



UNIVERSIDAD AUTÓNOMA DE NUEVO LEÓN
SCHOOL OF MEDICINE
Ba CLINICAL CHEMISTRY



SYNTHETIC PROGRAM.

1. Identification data:	
• Institution	Universidad Autónoma de Nuevo León
• College	Faculty of Medicine
• Education program	Clinical Chemistry
• Learning unit	Molecular Biology
• Total hours of classroom, theory and practice	100
• Frequency in classroom per week	6
• Total extra hours Outside classroom)	50
• Modality	Schooled
• Academic period	Fifth Semester
• Type of learning unit	Mandatory
• Curricular area	ACFB
• UANL Credits	5
• Date of elaboration	21/06/2018
• Date of actualization	10/06/2024
• Responsible (s) for the design and	Celia Nohemí Sánchez Domínguez, PhD María Del Carmen Villalobos Torres, PhD Antonio Alí Pérez Maya, PhD Ana María G. Rivas Estilla, PhD

actualization	Ana María G. Rivas Estilla, PhD Ma. del Carmen Barboza Cerda, PhD Sonia A. Lozano Sepúlveda, PhD Celia N. Sánchez Domínguez, PhD
2.Purpose(s):	
The purpose of the Learning Unit (LU) of Molecular Biology (MB) is for the student to analyze the structural aspects, interactions, and metabolic processes that occur between the main macromolecules of life: DNA, RNA, and proteins (Dogma Central of Molecular Biology). Likewise, you will learn and analyze the fundamentals and applications of Molecular Medicine, molecular diagnostic tools used for the interpretation of genetic and infectious diseases, and biotechnology. This learning unit is located in the fifth semester. It is part of the basic instruction that the Clinical Chemistry Biologist student must acquire to base their professional practice within Molecular Medicine and Molecular Diagnostics. For this LU, use is made of the knowledge acquired in the LU of Biochemistry since it allows it to integrate the metabolism of biomolecules, including amino acids and nucleotides as fundamental elements of proteins and nucleic acids, respectively, of Morphological Sciences to recognize their aspects. Structural and functional of cells and tissues of medical physiology by basing the homeostatic processes of the organism. In turn, the LU of MB contributes to obtaining the LU's competencies in both Clinical Biochemistry by providing basic knowledge of the molecular tests used in the diagnosis of molecular diseases and Clinical Pathology by implementing and interpreting laboratory tests for the diagnosis of molecular diseases. Likewise, the LU of MB will be the basis of the optional UA of Molecular Diagnosis and Biotechnology since it will use the knowledge acquired in applying the tools of Molecular Biology to the molecular diagnosis of diseases (monogenic, multifactorial, and infectious), the studies of individual identification (forensic, paternity, and chimerism), and biotechnology. The LU of MB serves as a platform for promoting logical, critical, and purposeful thinking in students. It encourages them to analyze the structural characteristics of the macromolecules of life in relation to their function and their impact on the organism's functioning. Moreover, it provides opportunities for students to discuss societal health challenges, fostering interventions with a critical attitude and professional commitment. This LU also contributes to the general well-being of students and their colleagues, promoting respect for working conditions in the classroom and laboratory. The LU of MB is not just about theoretical learning; it's also about skill development. Students are encouraged to apply their knowledge of the Central Dogma of Molecular Biology to solve problems. They also develop skills for executing chemical and/or biological procedures in the analysis of samples, which are crucial for the clinical diagnosis of genetic diseases. Furthermore, they learn to apply their knowledge to understand and interpret the production of recombinant proteins, their purification, and their use in solving health problems.	

3. Competence of the graduate profile

- **General skills contributing to this learning unit**

Instrumental skills:

1. Use logical, critical, creative, and purposeful thinking to analyze natural and social phenomena that allow you to make relevant decisions with social responsibility in your sphere of influence.

Personal and social interaction skills:

2. Intervene in the face of the challenges of contemporary society, locally and globally, with a critical attitude and human, academic, and professional commitment to contribute to consolidating general well-being and sustainable development.

Integrative skills:

3. Resolve personal and social conflicts following specific techniques in the academic field and their profession for appropriate decision-making.

- **Specific skills of the graduate profile that contributes to the learning unit**

1. Solve problems by applying knowledge of the chemical composition of matter, as well as its physicochemical properties to determine analytes in biological, environmental and food matrices.
2. Execute physical, chemical and/or biological procedures in obtaining, handling, storing and analyzing samples to contribute to a reliable clinical, toxicological, chemical, food, forensic and environmental diagnosis.

