UNIVERSITATEA DE ŞTIINŢE AGRICOLE ŞI MEDICINĂ VETERINARĂ CLUJ-NAPOCA
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Nr._____din _____

USAMV form 0702040218

SUBJECT OUTLINE

1. Information on the programme

1.1. Higher education institution	University of Agricultural Sciences and Veterinary-Medicine Cluj-Napoca
1.2. Faculty	Food Science and Technology
1.3. Department	Food Engineering
1.4. Field of study	Food Engineering
1.5.Cycle of study[1]	Level 1. Bachelor
1.6. Specialization/ Study programme	**Food Control and Expertise**
1.7. Form of education	Regular studies

2. Information on the discipline

2.1. Name of the discipline	**BIOTECHNOLOGIES FOR FOOD WASTE RECYCLING**							
2.2. Course coordinator				**Associate professor PhD. Mirela Jimborean**				
2.3. Seminar/ laboratory/ project coordinator				**Assistant PhD. Delia Michiu**				
2.4. Year of study	IV	2.5. Semester	VIII	2.6. Type of evaluation	Continue	2.7. Discipline status	Content[2]	BD
							Compulsorines s[3]	OD

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	28
Distribution of the time allotted					Hours
3.4.1. Study based on book, textbook, bibliography and notes					4
3.4.2. Additional documentation in the library, specialized electronic platforms and field					
3.4.3. Preparing seminars/ laboratories/ projects, subjects, reports, portfolios and essays					
3.4.4. Tutorials					
3.4.5. Examinations					
3.4.6. Other activities					Hours
3.7. Total hours of individual study	4				
3.8. Total hours per semester	60				
3.9. Number of credits[4]	2				

4. Prerequisites (is applicable)

4.1. curriculum-related	Processing Technology of Animal Products, Vegetable Products Processing Technology, Food Biotechnology
4.2. skills-related	Identification, description and appropriate use of specific concepts of food science Understanding the Basics by-products resulting from major food technologies and direction of recovery

5. Conditions (if applicable)

5.1. for the lecture	Video, ppt presentation.
5.2. for the seminar/ laboratory/ project	Pilot Station, raw materials and auxiliary technological schemes

6. Specific competences acquired

Professional competences	C3.1. Description and use of concepts, basic methods and theories regarding the technologies of dairy industry C3.2 Identification of concepts, theories, models and elementary methods regarding the possibility of expanding the production activity in the field of by-products valorization. C2.3. To apply principles and scientific methods of packaging and labelling to help solution technological problems in the agro-food chain.
Transversal competences	**CT1.** Application of strategies of perseverance, rigor, efficiency and responsibility in work, punctuality and assuming responsibility for the results of personal activities, creativity, common sense, analytical and critical thinking, problem solving etc., based on the principles, norms and values of the code of professional ethics in the food industry.

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

7.1. Overall course objective	Understanding the problems regarding biotechnologies for waste recycling which result from the technological processes of food products. The studied chapters help to understand the importance of waste valorization to a significant proportion in technological processes. Understanding the role of technologist in food industry for leading the technological operations as well as monitoring the technological parameters.
7.2. Specific objectives	Knowledge of the processes underlying the food products production. Interpretation of technological schemes and description of waste processing technologies resulted in technological processes of food products production. Characterization of finished products Understanding the role and importance of biotechnologies in wastes and residues recycling from the food industry.

8. Content

8.1. LECTURE **Number of hours**	Teaching methods	Notes
Classification and properties of food industry residues **General methods of reuse and/or treatment of food industry wastes**	Lecture, heuristic conversation, explanation	4 hours
Superior valorization of food industry by - products General technological processes applied to the residues valorization. New methods of waste valorization in the food industry	Lecture, heuristic conversation, explanation	4 hours
Biotechnology for separation by ultrafiltration of proteins from skimmed milk - Use of protein concentrate obtained by ultrafiltration of skimmed milk in cheeses production; - Use of protein concentrate in the manufacture of yogurt with low lactose content; - Concentration by reverse osmosis of whey and skimmed milk; - Demineralization of whey and skimmed milk; - Obtaining biomass from whey; - Obtaining biogas from whey; - Metabolites obtained by whey fermentation - Use of whey and whey products for animal feed	Lecture, heuristic conversation, explanation	6 hours
By-products and slaughterhouse waste 1. Processing of slaughterhouse wastes in feed flours 2. Endocrine glands and by-products intended for the chemical-pharmaceutical industry.	Lecture, heuristic conversation, explanation	4 hours

