TECHNOLOGY AND QUALITY CONTROL OF MILK AND ITS PRODUCTS

COURSE OUTLINE

GENERAL

SCHOOL	AGRICULTURAL SCIENCES		
DEPARTMENT	FOOD SCINECE AND NUTRITION		
COURSE LEVEL	*Undergraduate*		
COURSE CODE	ME711	**SEMESTER**	7th
COURSE TITLE	TECHNOLOGY AND QUALITY CONTROL OF MILK AND ITS PRODUCTS RESPONSIBLE: M. KAKAGIANNI		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**ECTS**
Lectures	3	6
Lab Lectures-exercises	3	

COURSE TYPE *Background, General Knowledge, Scientific Area, Skill Development*	*Scientific Area, special background*
PREREQUISITES:	-
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK
THE COURSE IS OFFERED TO ERASMUS STUDENTS	YES
URL	https://eclass.uth.gr/ poiotikos-elegxos-galatos/

TEACHING RESULTS

Teaching Results

TECHNOLOGY AND QUALITY CONTROL OF MILK AND ITS PRODUCTS is a core subject of specialist and scientific background on the biosynthesis and secretion of milk, composition, physicochemicals characteristic nutritional and microbiological characteristics, adulteration, quality management, of hygiene and safety of milk and its products, factors affecting the composition and the physicochemical characteristics of milk, microbiology of raw milk, growth micro-organisms, fermentations and mechanism of milk spoilage, hygiene of production, preservation and transportation of raw milk, technology, hygiene and quality control of pasteurized milk, of sterilized, condensed, powdered and chocolate milk, technology, hygiene and quality control of cheese, yogurt, cream, butter and ice cream, enzymes and microbial cultures used in the production of milk products, effect of processing methods in the composition and physicochemical characteristics of milk, its sampling milk and its products, hygiene of milk processing units, unit equipment milk processing, specifications, cleaning and disinfection, automation of processing units milk, utilization of by-products of milk processing units.

Upon successful completion of the course, students will be able to:

- **Critically analyze** the biosynthesis, composition, and microbiology of milk and dairy products, with a deep understanding of the biochemical and physicochemical processes affecting their quality.

- **Apply advanced sampling and quality control methods** to evaluate the safety and quality of milk and dairy products under real production and processing conditions.
- **Design and assess technological processing schemes** for dairy production, integrating modern automation systems and hygiene standards.
- **Solve complex problems** related to product quality, safety, and spoilage during production, storage, and distribution by proposing scientifically grounded solutions.
- **Critically evaluate** the impact of processing methods on the composition and functional properties of milk and its derivatives.
- **Independently perform** complex laboratory analyses and tests (chemical, microbiological, sensory), and interpret the results using international literature and industry standards.
- **Collaborate in interdisciplinary teams** within the agri-food sector to design quality-oriented and innovative dairy products.
- **Develop quality assurance and traceability strategies**, aligned with HACCP principles and European/international specifications.
- **Scientifically document and communicate** findings and proposals effectively in both written and oral form, using the appropriate scientific terminology.

General Skills

○ **Retrieval, analysis, and synthesis of data and information**, using appropriate technologies (*essential for laboratory-based and qualitative analysis*)
○ **Decision-making** (*in matters of quality, safety, and critical control points*)
○ **Autonomous work** (*in conducting laboratory testing and preparing technical reports*)
○ **Teamwork** (*strongly developed through group laboratory activities and site visits*)
○ **Working in an interdisciplinary environment** (*integrating knowledge from technology, chemistry, microbiology, hygiene, and engineering*)
○ **Critical thinking and self-assessment** (*through evaluations, sensory analysis, and scientific justification*)
○ **Adaptability to new situations** (*due to the evolution of technologies, automation, and regulatory updates*)
○ **Promotion of free, creative, and inductive thinking** (*especially in the development and design of innovative dairy products*)

