



**UNIVERSIDAD AUTÓNOMA DE NUEVO LEÓN**  
**SCHOOL OF MEDICINE**  
**Ba CLINICAL CHEMISTRY**



**SYNTHETIC PROGRAM.**

<b>1. Identification data:</b>	
• Institution	Universidad Autónoma de Nuevo León
• College	School of Medicine
• Education program	Clinical Chemistry
• Learning unit	Molecular diagnostics and biotechnology
• Total hours of classroom, theory and practice	54
• Frequency in classroom per week	3 hours
• Total extra hours (Outside classroom)	30
• Modality	Face-to-face instruction
• Academic period	Sixth semester
• Type of learning unit	Optative
• Curricular area	ACFB-F
• UANL Credits	3
• Date of elaboration	11/12/2018
• Date of actualization	20/01/2023
• Responsible (s) for the design and actualization	Dra. C. Celia Nohemí Sánchez Domínguez, Dra. C. Ma. Del Carmen Villalobos Torres, Dr. C. Antonio Alí Pérez Maya, Dr. C. Daniel Arellano Soto

## **2.Purpose(s):**

The purpose of the module (LU) is to understand the application of molecular biology techniques in the analysis of the macromolecules of life: DNA, RNA and proteins, as tools for molecular diagnosis and biotechnology.

This learning unit is located in the sixth semester and is part of the professional training instruction that the Clinical Chemistry student must acquire as the fundamentals for their professional practice in a molecular biology laboratory.

For this LU, fundamentals acquired in the following Lus are required: Biochemistry allows them to integrate the metabolism of biomolecules, including amino acids and nucleotides as fundamental elements of proteins and nucleic acids respectively; Morphological sciences to recognize structural and functional aspects of cells and tissues; Medical physiology for the homeostatic processes of the organism; Molecular biology to provide basic knowledge of molecular tests used in the diagnosis of molecular diseases; and Clinical pathology to implement and interpret laboratory tests for the diagnosis of molecular diseases. Likewise, the LU of MD&B will be the basis of the optional UA Research and Thesis Seminar since it will use the knowledge acquired in the application of the tools of molecular biology in the areas described above.

The LU of MD&B B promotes use logical, critical, creative and proactive thinking in the student by determining the main tools of molecular biology required for the identification of individuals, the diagnosis of monogenic, multigenic and infectious diseases, as well as in pharmacogenomics and the use of molecular biology in the production of recombinant proteins and other biomedical applications.

Also, during this UA, spaces for discussion are favored about the challenges of our society in the area of health, generating interventions with a critical attitude, human and professional commitment. It contributes to consolidating the general well-being of oneself and one's colleagues, respecting the working conditions in the classroom.

<b>3. Competence of the graduate profile</b>
<ul style="list-style-type: none"> <li><b>General skills contributing to this learning unit</b></li> </ul> <p><b>Instrumental skills:</b></p> <p>5. To use logical, critical, creative and proactive thinking to analyze natural and social phenomena that allow them to make relevant decisions in their sphere of influence with social responsibility to apply autonomous learning strategies at different levels and fields of knowledge that allow them to make timely and relevant decisions in the personal, academic and professional spheres.</p> <p><b>Personal and social interaction skills:</b></p> <p>10. To intervene in the face of the challenges of contemporary society at the local and global level with a critical attitude and human, academic and professional commitment to contribute to consolidating general well-being and sustainable development.</p> <p><b>Integrative skills:</b></p> <p>14. To resolve personal and social conflicts, in accordance with specific techniques in the academic field and in their profession for appropriate decision-making.</p>
<ul style="list-style-type: none"> <li><b>Specific skills of the graduate profile that contributes to the learning unit</b></li> </ul> <p>2. To execute physical, chemical and/or biological procedures in the collection, handling, storage and analysis of samples to contribute to a reliable clinical, toxicological, chemical, food, forensic and environmental diagnosis.</p> <p>6. To interpret the results of analyses based on established criteria that allow timely and pertinent decision-making in clinical, toxicological, chemical, food, forensic, and environmental diagnosis.</p>
<b>4. Factors to consider for evaluating the learning unit</b>
<ul style="list-style-type: none"> <li>Partial evaluations.</li> <li>Accredited activities.</li> <li>Oral presentations.</li> <li>Course integrative project/product.</li> </ul>
<b>5. Course integrative project/product:</b>
<p>The CIP (course integrative project) correspond to a final integrative evaluation, and a video of the topics reviewed in the LU such as genetic identification, molecular diagnosis of human pathologies or biomedical biotechnological applications.</p>
<b>6. Sources of support and consultation (bibliography, hemerography, electronic sources):</b>

Arbitrio, M., Di Martino, M. T., Scionti, F., Barbieri, V., Pensabene, L., & Tagliaferri, P. (2018). Pharmacogenomic Profiling of ADME Gene Variants: Current Challenges and Validation Perspectives. *High-throughput*, 7(4), 40.

