



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	Instrumental Analysis
• Total hours of classroom, theory and practice	140 hours
• Frequency in classroom per week	7 hours
• Total extra hours Outside classroom)	10 hours
• Modality	Face to face instruction
• Academic period	Fifth semester
• Type of learning unit	Core
• Curricular area	ACFB
• UANL Credits	5
• Date of elaboration	April 10 th , 2018
• Date of actualization	June 28 th , 2024
• Responsible (s) for the design and	Dr. C. Blanca Alicia Alanís Garza Dr. C. Ricardo Salazar Aranda Dr. C. Norma Cecilia Cavazos Rocha

actualization	
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2.Purpose(s):

The LU of Instrumental Analysis contributes to achieving the graduate profile that will allow the student to propose and apply an adequate methodology for chemical analysis in all its stages from sampling, sample preparation, use of instrumental equipment for spectroscopy, spectrometry and chromatography, as well as the interpretation and evaluation of the results.

With this learning unit, the student will develop some of the general competencies of the UANL, since he will use traditional and cutting-edge research techniques for the development of his/her practical work once this has been reviewed in the theoretical part, this experience will be very useful in the exercise of his/her profession. At the same time, the student develops his/her practices adhering to safety regulations, reviews the safety data sheets of solvents or reagents and makes sure to generate the least possible amount of waste, which he handles responsibly as marked in the Mexican Official Standards as a form of respect for nature and the environment. With the material reviewed during this LU, the student is able to resolve personal and social conflicts in the field of his/her profession to make appropriate decisions when responding to real problems posed by teachers.

At the same time, this LU also develops specific competencies for the graduate profile. For example, in this LU the fundamentals of different analytical methodologies that are being incorporated into analysis laboratories are studied. Likewise, the parameters used to validate bioanalytical methods that allow for the reliability of the results are practiced. Competencies are also developed to use the criteria that allow for interpreting results and thus making timely and pertinent decisions.

Within the LU of previous semesters there is a relationship with **General Chemistry** when interpreting the physical and chemical properties of inorganic compounds of biochemical interest, with **Physic** when justifying the basis of the instrumental methods and the behavior of the analytes, with **Biostatistics** when applying the statistical methods for the validation of methods, with **Fundamentals of Analytical Chemistry** when applying the knowledge of concentration, chemical equilibrium and data analysis, with **Basic Organic Chemistry** when identifying and justifying the behavior of organic molecules compared to measurement methods and with **Biochemistry** when relating the instrumental methods in the analysis of samples of biochemical interest.

3. Competence of the graduate profile

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

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:

11. To practice the values promoted by the UANL: truth, equity, honesty, freedom, solidarity, respect for life and others, peace, respect for nature, integrity, ethical behavior and justice, in their personal and professional environment to contribute to building a sustainable society.

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

4. To validate bioanalytical methods under established performance criteria that allow reliability of the results obtained in chemical-biological samples.

5. To incorporate new analytical methodology that contributes to the functional, economic and/or environmental improvement of laboratory processes to respond to needs in health areas.

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.

4. Factors to consider for evaluating the learning unit
<ul style="list-style-type: none">• Written evaluations• Laboratory practices• Comparative of automated systems• Written report• Problem solving• Class participation• Comparative tables• Resolution of questionnaires and problems• Course integrative project/product
5. Course integrative project/product:
Written proposal for a solution to situations raised by the teacher, justifying the selected instrumental technique, applying the performance criteria to evaluate the proposed analytical methodology and interpreting results.
6. Sources of support and consultation (bibliography, hemerography, electronic sources):

- Benson SW. (2004) *Cálculos químicos una introducción al uso de las matemáticas en la química*. México, D.F.: Editorial Limusa.
- Christian G. (2009) *Química Analítica* (6ª Edición) México: Ed. Mc Graw Hill.
- Harris D. (2007) *Análisis Químico Cuantitativo* (3ª Edición). España: Ed. Reverté S.A.
- Rouessac F., Rouessac A. (2003) *Métodos y Técnicas Instrumentales Modernas. Teoría y Ejercicios resueltos*. Análisis Químico (1º edición). México: Ed. Mc Graw Hill/Interamericana.
- Robinson K., Robinson J. (2001) *Análisis Instrumental* (1ª Edición). Madrid: Ed. Pearson Educación S.A.
- Sierra I, Pérez D, Morante S, Pérez Y, Ballesteros R, Sánchez A. (2008) *Prácticas de Análisis Instrumental*. España: Ed.Dykinson S. L.

Web pages:

- Angie carrero. (2019, 4 abril). *Técnica de espectrofotometría*. YouTube. <https://www.youtube.com/watch?v=pXe-Qx9NvvY>
- AutoChem Solutions from METTLER TOLEDO. (2020, 24 enero). *What is ATR? (Attenuated Total Reflectance) - METTLER TOLEDO - EN*. YouTube. <https://www.youtube.com/watch?v=QW2uh1BQuGw>
- B Zaleta. (2020, 30 marzo). *Curvas de Adición Patrón sin Dilución. Explicación general*. YouTube. <https://www.youtube.com/watch?v=JJIImYvqgEU>
- Eliana Rocha. (2017, 23 agosto). *LEY DE BEER LAMBERT*. YouTube. <https://www.youtube.com/watch?v=2G7Ya2LT5mw>
- Gobierno de México. (2019, 19 febrero). *Gobierno de México, COFEPRIS*. COFEPRIS. <http://transparencia.cofepris.gob.mx/index.php/es/marco-juridico/normas-oficiales-mexicanas>.
- Gobierno de México. (2019, 8 marzo). *Catálogo de Normas Mexicanas*. <http://www.economia-nmx.gob.mx/normasmx/index.nmx>. <http://www.economia-nmx.gob.mx/normasmx/index.nmx>.
- Guillermo Corrales. (2016, 10 marzo). *Gas chromatography (IQOG-CSIC)* [Vídeo]. YouTube. <https://www.youtube.com/watch?v=iX25exzwKhl>
- Ha hoang. (2015, 15 enero). *automatic hematology analyzer 49 parameter 12394*. YouTube. <https://www.youtube.com/watch?v=-ks3Eu5bwU&t=60s>
- Ingenia U de A. (2016, 24 octubre). *rayos X*. YouTube. <https://www.youtube.com/watch?v=B1CmpGjGUPw>
- Jhon Jesus. (2015, 14 abril). *Turbidimetría*. YouTube. <https://www.youtube.com/watch?v=WfUvgYg7BpU>
- KhanAcademyEspañol. (2015, 11 octubre). *Espectroscopía UV-Visible*. YouTube. https://www.youtube.com/watch?v=_mR9i4wS3qM
- Messenet reales jimenez. (2018, 7 marzo). *ICP (plasma acoplado por inducción)*. YouTube. <https://www.youtube.com/watch?v=5GAePlqSePg>
- Ricardo López. (2016, 8 junio). *Filtrado de disolventes para HPLC* [Vídeo]. YouTube. <https://www.youtube.com/watch?v=yjrCpKMGEfM&t=10s>
- Tecnología Educativa UC Temuco. (2016, 16 junio). *Química Analítica - Métodos ópticos*. YouTube. <https://www.youtube.com/watch?v=Y5J6hU64a4o>

Practice manual:

Dr. C. Blanca Alicia Alanís Garza, Dra. Norma Cecilia Cavazos Rocha, Dr. Ricardo Salazar Aranda, Q.C.B. Olga Catalina Rodríguez Martínez, Dr. C. David Paniagua Vega. (2024) *Manual de procedimientos de laboratorio de Análisis Instrumental*. (12ª edición) México: Ed. UANL