CONTENT

LECTURES

- Biosynthesis and secretion of milk
- Ingredients, physicochemical characteristics and nutritional value of milk.
- Effect of various factors (heating, cooling, homogenization, etc.) that affect the composition and the physicochemical characteristics of milk.
- Microbiology of raw milk. Growth of microorganisms, fermentations and mechanism of spoilage of milk.
- Hygiene of production, storage and transport of raw milk.
- Quality control of raw milk and relationship between quality of raw milk and products.
- Technology, hygiene and quality control of pasteurized, sterilized, concentrated, powdered and chocolate milk.
- Technology, hygiene and quality control of cheeses, yogurt, and other fermented products (sour milk, kefir), cream, butter, ice cream.
- Enzymes and microbial cultures used in the production of milk products.
- Effect of processing methods on the composition and physicochemical characteristics of milk. Shelf life of milk
- Microbiology and spoilage of pasteurized milk and milk products. Unhealthy – unsuitable products.
- Modern trends in milk technology
- Cleaning and hygiene of milk processing facilities.
- Equipment for milk processing units. Specifications, cleaning and disinfection.
- Automation of milk processing units and modern trends in structure and organization
- Utilization of by-products of milk processing units. Use of milk components in preparation of other foods.
- Quality, safety assurance and critical control points, from raw material to final product, sampling of milk and its products and control methods at the various stages production and receipt of raw material, processing and finished products, quality characteristics, evaluation and

standards of milk and milk products

LAB LECTURES-EXERCISES

1. Physicochemical characteristics of raw milk (pH, titratable acidity, indirect methods estimation of acidity, stability of raw milk, specific gravity).
2. Determination of main milk components (fat content, protein separation).
3. Checking the sanitary condition of raw milk (inhibitory factors, indirect and direct methods assessment of microbiological status, purity control).
4. Additional checks for the quality of raw milk (water adulteration control, detection of various types of milk in mixtures).
5. Familiarization of students with the basic equipment used by the milk industries (centifugers, homogenizers, heat exchangers).
6. Problems of standardization and use of automated milk analyzer for the control of milk composition.
7. Control of the degree of heat treatment of milk (phosphatase, peroxidase) and special categories of microorganisms (heat-resistant, cold-tolerant).
8. Use of lactic acid cultures, production of fermented milk products (yoghurt), determination of yogurt acidity, control of characteristic microorganisms of yogurt.
9. Mechanism of coagulation of milk with rennet and study of factors affecting coagulation ability and subtraction.
10. Organoleptic control of cheeses, determination of fat content and determination of acidity in cheese.
11. Ice cream preparation and quality control.
12. Determination of milk contaminants: detection of aflatoxin M1, antimicrobial agents.
13. Monitoring in a cheese factory, as part of an educational visit, the manufacturing process of traditional Greek cheeses (Feta, Graviera, whey cheeses) and pH measurements during during cheese making

TEACHING AND LEARNING METHODS - EVALUATION

TEACHING METHOD.	Face to face lectures in the auditorium/classroom and face to face laboratory exercises in an appropriate laboratory.
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	• Use of I.C.T. in Teaching, in Laboratory Education, in Communication with the students • Use of ICT in Teaching • Use of ICT in Laboratory Education (Usage software for statistical control of the quality of food) • Use of ICT in Communication with students The course material (theory and exercises) is posted in the e-class of the DFSN of UT. Communication with the students is done through announcements on the e- class. From this platform, students can communicate by email with the teacher.
TEACHING STRUCTURE	

Activity Semester	***Workload***
Lectures	39
Lab Lectures	39
Elaboration of a study (project)	45
Independent Study	27
Course Total: ***(25 hours of workload per credit unit)***	**150**

EVALUATION OF STUDENTS	1. Written exam (70 %): - Multiple choice questions (Formative, conclusion) - Short development questions (Formative, conclusion) - Questions of crisis and development (Formative, conclusion) - Extended development questions (Formative, conclusion) 2. Lab grade (30%): - Multiple choice questions - Short answer questions - Evaluation of laboratory work

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