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):	Food Analysis
Total number of class hours-theory and practice:	140
Class hours per week:	3 hours
Independent study:	10
Course modality:	Face-to-face instruction
Module level:	Eighth semester
Core/elective module:	Core
Curriculum area:	ACFB
UANL credit points:	5
Create date:	May 5th, 2018
Date of last amendment made:	January 19th, 2024
Person(s) responsible for the design and amendment of the module:	Dr. C Norma Cecilia Cavazos Rocha, Dra. Idalia Francisca Carmona Alvarado, M.C. Samantha Armijo Martínez, Dr. David Paniagua Vega.

2. Presentation:

The module (learning unit) of Food Analysis is developed in three phases. During the phase I, the aspects that must be known to carry out a study and analysis of different foods are reviewed, as well as the knowledge of the composition and how it influences the organoleptic quality of foods. The other fundamental aspect is microbiology, the main microorganisms that can be found in foods as contaminants, and, derived from this, the methods are reviewed of conservation and quality aspects for the handling of different foods. Another aspect to consider in this phase is the use of additives and their presence in foods.

In phase II, different types of foods are reviewed, studying their properties, production process, conservation and the analytical (laboratory) and microbiological methods that must be carried out to carry out their quality control, as well as the criteria to evaluate the results obtained. Finally, in phase III, the toxicological aspect of foods is reviewed.

At the end of the course, for the Integrated Learning Product, the student can propose a solution to a problem where knowledge about different sections is required, such as composition, production, conservation, quality control, and nutritional value of a food.

3. Purpose:

The purpose of this learning unit is to encourage students to develop skills that allow them to select and apply appropriate methodology to ensure the quality of food, knowing its composition, preservation, nutritional value and manufacturing processes. This will allow them, as future graduates, to solve problems of chemical analysis in different food matrices.

Regarding general competencies, during this learning unit, the student applies autonomous learning strategies to study the chemical composition of food, the factors that determine its quality, some of the industrialization processes, the most commonly used conservation methods, the most important microorganisms in food, and relevant topics in food toxicology. Likewise, during the development of the unit, the student acquires an attitude of commitment and respect towards his/her peers when interacting for the presentation of seminars and classes. He/she also constructs innovative proposals when expressing his/her experiences during the development of his/her reports (field work) that contribute to overcoming the challenges of the interdependent global environment during his/her professional practice.

During the learning unit, the student also develops specific skills, both in the classroom and in the laboratory, as he or she applies procedures and interprets the results of analysis based on established criteria and guarantees the reliability of the analytical results obtained, applying quality control guidelines in food analysis methods for correct decision-making.

The Food Analysis learning unit is located in the eighth semester of the Clinical Chemistry Program, for its development, uses the

skills acquired in the Biochemistry learning units, to understand the properties of foods due to their nutrients and Instrumental Analysis to carry out an adequate selection and application of chemical analysis methods.
Food analysis provides students with the knowledge and skills necessary to develop in the analysis and quality control laboratory during professional internships and social service in the food area.

4. Competences of the graduate profile

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

Instrumental skills:

1. To apply autonomous learning strategies at different levels and fields of knowledge that allow them to make timely and relevant decisions in the personal, academic and professional spheres.

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:

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.

7. To guarantee the reliability of the analytical results obtained by applying quality control guidelines as established by laboratory policies for correct decision-making.

5. Course roadmap:

Phase 1. Fundamentals of food analysis
Integrate the aspects that make up food chemistry: chemical composition, functional properties, microbiology, preservation methods and use of additive

PIA
Proposal report to solve a problem related to the composition, quality and/or preservation of a food

Phase 2 Analyze the physical and chemical characteristics of different types of food.
Know the processes of their preparation Perform and interpret tests for analysis and quality control Phase 3. Toxins in food Identify the different toxins that can be found in food naturally, through contamination or addition.

Phase 3. Toxins in food
Identify the different toxins that can be found in food naturally, through contamination or addition.

6. Structuring into stages or phases:

Stage 1: Fundamentals of Food Analysis

Component(s) of the competence: Integrate the aspects that make up food chemistry, in terms of components, functional properties, microbiology and conservation methods, to be considered in their analysis.

