinary call (for the second theory partial exam) will be published by Vice-Rectorate Office for Academic Planning. Both theory exams will be held on-site.
Remember that failing the theory part means that the whole subject will be qualified as Fail.
1.2.- Experimentality exam - Lab practices and bioinformatics:
Bioinformatics and lab practices are considered out of the ordinary call. It is an indispensable requirement to attend and carry out all sessions of the laboratory practices (on-site) and bioinformatics seminars (telematic) to pass the subject. Non-attendance implies to qualify Experimentality as Fail (and so the whole subject), even in the case that the evaluation exams were approved. Both bioinformatics and lab practices will be assesed in the same exam. The exam consist of a multiple choice test and/or exercices that include concepts and experimental approaches treated in both practices and bioinformatics seminars. Considering the test-type exam, for each question only one of the answer options is correct, and wrong answer subtracts score (the grading criteria for each exam will be set out in the exam instructions). Exam should be held on-site.
The minimum mark to pass the exam and consider tasks as adquired is 5.00 (in an scale of 0,00 to 10,00). Once the experimentality is passed, its qualification will be preserved until passing the theoretical part. Thus, in the case of repeating the subject, qualification obtained at experimentality (lab practices and bioinformatics) will be taken in consideration and it will be unnecessary to attend again.
Remember that failing the experimental part means that the whole subject will be qualified as Fail.
1.3.- Oral presentations of grupal work:
Up to 10% of the final mark for the completion and presentation of an academic guided work . The work supporting the oral presentation will be performed by a group work (about 5 people), on a students-interest topic related with biochemical or molecular biology in Biomedical Engineering. At the end of the regular teaching period, they must present a video / PowerPoint recording of a maximum of 10 min. as a evidence of the work (everyone participates in the video/PP speech and on-site presentation). Two follow-up seminars will be held prior to delivery. The work will be considered as part of the continuous

Q2803011B UNIVERSIDAD REY JUAN CARLOS
Fecha firma: 23/11/2026 03:36 | Hash: 8524a2087224761ff4040f791fe96618.

evaluation, and so there is no reevaluation if mark scores below 5,00.
Weighting in the final mark:
Theory: 1st partial exam (1/2): 35%; 2nd partial exam (2/2): 35%
Experimentality: Lab practices &Bioinformatics (20%), and oral presentation of grupal work (10%).
2.- Extraordinary evaluation exams (re-assessment; call of June):
If one or both of the activities (both theoretical and experimental) are not accomplished, re-assessment in a exam to be held in the extraordinary call is available. It has to be obtained estrictly a minimum mark of 5,00 to consider the re-assessed part of the subject as Pass. With a mark lower than 5,00 in any of the re-assessed parts, the subject qualification will be "Fail". Weighted average between theory and experimentality marks obtained if any of these are below 5,00 will NOT be considered. Exams will be held on-site.
3.- Exams review:
Students do have the right to review their exams. Review will be called after the publication of the provisional marks of the subject. After the review, the final marks will be published. All announcements and marks will be published at the Virtual Classroom platform.
4.-Qualification "Not presented" in the subject:
The qualification of "Not presented" in the subject will only be obtained when the student has not attended any of the evaluated tests of the subject, including the continuous evaluation and the ordinary and extraordinary calls.
5.- Academic exemption:
The academic exemption will only be applicable to the attendance to theory classes, with sessions attendance at 100% of lab practices and bioinformatics seminar.
6.- Anticipated call.
The student who has requested the anticipated call must contact the professor responsible for the course as soon as possible so that he/she can provide the necessary information and/or material for the evaluation, which will be similar to the one followed by the rest of the students enrolled in the subject.
VII.B. Assessment of students with an academic exemption
Student who wish to opt for this assessment will have to get an academic exemption for the subject, which they will have to request from the Dean or Director of the Centre which teaches their course. An academic exemption may be granted where the subjects own characteristics allow for it.
Subject with the possibility of an exemption: Yes
VII.C. Review of assessment tests
In accordance with the exam appeal regulations of the Universidad Rey Juan Carlos.
VII.D.-Students with a disability or special educational needs
Curricular adaptations for students with a disability or special educational needs will be determined by the Disabled Students Support Department, in accordance with the regulations governing the Disabled Students Support service, approved by the Universidad Rey Juan Carlos Council, in order to guarantee equal opportunities, inclusive treatment, universal accessibility and a greater guarantee of academic success. For this purpose, this Department will have to issue a curricular adaptation report, therefore students with disabilities or special
educational needs must contact the Department to analyse the different alternatives together.
VII.E.-Academic behaviour, academic integrity and honesty
The Universidad Rey Juan Carlos is completely committed to the highest standards of academic integrity and honesty. Therefore, studying at the URJC means you accept and agree to the academic integrity and honesty values described in the University's Code of Ethics. In order to monitor this procedure, the University has Regulations on academic behaviour at the Universidad Rey Juan Carlos and uses different tools (anti-plagiarism, supervision?) which provides a collective assurance that these essential values are completely developed.

