

SYNTHETIC PROGRAM

Identification data:	
Name of the institution:	Autonomous University of Nuevo Leon
Name of the school:	School of Medicine
Name of the degree program:	Clinical Chemistry
Name of the course (learning unit):	Toxicology and legal chemistry
Total number of class hours-theory and practice:	80
Class hours per week:	4 hours
Independent study:	10
Course modality:	Face-to-face instruction
Module level:	Eighth semester
Core/elective module:	Mandatory
Curriculum area:	ACFP-F
UANL credit points:	3
Create date:	June 18 th , 2018
Date of last amendment made:	January 1 st , 2024

Person(s) responsible for the design and amendment of the module:	Dr. med. Lourdes Gaza Ocañas Dr. C. Christian Tadeo Badillo Dr. C. Sandra Lucía Montoya Eguía
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2. Purpose(s):

Provides the basic elements for the application of toxicological analysis to meet national and/or international regulatory requirements.

The learning unit promotes the development of general competencies, in which the student will be able to solve problems of identification and quantification of chemical substances in biological and non-biological matrices through the use of logical and critical thinking in the selection, design, development and validation of toxicological chemical analysis procedures.

During the learning unit, the student intervenes in the challenges of society by selecting the regional, national and global regulatory framework regarding the maximum permissible limits of toxic substances in air, water, soil and food, thus contributing to consolidate wellbeing and sustainable development. The student will be able to solve specific personal and social conflicts by adequately selecting the analysis techniques that apply to the different groups of xenobiotics, considering the analyte to be determined, type of matrix, required accuracy and sensitivity, number of samples to be analyzed and the concentration of the analyte in the matrix.

During the learning unit, specific competencies are developed jointly, since the student will be able to determine the presence of chemical substances of the different groups of toxicants (metals, substances of abuse, pesticides, organic solvents, drugs, etc.) in biological and non-biological matrices. In addition, it ensures the reliability and defense of the results through the design and validation of the analytical procedure based on current national and international regulations, as well as through the interpretation of the toxicological analysis through the fulfillment of the acceptance criteria established during validation, and in the operation, documentation and interpretation of the implemented quality control parameters.

Within the learning units of previous semesters, there is a relationship with Fundamentals of analytical chemistry by using mathematical models for the quantification of the analyte in a matrix; with Applied analytical chemistry by establishing the performance criteria for the validation of an analytical method; with Instrumental analysis by applying the fundamentals for the correct selection of equipment and instruments in chemical analysis; with Physiology by reviewing the processes involved in the biotransformation and elimination of xenobiotics as well as the understanding of the modification of physiological processes resulting from the interaction between the xenobiotic and its targets in the organism. This learning unit provides fundamental bases for the development of social service and professional practices in which chemical toxicological analysis is carried out in a standardized environment.

3. Competences of the graduate profile

General competences to which this module (learning unit) contributes:

Instrumental skills:

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.

Personal and social interaction skills:

11. 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.

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:

4. To validate bioanalytical methods under established performance criteria that allow reliability of the results obtained in chemical-biological samples.
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. Integral evaluation of processes and products:

- Daily evidences
- Partial exams
- PIA

5. Course integrative project/product:

Proposal for conducting a toxicological analysis in compliance with the applicable regulatory framework, considering the validation and interpretation of results.

6. Sources of support and consultation:

- Huerta, S. Environmental, clinical and daily toxicology. Basis and case studies (2022).
- 2002/657/EC: Commission Decision of 12 August 2002 implementing Council Directive 96/23/EC concerning the performance of analytical methods and the interpretation of results (Text with EEA relevance) (notified under document number C(2002) 3044).
- Albert, L. A. (2014). Curso básico de toxicología ambiental. Mexico City: Editorial Limusa S.A. de C.V.
- Albert, L. A., & Jacott, M. (2015). Toxic Mexico: chemical emergencies. Mexico City: Siglo XXI Editores.
- Caméan, A. M., & Repetto, M. (2006). Food Toxicology. Spain: Diaz de Santos.
- Flanagan, R. J., Taylor, A., & Watson, I. (2008). Fundamentals of Analytical Toxicology. Great Britain: John Wiley & Sons Ltd.
- Guide for metrological traceability of values assigned to calibrators and control materials used by the clinical laboratory/January 2009 Issue date 2009-01-16, effective date 2009-01-21, revision 01.
- Guide for the validation and verification of quantitative examination procedures used by the clinical laboratory/March 2008. Date of issue 2008-04-15, effective date 2008-07-01, revision 00.
- Technical Guide on Traceability and Uncertainty in GC and HPLC/April 2008 Date of issue 2008-04-30, effective date 2008-05-15, revision 01. CENAM.
- Technical Guide on Traceability and Uncertainty in Chemical Measurements using Atomic Absorption and Inductively Coupled Plasma Atomic Emission Spectrophotometry/April 2008 Issue date 2008-04-30, effective date 2008-05-15, revision 01.
- Klassen, C., & Watkins, J. (2015). Casarett & Doull's Essentials of Toxicology (3^a ed.): McGraw-Hill Education.
- MOOC Learning Toxicology through Open Educational Resources. (2018). Retrieved from <http://moodle.toxoer.com/>.
- NOM-127-SSA1-1994, Environmental health. Water for human use and consumption. Permissible quality limits and treatments to which water must be subjected for its potabilization (Modification of the year 2000).

- Repetto, M., & Repetto, G. (2009). Toxicología fundamental (4ª ed.). Ediciones Díaz de Santos, S.A.
- Official Mexican Standard NOM-004-ZOO-1994, fat, liver, muscle and kidney in poultry, cattle, goats, deer, horses, sheep and pigs. Toxic residues. Maximum permissible limits and sampling procedures.
- NORMA Oficial Mexicana NOM-047-SSA1-2011, Salud ambiental-Índices biológicos de exposición para el personal ocupacionalmente expuesto a sustancias químicas.
- Peters, F. T., & Maurer, H. H. (2002). Bioanalytical method validation and its implications for forensic and clinical toxicology - A review. Accreditation and Quality Assurance, 7(11), 441-449. doi:10.1007/s00769-002-0516-5.
- Redalyc (2018). Sistema de Información Científica Redalyc Red de Revistas Científicas de América Latina y el Caribe, España y Portugal. Retrieved from <http://www.redalyc.org/revista.oa?id=919>.
- Repetto, G., Moreno, I. M., Peso, A. d., Repetto, M., & Cameán, A. M. (2001). The search for toxicological information: a practical learning module. Revista de Toxicología, 18(2), 92-98.
- Commission Regulation (EU) No 37/2010 of 22 December 2009 on pharmacologically active substances and their classification as regards maximum residue limits in foodstuffs of animal origin (Text with EEA relevance).
- Repetto, M., & Repetto, G. (2009). Toxicología fundamental (4ª ed.): Ediciones Díaz de Santos, S.A.
- SANTE/11813/2017 Guidance document on analytical quality control and method validation procedures for pesticide residues and analysis in food and feed.
- Scientific Working Group for Forensic Toxicology (SWGTOX) Standard Practices for Method Validation in Forensic Toxicology (2013). Journal of Analytical Toxicology, 37(7), 452-474. doi:10.1093/jat/bkt054.
- The Fitness for Purpose of Analytical Methods: A Laboratory Guide to Method Validation and Related Topics (1998) EuraChem.
- The Role of and the Place of Method Validation in the Quality Assurance and Quality Control (QA/QC) System. Critical Reviews in Analytical Chemistry, 37:173-190, 2007 .