

SYNTHETIC PROGRAM

1. Module identification code.	
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):	Design and Analysis of Experiments
Total number of class hours-theory and practice:	60 hours
Class hours per week:	3 hours
Independent study:	30 hours
Course modality:	Face-to-face instruction
Module level:	Seventh, eighth or ninth semester
Core/elective module:	Elective
Curriculum area:	ACFP-F
UANL credit points:	3
Create date:	01/17/2019
Date of last amendment made:	07/27/2022
Person(s) responsible for the design and amendment of the module:	Dr. Juan Ricardo Lucio Gutiérrez, Dr. Graciela Granados Guzmán

2. Purpose:

The purpose of this LU is to encourage the student to develop skills that will help him/her select, apply and interpret the different experimental designs of practical use in the field of chemistry and biochemistry. This will allow him/her as a future graduate to ensure that the experiments selected in a given design are as informative as possible and to apply them as a quality tool in the optimization of processes. During this LU, the student will develop some general skills, since he/she will carry out his/her activities through the use of computer programs specialized in the design of experiments as a tool for accessing information and transforming it into knowledge of practical use for society. Likewise, in everyday situations of the course, the student acts in accordance with his/her principles and the values promoted by the UANL during teamwork, showing ethical behavior with his/her peers in the academic community and living harmoniously with people from different cultural contexts. Also, he/she will propose solutions to real and hypothetical problems related to his/her field of work, through a holistic understanding of the relationship between the analytical system under study and the objective of the experimental design. The student also develops the specific competence, since he interprets the statistical results of the mathematical models built from the experimental data, which will allow him to make timely and pertinent decisions when detecting and quantifying the effects of the factors that affect the analysis. DoE learning unit uses the skills acquired in the Biostatistics LU, applying knowledge of probability and descriptive statistics, to understand the information provided by repeated measurements, confidence limits and significance level. In addition, it makes use of the knowledge acquired in the Higher Mathematics LU such as algebraic equations, handling of logarithmic functions and linear regression for the understanding of the mathematical models built by the computer program. Likewise, this LU provides the student with tools that can be used in the learning units of Food Analysis, Toxicology and Legal Chemistry, Forensic Analysis and Research Seminar II; since the acquired knowledge can be applied to different types of analytical systems in the field of clinical, toxicological, chemical, food, forensic and environmental diagnosis, in which he/she participates.

3. Competencies of the graduate profile:

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

Instrumental skills:

3. To manage Digital Information, Communication, Knowledge and Learning Technologies (TICCAD), in academic, personal and professional environments with cutting-edge techniques that allow their constructive and collaborative participation in society.

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:

12. To make innovative proposals based on a holistic understanding of reality to help overcome the challenges of the interdependent global environment.

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

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:

- Comparative table of experimental designs reviewed throughout the course.
- Challenge where you describe a hypothetical experimental model and its evaluation through experimental design, considering the exploration and optimization of variables and the evaluation of the robustness of the process.
- Course integrative project/product

5. Course integrative project/product:

DoE case is resolved, including exploration and optimization of variables and robustness analysis.

6. References:

Brereton, R.G. (2007). *Applied Chemometrics for Scientists*. USA: John Wiley and sons publishing house.
 Rovira i Virgili University website . Retrieved from: <http://www.quimica.urv.es/quimio/general/dis.pdf>
 Gassos L. (Feb. 5, 2015). Basic concepts of experimental design, Consulting. YouTube. Retrieved from: <https://www.youtube.com/watch?v=1Tg0vT17aS8>
 Gemperline , P. (2006). *Practical Guide To Chemometrics* , USA: CRC Press.
 Gutiérrez Pulido, H. (2008). *Analysis and Design of Experiments* . Mexico: McGraw-Hill Publishing.
 Miller, J. and Miller, J. (2002). *Statistics for Analytical Chemistry* , Spain: Pearson - Prentice Hall.
Montgomery, DC. (2004). *Design and Analysis of Experiments*. Mexico: Limusa – Wiley publishing house.
 The Open Educator. (5 Jul. 2020). Design of Experiments. United States. YouTube. Retrieved from: <https://www.youtube.com/playlist?list=PLW-oQRxLODMcYEFXP4eg5EXBI-0hsTSe1>
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