Evidence of student learning	Performance criteria	Learning activities	Content	Resources
1.Two written assessments: a) Resolution of a case that relate the composition of food with aspects of microbiology and quality (appearance, texture and flavor). b) Resolution of a case that involve methods for preserving food, as well as programs to ensure food safety and use of additives.	Solves the evaluation individually, with good spelling. Solved with concise and concrete answers the questions and problems about the composition of foods, functional properties, nutritional labeling, food quality, preservation methods and food additives. Respect the day and time indicated for each evaluation.	During the first session, the teacher and the student review the analytic program to consider the guidelines on which they will work. The student reads the materials proposed in the class script and reviews the material that is presented on the Moodle platform. The student carries out bibliographical searches within the framework of the current regulations (extra-class activity). Students meet work teams according to the teacher's instructions and send the information through the Food	Definition of food and nutrient. Chemical nature of foods: components and functional properties. Information on food labels Food quality: appearance, texture and flavor. Conservation methods. Additives. Regulations for food quality. Important microorganisms in food.	Curriculum for the Bachelor's Degree of Q.C.B. https://www.uanl.mx/wp-content/uploads/2018/08/Medicina-Plan-de-estudios_Quimico_Clinico_Biologo.pdf Textbook: Badui D. S. Food Science in Practice.2nd edition. Pearson Education. Mexico 2015 Frazier, M.C., Food Microbiology. 2nd edition. Acribia Ed. España. chapters. Official Journal of the Federation (DOF). 16- 07-2012: Agreement by which the additives and coadjuvants in foods, beverages and food supplements, their use and health provisions are

		Analysis team chat on MS Teams. At the end of the session, students will be asked to log on to the Moodle platform at home to answer a diagnostic assessment. In a second session, the student participates by explaining the concepts of Food, classification and types of food, macro and micro components and the characteristics that they confer to the food; also, the definition of nutrient is reviewed. During the sessions, as well as in extra-class hours, students analyze scientific articles and official standards to complement and evaluate acquired knowledge. Individually, students select a food that contains nutritional information, and with the data indicated, they perform calculations to know the energy content and labeling of a food and compare it with the information on the product label. (Weighted		determined. https://dof.gob.mx/nota_detalle.php?codigo=5437267&fecha=16/05/2016#gsc.tab=0 Audiovisual equipment. Blackboard Platform of the Faculty of Medicine. MS Power Point Platform MS Teams and MS Forms Scientific articles referenced by professor

		Activity 1.1 corresponding to phase 1).		
		The teacher uploads material to the Moodle platform for students to download and analyze.		
		Students, asynchronously and collaboratively, review the material and enter to the link available on the Moodle platform to answer the questionnaire and/or activity, consulting for this purpose the notes taken during the class, the textbook and/or the complementary bibliographical material.		
		If the activity is a quiz, whether in MS Forms or another format, the student, individually, solves it and sends it through the Moodle platform, on the date and time indicated on this same platform. Upload the document in .pdf format		
		Tasks and questionnaires correspond to the different topics included in this phase (water activity, sensory perception, important microorganisms in food,		

		quality and preservation of food and use of additives). (Weighted activities 1.2.- corresponding to phase 1). The student completes the assessments in person, and submits them in a timely manner according to the teacher's instructions.		

Stage 2: Quality Control and Food Analysis
Component(s) of the competence:
Propose tests for food analysis and quality control, according to the physicochemical characteristics of the food, its production process and current regulations, to guarantee the reliability and quality of the results and contribute to take a decision.

Evidence of student learning	Performance criteria	Learning activities	Content	Resources
Two written evaluations that include problem solving and theoretical aspects related to food analysis and control.	Solve the written assessment individually

Solve with concise and concrete answers the questions and problems about food composition, functional properties, nutritional value, and quality control tests.

Respect the day and time indicated.

Turns in the evidence at the time and in the day programmed. | The student reads previously the materials proposed in the class script. The teacher, in class discusses the most relevant concepts of the topic to be discussed, making use of audiovisual material to facilitate the understanding of the information.