Biotechnologies for complex processing of wine industry by-products 1. Preparation of feed flour 2. Preparation of food coloring 3. Preparation of grape pomace and bunch fertilizers		2 hours
Recycling of food industry wastes through bioconversion 1. Bioenergy production 2. Bioconversion of food industry wastes to organic acids	Lecture, heuristic conversation, explanation	4 hours
Wastes bio-valorisation: 1. Obtaining biomass and microbial proteins by industrial waste valorisation (whey, molasses, methanol, hydrocarbons, wood hydrolysates etc.). 2. Obtaining new unconventional sources of energy through fermentations (biogas, fuel alcohol, hydrogen bio-production)		4 hours
8.2. PRACTICAL WORK **Number of hours –**		
Obtaining a new product by skimmed milk valorization.	Practical demonstration, observation	4hours
Use of whey: getting soft cow cheese	Practical demonstration, observation	2 hours
Obtaining whey jelly products	Practical demonstration, observation	2 hours
Use of lecithin in the food industry	Practical demonstration, observation	2 hours
Superior valorization of organs in obtaining functional products	Practical demonstration, observation	4 hours
Recycling of animal fat	Practical demonstration, observation	2 hours
Waste bio-valorisation from alcohol and compressed yeast industry	Practical demonstration, observation	4 hours
Wastewater treatment Preliminary separation of proteins from wastewater Wastewater disposal systems Wastewater treatment methods	Practical demonstration, observation	4 hours
Presenting an innovative by- product from the realization of a product obtained from processes in the food industry	Presentation, discussion	4 hours

Compulsory bibliography:

1. Costin, Gh.M., Lungulescu, Gr. 1985, Valorificarea subproduselor din industria laptelui, Ed. tehnică, Bucureşti.
2. Mirela Anamaria Jimborean**,** 2010, Valorificarea subproduselor din industria alimentară, Editura ACADEMICPRES, Cluj-Napoca, ISBN 978-973-744-205-5
3. Jimborean Mirela Anamaria și Michiu Delia, 2019, Valorificarea subproduselor din industria alimentară, Editura RISOPRINT, Cluj-Napoca, ISBN 978-973-53-2319-6

Optional bibliography:

1. Banu, C. şi colab., 1999, Manualul inginerului de industrie alimentară, Vol. II, Editura Tehnică, Bucuresti.
2. Banu, C şi colab.,1998, Manualul inginerului de industrie alimentară, vol. II, Editura Tehnică, Bucuresti.
3. Ciobanu Domnica, Valentin Nedef, Mihai Leonte, 2006, *Minimizarea scăzămintelor tehnologice în industria alimentară prin valorificarea subproduselor şi deşeurilor*, Editura Ecozone, Iaşi
4. Jimborean Mirela şi Dorin Ţibulcă, 2006, Tehnologia de fabricare a brânzeturilor, Editura Risoprint, Cluj-Napoca;
5. N. I. Razuvaev, 1980, Prelucrarea complexă a produselor secundare de la vinificatie, Ed. Ceres, Bucuresti.
6. Ţibulcă, D., Sălăgean, D. 2000, Tehnologia cărnii şi a produselor din carne, Ed. Risoprint, Cluj-Napoca.
7. Ţibulcă, D. şi Jimborean Mirela, 2008, Tehnologia de obţinere a produselor lactate, Editura Risoprint, Cluj-Napoca.

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

Course content is consistent with national professional associations specific applications

10. Assessment

Type of activity	10.1. Assessment criteria	10.2. Assessment methods	10.3. Percentage of the final grade
10.4. Lecture	Knowledge of the main operations, description and use of basic methods regarding biotechnologies of waste recycling in the food industry;	Verification	75%
10.5. Seminar/Laboratory	Logical, coherence and correct application of the acquired notions	Prepare a report on how to exploit a by-product of food production	25%
10.6. Minimum performance standards			
Making an individual raport on biotechnologies for waste recycling in the food industry. Obtaining a minimum grade of 5 for practical works conditions the entrance to the exam			

[1] Cycle of studies- choose of the three options: Bachelor/Master/PhD.
[2] Discipline status (content)- for the undergraduate level, choose one of the options:- **FD** (fundamental discipline), **BD** (Basic discipline), **CS** (specific disciplines-clinical sciences), **AP** (specific disciplines-animal production), **FH** (specific disciplines-food hygiene), **UO** (disciplines based on the university's options).
[3] Discipline status (compulsoriness) - choose one of the options – **CD** (compulsory discipline) **OD** (optional discipline) **ED** (elective discipline).
[4] One credit is equivalent to 25-30 hours of study (teaching activities and individual study).

Course coordinator
Associate professor PhD. Mirela Jimborean

Laboratory work/seminar coordinator
Assistant PhD. Delia Michiu

Filled in on
08.09.2021

Subject coordinator
Associate professor PhD. Mirela Jimborean

Approved by
the department
on
22.09.2021

Head of the Department
Professor PhD. Sevastiţa Muste

Approved by
the Faculty
Council on
28.09.2021

Dean
Professor PhD. Elena Mudura