Baghban, R et al (2019). Yeast Expression Systems: Overview and Recent Advances. *Molecular Biotechnology*. 61. 10.1007/s12033-019-00164-8.

Buttò S, Suligoì B, Fanales-Belasio E, Raimondo M. (2010). Laboratory diagnostic for HIV infection. *Ann Ist Super Sanita*, 46(1) 24-33.

Coleman, William B., Tsongalis, Gregory J. *Molecular Diagnostics For the Clinical Laboratorian*. (2005) Humana Press.

Cox T M, Sinclair J. *Biología Molecular en Medicina*. Editorial Médica Panamericana. 2002.

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Gil del Valle, L., Rabeiro Martínez, C.L., Gravier Hernández, R., Hernández González-Abreu, M.C., y Bermudez Alfonso, Y. (2017). Updating on the pharmacogenetics and the molecular bases for the variable drug response. *Cubana de Farmacia*, 51 (1):1-26.

Gomes, Amitha et al. (2016). An Overview of Heterologous Expression Host Systems for the Production of Recombinant Proteins. *Advances in Animal and Veterinary Sciences*. 4. 346-356. 0.14737/journal.aavs/2016/4.7.346.356.

Iáñez-Pareja, E. *Introducción a la biotecnología*. España: Instituto de Biotecnología., Universidad de Granada. On line resource: <http://www.ugr.es/~eianez/Biotecnologia/introbiotec.htm>

Kidd, S. E., Chen, S. C., Meyer, W., & Halliday, C. L. (2020). A New Age in Molecular Diagnostics for Invasive Fungal Disease: Are We Ready?. *Frontiers in microbiology*, 10, 2903. <https://doi.org/10.3389/fmicb.2019.02903>

McPherson R. A., Pincus M. R. *Henry's Clinical Diagnosis and Management by Laboratory Methods*, Twenty Third Edition. Editorial Elsevier. 2017.

Opota O, Mazza-Stalder J, Greub G, Jaton K. (2019). The rapid molecular test Xpert MTB/RIF ultra:towards improved tuberculosis diagnosis and rifampicin resistance detection. *Clinical Microbiology and Infection*, (11): 1370-1376.

Ramos J. *Infectología Clínica* (2012). Editorial Manual Moderno.

Rangel – Villalobos H. La prueba de paternidad con ADN (2010). *NOTICONAQUIC* 18 (49): 40-51. 2018;16(1):3-11.

Sánchez Domínguez, C.N, Gallardo Blanco, H. L., Salinas-Santander, M.A., y Ortiz-Lopez, R (2018). Uridine 5'-diphospho-glucuronosyltransferase: Its role in pharmacogenomics and human disease. Experimental and Therapeutic Medicine, Sanchez-Dominguez CN, Gallardo-Blanco HL, Salinas-Santander MA, Ortiz-Lopez R. Uridine 5'-diphospho-glucuronosyltransferase: Its role in pharmacogenomics and human disease. Exp Ther Med. 2018;16(1):3-11.

She RC, Bender JM. (2019). Advances in Rapid Molecular Blood Culture Diagnostics: Healthcare Impact, Laboratory Implications, and Multiplex Technologies. Rapid Molecular Diagnostics for Blood Cultures, 3(4):617-630.

Solari AJ (2005). Genética Humana. Fundamentos y aplicaciones en Medicina. Editorial Médica Panamericana. 2011.

Stefano Butto, Barbara Suligoj, Emanuele Fanales Belasio and Mariangela Raimondo. (2010). Laboratory diagnostics for HIV infection. Ann Ist Super Sanita, 46, 24-33.

Yang Y, Botton MR, Scott ER, Scott SA. (2017). Sequencing the CYP2D6 GENE: From Variant allele discovery to clinical pharmacogenetic testing. Pharmacogenomics, 18(7): 673-685.

Centers for Disease Control and Prevention. <http://www.cdc.gov/>

Google academic <http://scholar.google.es/>

National Center for Biotechnology Information. <http://www.ncbi.nlm.nih.gov/>

National institutes of health. <http://www.nih.gov/>

Organización Mundial de la Salud. <http://www.who.int/es/>

Promega [www.promega.es](http://www.promega.es)

Secretaría de Salud. <http://www.salud.gob.mx/>

TRIP turning Research Into Practice. <http://www.tripdatabase.com/>

Thermo Scientific. <https://www.thermofisher.com/>