Students, in teams and guided by the teacher, participate in class and group discussion, complementing the contents of the phase in order to consolidate the concepts and resolve doubts. The date for the teams to participate, as well as the content and/or material to be presented, will be assigned by the teacher | In this phase, the following topics will be reviewed:
1. Cereals and derivatives.
2. Vegetable oils
3. Legumes: soybeans and industrialized products.
4. Milk and derivatives.
5. Eggs and industrialized products
6. Fruits and vegetables
7. Meat and sausages
8. Fermented and carbonated drinks.

For the seminar, different topics will be designated that will be related to the material reviewed in classes or to the review of current standards that deal with the different foods and their quality control. The report and presentation of the visit to the company must contain the process of preparation and quality control of the food of the selected company. | Textbook: Food Science in Practice, chapters 8 and 9 Support books (bibliography). Various scientific articles, provided by the teacher, on different foods and their characteristics. Class scripts. Blackboard. Audiovisual equipment. Faculty of Medicine platform. Articles provided by the teacher.

Companies in industry food of Monterrey and its metropolitan area |

		and published on the Moodle platform. (**Weighing** activity 2.1 corresponding to phase 2) The students work in a team and, individually, answers the questionnaires that will be presented through MS Forms, where they demonstrate their knowledge about the research work done on the different topics included in this phase. They deliver their activity the day and time established by the teacher, (**Weighing** activities 2.2 corresponding to phase 2). The teacher assigns a seminar topic to each team of students and publishes the presentation date on the Moodle platform. The team prepares the assigned seminar that will be presented following the instructions published on the Moodle platform. The team will present the seminar on the indicated day and time. To complement this activity, the student, individually, will write a summary of the seminar topic, following the instructions that will be published on the Moodle platform. This will be sent		

		through the Moodle platform on the indicated day and date. (**Weighing** Activity 2.3 corresponding to phase 2). The student team attends a scheduled visit to a company that is dedicated to the food industry. They attend following the rules indicated by the selected company, and during their visit, they take notes about the product production process, critical points and quality control. In case of contingency, and if the visit cannot take place, the teacher assigns a video (about the production of a food) to each team so that they can work on its content. It presents the experience of having attended and observed the production process of a food, as well as the care taken during the process, both with regard to the raw material and the finished product. This presentation must be accompanied by an explanation of the process, as well as a personal contribution that may be opportunities for improvement in what has been observed. Date of the		

Evidence 3 Performance, reports and evaluations of laboratory practices for analysis and quality control of different foods.	Attend punctually respecting the day and time indicated and perform the practice in the scheduled session, in person. Submit a flow chart of the practice to be performed and a report of the results of the previous practice, at the scheduled time and date, in PDF format via the MS Teams platform.	presentation will be published on the Moodle platform, for the presentation. This activity is called "Field work". (**Weighing** Activity 2.4 corresponding to phase 2) The student solves the assessments in person, and hand in the exam to the teacher in time according to the teacher's instructions. For each laboratory session: The teacher uses power point presentations to explain the basis of the method that will be developed in the laboratory, as well as the criteria for evaluating the results obtained. The student prepares the flow chart beforehand. of the procedures to follow in the analysis of drinking water quality, proximal analysis, and quality control of different types of food. The teacher asks questions during the development of the practice. The student assimilates the theoretical framework of the practices, performs	• Water analysis. Determination of residual chlorine. • Proximal analysis. Determination of Humidity, Ash, Ethereal extract, Proteins and Crude fiber. • Nitrite analysis • Flour analysis. Determination of gluten. • Analysis of Fats and Oils. Determination of acidity index and peroxide index. • Analysis of reducing sugars. • Analysis of milk.	▪ Laboratory ▪ equipped for food analysis. ▪ Audiovisual equipment. ▪ Blackboard. ▪ Laboratory materials and reagents. ▪ Food Analysis Manual. Mexican Standard for drinking water: NOM-127-SSA1- 1994. Official Mexican Standards for food: https://transparencia.cofepris.gob.mx/index.php/es/marco-juridico/normas-oficiales-mexicanas Food composition tables published by international organizations. Kirk R.S., Sawyer R., Egan H., Composition and Food Analysis of Pearson Moddle Platform of the Faculty of Medicine Digital platform MS Teams. Suggested digital resources: Canva Menti MindMeister

