UNIVERSITATEA DE ŞTIINŢE AGRICOLE ŞI MEDICINĂ VETERINARĂ CLUJ-NAPOCA
Calea Mănăştur 3-5, 400372, Cluj-Napoca
Tel: 0264-596.384, Fax: 0264-593.792
www.usamvcluj.ro

No._____of _____ **USAMV-CN form-0705010210**

SUBJECT OUTLINE

1. Information on the programme

1.1. Higher education institution	**University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca**
1.2. Faculty	**Food Science and Technology**
1.3. Department	**Food Engineering**
1.4. Field of study	**Food Engineering**
1.5. Education level	**Master**
1.6. Specialization/ Study programme	**Food Processing Systems and Quality Control**
1.7. Form of education	**Regular studies**

2. Information on the discipline

2.1. Name of the discipline	**Food chemical modifications and food analysis**							
2.2. Course coordinator				**Assoc. Prof. Dr. habil. Cristina Anamaria Semeniuc**				
2.3. ~~Seminar~~/ laboratory/ ~~project~~ coordinator				**Assoc. Prof. Dr. habil. Cristina Anamaria Semeniuc**				
2.4. Year of study	**I**	2.5. Semester	**II**	2.6. Type of evaluation	**Continuous**	2.7. Discipline status	Content[2]	**SD**
							Compulsoriness [3]	**CD**

3. Total estimated time (teaching hours per semester)

3.1. Hours per week – full time programme	4	out of which: 3.2. lecture	2	3.3. ~~seminar~~/ laboratory/ ~~project~~	2
3.4. Total number of hours in the curriculum	56	out of which: 3.5. lecture	28	3.6. ~~seminar~~/ laboratory/ ~~project~~	28

Distribution of the time allotted	hours
3.4.1. Study based on book, textbook, bibliography, and notes	30
3.4.2. Additional documentation in the library, specialized electronic platforms, and field	30
3.4.3. Preparing ~~seminars~~/ laboratories/ ~~projects~~, ~~subjects~~, ~~reports~~, ~~portfolios~~, and ~~essays~~	30
3.4.4. Tutorials	10
3.4.5. Examinations	10
3.4.6. Other activities	9

3.7. Total hours of individual study	119
3.8. Total hours per semester	175
3.9. Number of credits[4]	7

4. Prerequisites (is applicable)

4.1. curriculum-related	Basic notions of food chemistry and biochemistry
4.2. skills-related	The student must have the necessary knowledge for proper handling of chemical reagents, glassware, utensils, and laboratory equipment

5. Conditions (if applicable)

5.1. for the lecture	Classroom, equipped with: blackboard, video projector, and computer In the case of carrying out online didactic activities, the teaching methods will be adapted
5.2. for the ~~seminar~~/ laboratory/ ~~project~~	Laboratory equipped with laboratory equipment, glassware, utensils, and reagents In the case of carrying out online didactic activities, the teaching methods will be adapted

6. Specific competences acquired

Professional competences	C5.2. Explanation and interpretation of methods for assessing the quality of agri-food products C5.3. Use of specific methodology for evaluation and control of agri-food products
Transversal competences	CT1. Responsible execution of laboratory tests; analytical and critical thinking in interpreting results

7. Course objectives (based on the list of competences acquired)

7.1. Overall course objective	Knowledge of chemical changes, induced, and accidental, of nutrients in animal origin products
7.2. Specific objectives	Assessment of major nutrients and minor compounds of interest for food quality using instrumental analytical techniques

8. Contents

8.1. LECTURE	Teaching methods	Notes
1. Lactose 1.1. Introduction 1.2. Structure of lactose 1.3. Lactose and the Maillard reaction 1.4. Determination of lactose concentration 1.4.1. Polarimetry 1.4.2. Oxidation and reduction titration 1.4.3. Infrared (IR) spectroscopy 1.4.4. Colorimetric methods 1.4.5. Chromatographic methods 1.4.6. Enzymatic methods	Participatory lecture, debate, exemplification	2 lectures
2. Milk lipids 2.1. Introduction 2.2. Classes of lipids in milk 2.3. Fatty acid profile of milk lipids 2.4. Lipid oxidation 2.4.1. Autocatalytic mechanism 2.4.2. Pro-oxidants in milk and milk products 2.4.3. Antioxidants in milk 2.4.4. Spontaneous oxidation 2.4.5. Other factors that affect lipid oxidation in milk and dairy products 2.4.6. Measurement of lipid oxidation 2.5. Analytical methods for the quantitative determination of milk fat		2 lectures
3. Milk proteins 3.1. Introduction 3.2. Heterogeneity of milk proteins 3.2.1. Other protein fractions 3.3. Methods for quantitation of proteins in foods 3.3.1. Kjeldahl method 3.3.2. The formol titration 3.3.3. Absorbance of UV light 3.3.4. Biuret method 3.3.5. Folin-Ciocalteau (F-C) method 3.3.6. Dye-binding methods		2 lectures