V.C.- Revisión y reclamación de las actividades de evaluación

Se realizará conforme al Reglamento de evaluación de los resultados de aprendizaje de la Universidad Rey Juan Carlos.

V.D.- Alumnado con discapacidad o necesidades educativas especiales

Q2803011B UNIVERSIDAD REY JUAN CARLOS
Fecha firma: 23/11/2026 03:36 | Hash: 8524a2087224761ff4040f791fe96618.

Con el fin de garantizar la igualdad de oportunidades, la no discriminación, la accesibilidad universal y la mayor garantía de éxito académico, las adaptaciones curriculares para alumnado con discapacidad o con necesidades educativas especiales serán pautadas por la Unidad de Atención a Personas con Discapacidad, de acuerdo con la normativa que regula el servicio de Atención a Estudiantes con Discapacidad, aprobada por Consejo de Gobierno de la Universidad Rey Juan Carlos.
Para que esas adaptaciones puedan realizarse, será requisito la emisión de un informe de adaptaciones curriculares por parte de dicha Unidad, por lo que el alumnado con discapacidad o necesidades educativas especiales deberán contactar con este servicio para analizar conjuntamente las distintas opciones.

V.E.- Conducta académica, integridad y honestidad académica

La Universidad Rey Juan Carlos está plenamente comprometida con los más altos estándares de integridad y honestidad académica, por lo que estudiar en la URJC supone asumir y suscribir los valores de integridad y la honestidad académica recogidos en el Código Ético de la Universidad.

Para acompañar este proceso, la Universidad dispone de la Normativa de Convivencia de la Universidad Rey Juan Carlos y de diferentes herramientas (antiplagio, supervisión) que ofrecen una garantía colectiva para el completo desarrollo de estos valores esenciales.

Las herramientas basadas en inteligencia artificial pueden mejorar la experiencia de aprendizaje, pero debe utilizarse de forma ética, legal, honesta y transparente. Por este motivo, deben seguirse las recomendaciones de uso adecuado indicadas por los docentes de la asignatura.

Q2803011B UNIVERSIDAD REY JUAN CARLOS
Fecha firma: 23/11/2026 03:36 | Hash: 8524a2087224761ff4040f791fe96618.

VI.-Recursos y materiales didácticos

Bibliografía básica

Biochemistry. Jeremy M. Berg, John L. Tymoczko, Gregory J. Gatto, Jr, Lubert Stryer. (8th edition, 2015). 1120 pp. WH Freeman. **ISBN-10:** 1464126100**. ISBN-13:** 978-1464126109

Lehninger Principles of Biochemistry. David L. Nelson, Michael M. Cox. (6th edition, 2012). 1340 pp. Worth Publ Inc. **ISBN-10:** 1429234148**. ISBN-13:** 978-1429234146.

Biochemistry. Christopher K. Mathews, Kensal E. van Holde, Dean R. Appling. (4th Edition, 2012). 1368 pp**.** Pearson. **ISBN-10:** 0138004641. **ISBN-13:** 978-0138004644

Introduction to genetic analysis. Anthony J. F. Griffiths, Susan R. Wessler, Sean B. Carroll (11th edition, 2015). 896 pp. W.H. Freeman & Co. **ISBN-13:** 978-1-4641-0948-5.

Fundamentals of Biochemistry: Life at the Molecular Level. Donald Voet, Judith G. Voet, Charlotte W. Pratt (4th edition, 2012). 1077 pp. John Wiley & Sons Inc. **ISBN-10:** 1118129180**. ISBN-13:** 978-1118129180.

Genetics: A Conceptual Approach. Benjamin A. Pierce (5th edition, 2014). 864 pp. WH Freeman. **ISBN-10:** 146410946X**. ISBN-13:** 978-1464109461.

Concepts of genetics. William S. Klug, Michael R. Cummings, Charlotte A. Spencer, Michael A. Palladino (Student edition, 2014). 752 pp. Benjamin-Cummings Pub Co. **ISBN-13:** 978-0321948472

Bibliografía complementaria

Molecular Cell Biology. Harvey Lodish, Arnold Berk, Chris A. Kaiser, Monty Krieger, Anthony Bretscher, Hidde Ploegh, Angelika Amon, Kelsey C. Martin (8th Edition, 2016). 1280 pp. W. H. Freeman**. ISBN-10:** 1464183392**. ISBN-13:** 978-1464183393.

Molecular Biology of the Cell. Bruce Alberts, Alexander Johnson, Julian Lewis, David Morgan, Martin Raff. (6th edition , 2014)**.** 1464 pp. Garland Science**. ISBN-13:** 978-0815344322.

VII.-Profesorado

Q2803011B UNIVERSIDAD REY JUAN CARLOS
Fecha firma: 23/11/2026 03:36 | Hash: 8524a2087224761ff4040f791fe96618.