

Biotechnical Faculty / ANIMAL PRODUCTION / DAIRY SCIENCE

Course:	DAIRY SCIENCE			
Course ID	Course status	Semester	ECTS credits	Lessons (Lessons+Exercises+Laboratory)
4819	Mandatory	6	6	3+0+2
Programs	ANIMAL PRODUCTION			
Prerequisites	no conditionality			
Aims	Acquaint students with the economic importance of dairying in the world and in our country, the most important legal acts in the dairy industry, the acquisition of basic knowledge about the biosynthesis of milk, the factors that affect the quantity and properties of milk, the physical and chemical properties of milk, microorganisms in milk, the basic principles of hygiene in the dairy industry. industry and milk production according to the principles of good hygienic practice.			
Learning outcomes	Recognizing and implementing the most important laws and by-laws in the dairy industry, • Explain the synthesis of milk and the most important components of milk, • Recognizes the most important factors that affect the quantity and quality of milk, • Understands the importance of the physical and chemical properties of milk from the point of view of processing milk into dairy products, • Explain the concepts of primary and secondary contamination of milk and apply measures of good hygiene practice in the elimination of undesirable microorganisms from milk, • Describe and apply the basic principles of hygiene in dairy farming, above all milking hygiene and procedures with milk after milking, • Organizes proper manual and machine milking and recognizes and eliminates possible milking errors, • Transfers acquired knowledge to milk producers			
Lecturer / Teaching assistant	prof. dr Slavko Mirecki, mr Olga Kolutović			
Methodology	lectures, exercises (laboratory and computational), seminar work on a given topic, consultations			
Plan and program of work				
Preparing week	Preparation and registration of the semester			
I week lectures	Definition of milk, development of the dairy industry, state of the dairy sector in the world and in Montenegro. Legal framework for milk quality in the world and in Montenegro			
I week exercises	Introduction to laboratory analyzes of milk: chemical, physical, cytological and microbiological methods.			
II week lectures	Milk production: function and structure of the udder			
II week exercises	Analysis of milk fat content: Rose-Gottlieb and Gerber methods (theory) Gerber method (practice)			
III week lectures	Biosynthesis and secretion of milk			
III week exercises	Analysis of protein content in milk: Kjeldhal and formalin titration method (theory), formalin titration (practice)			
IV week lectures	Composition of milk by mammal species with special emphasis on 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 refractometric method (theory and practice)			
V week lectures	Milk adulteration: adding water, skimming milk fat...			
V week exercises	Colloquium 1			
VI week lectures	Chemical properties of milk: fat, protein, lactose content			
VI week exercises	Analysis of dry matter in milk by drying (theory and practice)			
VII week lectures	Chemical properties of milk: content of dry matter, minerals, vitamins, enzymes...			
VII week exercises	Acidity of milk (theory and practice): native and supplementary acidity pH metric method			
VIII week lectures	Physical properties of milk: sonic balance, buffer capacity, density, acidity (pH, SH) ...			
VIII week exercises	Acidity of milk (practice): Titration acidity (Soxhlet-Henkel method),			
IX week lectures	Physical properties of milk: red-ox potential, density, optical properties, osmotic pressure, cryoscopy, viscosity, specific heat, electrical conductivity of milk			
IX week exercises	Quick analytical methods: alcohol test (practice), Determining the freezing point of milk (FPD). Cryoscopic method, Determination of milk density (theory) Lactodensimetric method (practice)			

X week lectures	Physical properties of milk: density, relative volumetric mass					
X week exercises	Colloquium 2					
XI week lectures	Microbiology of milk: milk as a medium for the growth of microorganisms. Stages of development of microorganisms in milk, sustainability of milk, microbiological transformations of milk (fermentation), importance of microorganisms in dairying, milk bacteria					
XI week exercises	Determination of the total number of bacteria (CFU/IBC) Flow cytometry method (practice)					
XII week lectures	Mastitis, prevention of mastitis, somatic cells, determination of the number of somatic cells.					
XII week exercises	Determination of the number of somatic cells in milk Microscopic method (theory), flow cytometry method (practice),					
XIII week lectures	Milk production according to the principles of good production practice (GAP), milking and types of milking (manual and machine). Proper milking and milking mistakes.					
XIII week exercises	Detection of antibiotic residues in milk Microbiological inhibitor test (practice)					
XIV week lectures	Milking hygiene. Procedures with milk after milking (filtration, cooling, storage...).					
XIV week exercises	Application of IR spectrophotometry in milk analysis Determination of fat, protein and lactose content by IR spectrophotometry (practice)					
XV week lectures	Production of drinking milk: pasteurized, UHT, sterilized milk					
XV week exercises	Technological processes, equipment and lines for thermal processing of milk: thermalization, pasteurization and sterilization.					
Student workload						
Per week			Per semester			
6 credits x 40/30=8 hours and 0 minuts 3 sat(a) theoretical classes 2 sat(a) practical classes 0 excercises 3 hour(s) i 0 minuts of independent work, including consultations			Classes and final exam: 8 hour(s) i 0 minuts x 16 =128 hour(s) i 0 minuts Necessary preparation before the beginning of the semester (administration, registration, certification): 8 hour(s) i 0 minuts x 2 =16 hour(s) i 0 minuts Total workload for the subject: 6 x 30=180 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) 36 hour(s) i 0 minuts Workload structure: 128 hour(s) i 0 minuts (cources), 16 hour(s) i 0 minuts (preparation), 36 hour(s) i 0 minuts (additional work)			
Student obligations			Obligations of students during classes: attending teaching exercises, writing a seminar paper, taking colloquiums, taking the final exam			
Consultations			2 hours a week, dates to be arranged with students			
Literature			Recommended 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			Forms of knowledge testing and assessment: Activity during the lecture (0-4 points) Practice test 1 (0-5 points) Practice test 2 (0-5 points) Seminar paper (0-6 points) I colloquium (0-20 points) II colloquium (0-20 points) Final exam (0-40 points) A passing grade is obtained if 50 points are accumulated cumulatively. Grade number of points: A (≥ 90 to 100 points); B (≥ 80 to < 90); C (≥ 70 to < 80); D (≥ 60 to < 70); E (≥ 50 to < 60); F < of 50			
Special remarks			Laboratory practice is performed for a group of 5 students each.			
Comment			The subject is compulsory in the "Animal products" module, and optional in the "Zootechnique" module.			
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