3.3.7. Bradford method 3.3.8. Infra-red spectroscopy 3.3.9. Dumas method		
4. Heat-induced changes in milk 4.1. Introduction 4.2. Lipids 4.2.1. Physicochemical changes 4.2.2. Chemical changes 4.2.3. Denaturation of indigenous enzymes 4.3. Lactose 4.3.1. Formation of lactulose 4.3.2. Formation of acids 4.3.3. Maillard browning 4.4. Milk salts 4.5. Vitamins 4.6. Proteins 4.6.1. Enzymes 4.6.2. Denaturation of other biologically-active proteins 4.6.3. Denaturation of whey proteins 4.6.4. Effect of heat on caseins 4.7. Effect of heat treatment on rennet coagulation of milk 4.8. Age gelation of sterilized milk 4.9. Heat-induced changes in flavour of milk		2 lectures
5. Basic nutritional composition of meat 5.1. Postmortem aging and evaluation methods 5.1.1. Introduction 5.1.2. Aging 5.1.3. Postmortem aging and meat quality 5.1.3.1. Tenderness 5.1.3.2. Flavor 5.1.3.3. Color 5.1.3.4. Water-holding capacity 5.1.4. Evaluation/assessment of postmortem aging		1 lecture
6. Analysis of lipid oxidation products 6.1. Introduction 6.2. Assessment of primary oxidation products 6.3. Assessment of secondary oxidation products 6.3.1. Malonaldehyde 6.3.2. Lipid-derived volatiles		1 lecture
7. Quality assurance for research and development and non-routine analysis 7.1. Introduction 7.2. Definitions 7.3. Principles of making valid analytical measurements 7.4. Organisational quality elements 7.5. Technical quality elements 7.6. Analytical task quality elements 7.7. External verification		4 lectures

8.2. PRACTICAL WORK	Teaching methods	Notes
Determination of thiobarbituric acid reactive substances (TBARS) in meat	Presentation, explanation, demonstration, case study	3 laboratory works
Determination of peroxide value (PV) in anhydrous milk fat		3 laboratory works

Determination of nitrate and nitrite content of meat products after enzymatic reduction of nitrate to nitrite		3 laboratory works
Determination of hidroximetilfurfural (HMF) in honey using Winkler method		3 l laboratory works
Test of verifying knowledge	-	2 laboratory works

Compulsory bibliography:

1. Fox P.F., Uniacke-Lowe T., McSweeney P.L.H., O' Mahony J.A. (2015). Dairy Chemistry and Biochemistry, 2nd Ed. Springer International Publishing, Cham;
2. Biswas A.K., Mandal P.K. (2020). Meat Quality Analysis: Advanced Evaluation Methods, Techniques, and Technologies, 1st Ed. Academic Press, Oxford.
3. Adams C., Cammann K., Deckers H.A., Dobkowski Z., Holcombe D., LaFleur P.D., Radvila P., Rohrer C., Steck W., Vermaercke P. (1998). Eurachem/CITAC Guide: Quality Assurance for Research and Development and Non-routine Analysis. Available from www.eurachem.org

Optional bibliography:

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9. Corroborating the course content with the expectations of the epistemic community representatives, of the professional associations and of the relevant stakeholders in the corresponding field

In outlining the course content and practical work were considered recommendations of food industry employers.

10. Assessment

Type of activity	10.1. Assessment criteria	10.2. Assessment methods	10.3. Percentage of the final grade
10.4. Lecture	Logical, correct, and coherent application of acquired notions	**Continuous assessment**	50%
10.5. ~~Seminar~~/ Laboratory	Ability to perform tests in a chemical testing laboratory Ability to analyse and interpret test results	**Test of verifying knowledge**	50%
10.6. Minimum performance standards			
Execution of a laboratory test Elaboration of a test report			

[1] Education levels-choose of the three options-Bachelor/ Master/ Ph.D.

[2] Discipline status (content)-or the undergraduate level, choose one of the options-**FD** (fundamental discipline), **BD** (basic discipline), **FE** (specific discipline-food engineering), **UO** (discipline based on the university's options).

[3] Discipline status (compulsoriness)-choose one of the options-**CO** (compulsory discipline) **OD** (optional discipline) **ED** (elective discipline).

[4] One credit is equivalent to 25-30 hours of study (teaching activities and individual study).

Filled in on
06.09.2021

Course coordinator
Assoc. Prof. Dr. habil. Cristina Anamaria Semeniuc

Laboratory work/ ~~seminars~~ coordinator
Assoc. Prof. Dr. habil. Cristina Anamaria Semeniuc

Course coordinator
Assoc. Prof. Dr. habil. Cristina Anamaria Semeniuc

Approved by the Department on
22.09.2021

Head of the Department
Prof. Dr. Sevastița Muste

Approved by the Faculty Council on
28.09.2021

Dean
Prof. Dr. habil. Elena Mudura