4. Factors to consider for evaluating the learning unit

- Comparative tables
- Written work
- Evaluations
- Mental map
- Laboratory (includes flow charts, concept maps, reports, presentations and class presentation)
- Table
- Summary
- Seminar
- Course integrative project/product

5. Course integrative project/product:

Research Seminar on the molecular diagnosis of human diseases or any biotechnological application of biomedical interest

6. Sources of support and consultation (bibliography, hemerography, electronic sources):

1. Abali Emine.E, *Bioquímica*. España: editorial Lippincott Williams &Wilkins. 8va. Edición.
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3. #BiotechReview #cDNA #mRNA. cDNA Complementary DNA (2011). Recuperado de <https://www.youtube.com/watch?v=rKPJpxCW2qw>
4. Besme Allah. (12 de julio de 2017). *Pasos en la clonación de un gen*. [Archivo de video]. Recuperado de https://www.youtube.com/watch?v=lzBDO_YFNW4
5. Brandon Ortiz Casas. (24 de agosto de 2018). *Electroforesis de ADN: Conceptos Básicos*. [Archivo de video]. Recuperado de https://www.youtube.com/watch?v=KGZBRfHQU_Y
6. Brandon Ortiz Casas. (5 ene. 2018). *Reacción en Cadena de la Polimerasa (PCR): Conceptos Básicos*. [Archivo de video]. Recuperado de <https://www.youtube.com/watch?v=mslMRgxbdOA>
7. Brandon Ortiz Casas. (26 de febrero de 2018). *Secuenciación Maxam-Gilbert: Conceptos Básicos*. [Archivo de video]. Recuperado de <https://www.youtube.com/watch?v=gP0uDYjA6jI>

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9. CanalDivulgación. (2 de enero de 2014). *PCR: Reacción en Cadena de la Polimerasa (divulgación científica IQOG-CSIC)*. [Archivo de video]. Recuperado de <https://www.youtube.com/watch?v=TaHTjA5gKU>
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11. Coleman W.B, Tsongalis G. J., Molecular Diagnostics For the Clinical Laboratorian
12. DENISSE RODRIGUEZ ALVAREZ. (6 de junio de 2019). *DNA Microarrays*. [Archivo de video]. Recuperado de <https://www.youtube.com/watch?v=hJMdso9Salo>
13. Devlin, T. M. (2004). *Bioquímica*. España: editorial Reverté, S.A.
14. EMAbiolog. Clonación de un gen en un plásmido vector (2013). Recuperado de <https://www.youtube.com/watch?v=mLd4WdQHeSM>
15. GeneCards. Department of Molecular Genetics at the Weizmann Institute of Science. (2020). *The Human Gene Database*. Rehovot, Israel.: HBB Gene (Protein Coding) Hemoglobin Subunit Beta. <https://www.genecards.org/cgi-bin/carddisp.pl?gene=HBB&keywords=sickle.cell#diseases>
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18. Martínez-Rodríguez, H.G. y cols. (2017). *Manual de Laboratorio de Bioquímica*. México: Facultad de Medicina, UANL.
19. Martin K. Gold Bio. A Deep Dive Into Induction with IPTG. Recuperado de <https://www.goldbio.com/articles/article/a-deep-dive-into-iptg-induction>
28. *MalaCards: The human disease database*. Department of Molecular Genetics at the Weizmann Institute of Science. (2020). Rehovot, Israel.: Sick Cell Anemia (SKCA). Recuperado de https://www.malacards.org/card/sickle_cell_anemia?search=sickle%20cell%20anemia
29. McKee, T. y McKee, J. (2014). Bioquímica las bases moleculares de la vida. 5ª edición. España: editorial McGraw-Hill.
30. Medicurio.(22 Dic 2016). Duchenne Muscular Dystrophy and Dystrophin.Recuperado de <https://www.youtube.com/watch?v=Ebu8W8Osuxk&t=32s>
31. Menor-Salvan C. ChemEvol. SDS-PAGE: ELECTROFORESIS EN GEL DE POLIACRILAMIDA (2019). Recuperado de <http://www3.uah.es/chemevol/index.php/sds-page-electroforesis-en-gel-de-poliacrilamida/>
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33. NCBI. National Center for Biotechnology Information. <http://www.ncbi.nlm.nih.gov/Omim/searchomim.html>
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35. OMIM. McKusick-Nathans Institute of Genetic Medicine, Johns Hopkins University School of Medicine. (2020). *OMIM- Online Mendelian Inheritance in Man*. Baltimore, MA, EU: #310200 MUSCULAR DYSTROPHY, DUCHENNE TYPE; DMD. Recuperado de: <https://omim.org/entry/310200#molecularGenetics>

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47. Watson, J. D., Myers, R. M., Caudy, A. A., Witkowski, J.A. (2006). *Recombinant DNA: Genes and Genomes – A Short Course*. EUA: editorial Scientific American Books