

**SYNTHETIC PROGRAM.**

<b>1. Module Identification code:</b>	
Name of the institution:	Universidad Autónoma de Nuevo León
Name of the school:	School of Medicine
Name of the degree program:	Clinical Chemistry
Name of the course (learning unit):	Techniques in organic chemistry
Total number of class hours-theory and practice:	80
Class hours per week:	4 horas
Independent study:	10
Course modality:	Face-to-face instruction
Module level:	Fourth semester
Core/elective module:	Core
Curriculum area:	ACFB
UANL credit points:	3
Create date:	28/08/2017
Date of last amendment made:	15/01/2024
Person(s) responsible for the design of module	Dr. C. Jonathan Pérez Meseguer, Dra. Q. Tannya R. Ibarra Rivera

## 2. Purpose(s):

This learning unit aims to contribute to achieving the graduate profile by mastering the basic knowledge of laboratory techniques commonly employed in organic chemistry. It seeks to develop the necessary competencies that allow students to integrate their understanding of functional groups so that, after carefully analyzing their physicochemical properties, they can select and apply methods for the separation and/or purification of organic compounds.

Additionally, the unit includes a simple organic synthesis designed under the principles of "green chemistry," which focuses on finding new ways to synthesize chemical substances that are more friendly to health and the environment.

This foundation will prepare students to apply their knowledge in the workplace, enabling them to handle organic samples and achieve the separation and/or purification of analytes of biomedical interest, which can later be subjected to specific analyses in biomedical laboratories.

During this learning unit, students will develop several general competencies, as they will be able to use traditional and cutting-edge research methods and techniques while handling organic compounds of biomedical interest. Additionally, teamwork will be encouraged, fostering a spirit of commitment and respect that allows for full social and labor integration of the students. Within the same teamwork framework, students will develop competencies to resolve conflicts while respecting the abilities and viewpoints of participants, facilitating appropriate decision-making. At the same time, they will develop the specific competency of the graduate profile by applying suitable physicochemical procedures in handling samples to achieve the isolation and purification of analytes of interest, enabling subsequent analysis that contributes to addressing a specific problem.

This learning unit, both in its content and its placement in the fourth semester of the degree program, constitutes a fundamental link within the framework of the QCB curriculum. It is a unit that relates to General Chemistry, Physical Chemistry, and Basic Organic Chemistry, as it utilizes knowledge of the general properties of matter, atomic structure, thermodynamics, kinetics, and functional groups, allowing students to predict and analyze the physicochemical properties of organic compounds and select the appropriate laboratory technique for their purification, as well as the procedure to verify the purity of the compound. Furthermore, it employs knowledge about the chemical reactivity of functional groups acquired in Basic Organic Chemistry to conduct a simple synthesis of an organic compound in the laboratory. This learning unit is also related to the Integral Organic Analysis Laboratory (LIAO), as the knowledge gained about separation techniques forms the basis for the traditional laboratory procedures used in LIAO.

## 3. Competences of the graduate profile

### General competencies to which this module (learning unit) contributes:

- *Instrumental skills:*

8. To use traditional and cutting-edge research methods and techniques for the development of their academic work, the exercise of their profession and the generation of knowledge..

- *Personal and social interaction skills:*

9. To maintain an attitude of commitment and respect towards the diversity of social and cultural practices that reaffirm the principle of integration in the local, national and international context in order to promote environments of peaceful coexistence.

- *Integrative skills:*

14. To resolve personal and social conflicts, in accordance with specific techniques in the academic field and in their profession for appropriate decision-making.

**Specific competences of the graduate profile to which this module (learning unit) contributes:**

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.

#### 4. Comprehensive Evaluation of Processes and Products:

- Weighted activities
- Evidences
- Digital reports
- Course integrative project/product

#### 5. Course integrative project/product:

Written proposal: A justification of the appropriate methodology for separating and purifying different organic compounds present in various theoretical mixtures.

#### 6. Sources of Support and Reference:

- 1) Pérez Meseguer, Ibarra Rivera, Pérez López, Rivas Galindo, Waksman de Torres. (2020). Prácticas de Técnicas Orgánicas. Monterrey, N.L.: UANL.
- 2) Shriner. (2013). Identificación sistemática de compuestos orgánicos. México DF: Limusa Wiley.
- 3) Grupo de Síntesis Orgánica. (2017). Fisicoquímica orgánica. agosto 2017, de Universidad Jaume I Sitio web: <http://www.sinorg.uji.es/Docencia/FUNDQO/TEMA11FQO.pdf>
- 4) Antonio Valiente Balderas. (1996). Historia de la destilación. Educación química, VII, 76-82.
- 5) Tannya R. Ibarra-Rivera\*, Cecilia Delgado-Montemayor, Fernando Oviedo-Garza, Jonathan Pérez-Meseguer, Verónica M. Rivas-Galindo, Noemi Waksman-Minsky, and Luis Alejandro Pérez-López. Setting Up an Educational Column Chromatography Experiment from Home. J. Chem. Educ. 2020, 97, 9, 3055–3059.
- 6) Tannya R. Ibarra-Rivera, Fátima B. García-Sánchez, Jonathan Pérez-Meseguer, Verónica M. Rivas-Galindo, Rocío Álvarez-Román. Síntesis Sustentables para la Enseñanza de Química Orgánica.