| | | calculations for the preparation of reagents and develops the practice. Performs the calculations necessary to obtain results. Interprets the results obtained to evaluate their composition and/or quality, based on data obtained from official tables and current regulations and submits the report corresponding to the practice carried out, via MS Teams platform. The student responds to two evaluations: the first includes the analysis of drinking water and proximal analysis. The second includes quality control practices in different types of food. The student will complete the evaluations in person. | | |

Stage 3. Toxics in food
Component(s) of the competence:
To Identify different toxins that can be found in food, endogenously or exogenously, to correlate them with its quality.

Evidence of student learning	Performance criteria	Learning activities	Content	Resources
Summary of classification of toxins in food and beverages.	Prepare, individually, a summary addressing the topic of toxins in food and beverages, the impact on health and the importance of determining them. Submit the summary, according to the characteristics and the date indicated by the teacher.	Students, supported by the teacher, identify the main chemical and biological agents responsible for diseases transmitted by contaminated food.	Toxics in Food.	Textbook: Food Chemistry, Badui S., chapter 11. Faculty of Medicine platform and MS team platform

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7. Summative evaluation:

Phase	Evidences	Description	Weighing
Phase 1 **15%**	Evidence 1	**Two written evaluations**	8%
		Accredited activity 1.1 Calculation for labeling food	1%
		Accredited activity 1.2 Resolution of questionnaires, questions, problems and research on the topics of: water activity (research), important microorganisms present in food (questions), food quality and preservation (questionnaires) and additives	6%
Phase 2 **72%**	Evidence 2	**Two written evaluations**	8%
		Accredited activity 2.1 Class participation	6%
		Accredited activity 2.2 Resolution of questionnaires, questions, problems and research on the topics of: cereals, oils, soy, milk, drinks, fruits, meat and sausages and eggs.	8%
		Accredited activity 2.3 Team work (seminar)	10%
		Accredited activity 2.4 Field work (fase to face)	10%
	Evidence 3	Performance, reporting and evaluations of laboratory practices.	30%
Phase 3 **1%**	Evidence 4	Summary of toxins present in food.	1%
PIA 12%	**Integrated Learning Product (PIA)**		12%
	TOTAL		100

8. Course integrative project/product:
Report and presentation of a proposal to solve a problem related to the composition, quality and preservation of a food

9. References:

Badui D. S. (2015). Food science in practice. Mexico: Pearson Education publishing house.

▪ *Baudi D. S. (2013) Food chemistry. Mexico: Limusa publishing house.*

▪ *Mendoza E., Calvo C. Bromatology. Composition and properties of food. Mc. Graw Hill publishing house. Mexico 2010.*

▪ *Kirk R., Sawyer R. Egan H. (2011) Pearson Food Composition and Analysis. Mexico: Grupo Editorial Patria publishing house.*

▪ *Chávez M. Food composition. Miriam Muñoz de Chávez. Nutritional value of the most consumed foods. (2009). Mexico: Mc Graw Hill publishing house.*

▪ *Frazier, M.C. (1993) Food microbiology. Spain: Acribia publishing house.*

▪ *Charley H. (2016) Food technology. Mexico: Limusa publishing house*

▪ *Lindner E. (1994) Food Toxicology. Spain: Acribia publishing house.*

▪ *Ediciones y Publicaciones Alimentaria. Website: https://eypasa.com/*

▪ *Official Mexican Standards. Retrieved on January 14, 2021. http://transparencia.cofepris.gob.mx/index.php/es/marco-juridico/normas-oficiales-mexicanas/alimentos*

▪ *Food and Agriculture Organization of the United Nations. Website: http://www.fao.org/home/es/*

▪ *Analytical and food scientific journals: Journal of the AOAC, Food Science, Food Technology.*