

Biotechnical Faculty / LIVESTOCK PRODUCTION / DAIRY SCIENCE

Course:	DAIRY SCIENCE			
Course ID	Course status	Semester	ECTS credits	Lessons (Lessons+Exercises+Laboratory)
4819	Mandatory	6	7	4+2+0
Programs	LIVESTOCK PRODUCTION			
Prerequisites	non			
Aims	Introduce students to the economic importance of dairy in the world and in our country, the most important legal acts in the dairy industry, the adoption of basic knowledge about the biosynthesis of milk, factors that influence the amount and properties of milk, physical and chemical properties of milk, milk micro-organisms, the basic principles of hygiene in the dairy industry and the production of milk by the principles of Good Hygiene Practice and Organic Farming..			
Learning outcomes	<ul style="list-style-type: none"> • Identify and apply of the most important laws and sub-law acts in the dairy industry, • Explain the synthesis of the milk and most important components of milk, • Recognize the main factors that influence on yield and quality of milk, • Understand the importance of physical and chemical properties of milk from the standpoint of milk processing, • Explain the concepts of primary and secondary contamination of milk and apply measures of good hygiene practices in elimination of undesirable microorganisms from milk, • Describe the application of the basic principles of hygiene in the dairy industry, first of all hygieneprocedures during milking, proper milking procedures and adequate milk handling after milking (milk filtration, milk cooling...), • Organize a proper manual and machine milking and identify and eliminate possible errors during milking proces, • Transfer the acquired knowledge to milk producers 			
Lecturer / Teaching assistant	dr Slavko Mirecki, mr Olga Kopitović			
Methodology	Lectures, practice (laboratory and computational), seminar paper on a given topic, consultations			
Plan and program of work				
Preparing week	Preparation and registration of the semester			
I week lectures	The definition of milk, development of dairy industry, the state of the dairy sector in the world and Montenegro. Legal framework for the quality of milk in the world and in Montenegro			
I week exercises	Introduction into laboratory analysis of milk: chemical, physical, cytological and microbiological methods.			
II week lectures	Milk production: udder structure			
II week exercises	Analysis of milk fat content: Rose-Gottlieb and Gerber methods (theory) Gerber method (practice)			
III week lectures	Synthesis and secretion of milk			
III week exercises	Analysis of protein content in milk: Kjeldhal and formol titration methods (theory), formol titration (practice)			
IV week lectures	The composition of milk by species of mammals with special emphasis on the cows, goats, sheeps milk and colostrum The influence of genetic, physiological and environmental factors on the quantity and quality of milk			
IV week exercises	Analysis of lactose content in milk: titrometric method (theory and practice) and refractometric method (theory and practice)			
V week lectures	Colloquium 1			
V week exercises	Milk adulteration: determination of freezing point of milk (FPD). Cryoscopic method (theory and practice)			
VI week lectures	Chemical properties of milk: fat, protein, lactose			
VI week exercises	Analysis of dry matter in milk by drying (theory and practice)			
VII week lectures	Chemical properties of milk: dry matter, minerals, vitamins, enzymes...			
VII week exercises	The acidity of milk (theory): native and supplementary acidity			
VIII week lectures	Physical properties of milk: mineral balance, buffering capacity, density, acidity (pH, SH) ...			
VIII week exercises	The acidity of milk (practice): titratable acidity method (Soxhlet-Henkel), pH metric method			
IX week lectures	Physical properties of milk: red-ox potential, density, optical properties, osmotic pressure, Cryoscopy, viscosity, specific heat, electrical conductivity			

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IX week exercises	Rapid methods: alcohol probe (practice), alizarol probe, red probe (theory).					
X week lectures	Colloquium 2					
X week exercises	Determination of milk density (theory) Lactodensimetric method (practice)					
XI week lectures	Microbiology of milk: milk as a medium for the growth of microorganisms. Stages of development of microorganisms in milk, milk viability, microbiological transformation of milk (fermentation), importance of microorganisms in dairy, lactic acid bacteria, butyric bacteria, propionic bacteria, proteolytic bacteria, lipolytic bacteria, pathogenic bacteria ...					
XI week exercises	Determination of total bacterial count in milk (CFU/IBC) Method of flow cytometry (practice)					
XII week lectures	Mastitis, prevention of mastitis, somatic cells, determining the number of somatic cells.					
XII week exercises	Determination of somatic cells count in milk Microscopic method, method of flow cytometry (practice),					
XIII week lectures	Production of milk by the principles of Good Manufacturing Practice, Milking and milking types (manual, mechanical). Proper milking and milking errors.					
XIII week exercises	Determination of antibiotic residues in milk Microbiological inhibitor test (practice)					
XIV week lectures	Milking hygiene. Procedures with milk after milking (filtration, cooling, storage...)Production of drinking milk (pasteurized, UHT, sterilized)					
XIV week exercises	Application of IR spectrophotometry for milk analysis Detection of fat, protein and lactose content by IR spectrophotometry (practice)					
XV week lectures	Thermal processing of milk: thermalization, pasteurization and sterilization of milk					
XV week exercises	Technological processes, equipment and lines for milk processing: thermalization, pasteurization and sterilization					
Student workload						
Per week			Per semester			
7 credits x 40/30=9 hours and 20 minuts 4 sat(a) theoretical classes 0 sat(a) practical classes 2 excercises 3 hour(s) i 20 minuts of independent work, including consultations			Classes and final exam: 9 hour(s) i 20 minuts x 16 =149 hour(s) i 20 minuts Necessary preparation before the beginning of the semester (administration, registration, certification): 9 hour(s) i 20 minuts x 2 =18 hour(s) i 40 minuts Total workload for the subject: 7 x 30=210 hour(s) Additional work for exam preparation in the preparing exam period, including taking the remedial exam from 0 to 30 hours (remaining time from the first two items to the total load for the item) 42 hour(s) i 0 minuts Workload structure: 149 hour(s) i 20 minuts (courses), 18 hour(s) i 40 minuts (preparation), 42 hour(s) i 0 minuts (additional work)			
Student obligations			The presence on practice, writing the seminar paper, colloquium exams, final exam			
Consultations			2 hours during the week			
Literature			1. Đorđević, J., (1982): Mleko – hemija i fizika mleka. INI PKB – Agroekonomik, BIGZ. 2. Vujičić, I., (1985): Mlekarstvo– I deo. Naučna knjiga, Beograd,.; additional literature: 1. Havranek, J. I Rupić, V. (2003): "Mlijeko". Hrvatska Mljekarska Udruga. Zagreb 2. Carić, M., Milanović, S., Vucelja, D.(2000): Standardne metode analize mlijeka i mlečnih proizvoda. Prometej, Novi Sad.			
Examination methods			- Activities during the classes (0-4 points) - Activity in practice (0-4 points) - Seminar (0-7 points) - First colloquium (0-20 points) - Second colloquium (0-20 points) - Final exam (0-45 points) - Passing grade gets the cumulatively collected 50			
Special remarks			Teaching (L + P) is performed for a group of 30 students, and laboratory practice for groups with 5 students.			
Comment						
Grade:	F	E	D	C	B	A
Number of points	less than 50 points	greater than or equal to 50 points and less than 60 points	greater than or equal to 60 points and less than 70 points	greater than or equal to 70 points and less than 80 points	greater than or equal to 80 points and less than 90 points	greater than or equal to 90 points