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Graduate Program in Chemistry (Grade 7/CAPES)
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COURSE SYLLABUS

1. Identification

Code and title: QUP 405 - Techniques used to study the interaction of organic and inorganic compounds with DNA
Professor: Legna A. Colina-Vegas and Wilmer Villarreal
Level: Master and Doctorate
Credit hours: 2
Revised: July_2021

2. Summary

DNA structure, interactionstypes compound-DNA. Spectroscopic, analytical, physical and biological techniques to determinate type and binding constants between organic and/or inorganic compounds with the DNA.

3. Objective

Description of the DNA structure and study of the covalent and non-covalent interactions between compounds and DNA. Discussion of the different techniques used to determine the intensity and type of interaction between compounds and DNA.

4. Contents

- DNA: history, structure, conformations and functions in the human body.
- Types of interaction of compounds with DNA: Covalent and non-covalent.
- Spectroscopic techniques: Compound/DNA titration by UV-vis and fluorescence, changes in the DNA thermal denaturation profile, changes in the DNA circular dichroism spectrum.
- Data processing and determination of the binding constants of compounds with DNA: Neighbor Exclusion and Scatchard.
- Competition assays by DNA grooves: Hoechst 33342.
- Competition assays by DNA intercalation: Thiazole Orange/Ethidium Bromide.
- Study of the relative viscosity of DNA in the presence of the compounds.
- Verification of changes generated in the quaternary structure of the DNA by the presence of the compound by gel electrophoresis.
- Determination of interaction sites by covalence experiment through the relationship between the UV-vis and analytical techniques for metal determination.
- Other tools: computational techniques for simulation, crystallization, nuclear magnetic resonance, among others

5. Assessment

The evaluation will consist of the mandatory presentation of a seminar (40%), questions to colleagues at the end of the seminar (20%) and a written test with data processing (40%). The student, who obtains a final grade of A, B or C, awarded as per the list below, will be considered approved:
A: grade equal to or above 9.0
B: grade equal to or above 7.5 and below 9.0
C: grade equal to or above 5.0 and below 7.5

D: grade below 5
FF: lack of frequency

6. Methodology

Lectures, exercises lists, seminars and examinations.

7. Bibliography

- Richard R. Sinden, DNA structure and function, Academic Press, USA, 1994.
- Janice Aldrich-Wright, Metallointercalators, SpringerWienNewYork, USA, 2011.
- Campbell, Neil. A.; Lawrence, Mitchell, G.; Reece, Jane. B. Biology: Concepts and connections, Benjamin/Cummings, USA, 1999.
- Skoog, Douglas; West, Donald; Holler, James; Crouch, Stanley. Fundamentos de Química analítica, Editora Thomson, USA, 2005.
- Referências de periódicos especializados.