Nr._____din _____ **Formular USAMV 0703030101**

COURSE DESCRIPTION

1. General data

1.1. Higher Education Institution	University of Agricultural Sciences and Veterinary Medicine
1.2. Faculty	Faculty of Food Science and Technology
1.3. Department	Food Science
1.4. Study field	Food Engineering
1.5. Study level[1)]	Bachelor
1.6. Specialization/ Study Program	**Food Engineering**
1.7. Teaching Form	FT

2. Course Characteristics

2.1. Name of the course	Food Biotechnology							
2.2. Course leader				Prof. Dr. Dan Cristian VODNAR				
2.3. Coordinator of the laboratory/seminar activity				Assist. Dr. Lavinia MUREŞAN				
2.4. Year of study	III	2.5. Semester	**5**	2.6. Type of evaluation	Summative	2.7. Course regime	Content[2]	DF
							Level of compulsory[3]	DI

3. Total estimated time (hours/semester for the teaching activities)

3.1. Number of hours/week – frequency form	3	of which: 3.2. course	2	3.3. seminar/ laboratory/ project	1
3.4. Total hours in the curricula	42	of which: 3.5. course	28	3.6.seminar/laboratory	14

Distribution of time	hours
3.4.1.Study based on handbook, notes, bibliography	10
3.4.2. Extra documentation in the library, on specific electronic platforms and on field	5
3.4.3. Prepare the seminars / laboratories / projects, theme, essays, reports, portfolio	8
3.4.4.Tutorial	2
3.4.5.Examination	10
3.4.6. Other activities	0

3.7. Total hours of individual study	40
3.8. Total hours per semester	75
3.9. Number of ECTS [4]	3

4. Pre-conditions (where is the case)

4.1. of curriculum	Knowledge of general biotechnology, food chemistry, food biochemistry, general / special microbiology
4.2. of competences	The student must have knowledge about chemical reactions involved in fermentation processes, specific conditions for the cultivation of microorganisms.

5. Conditions (where is the case)

5.1. of course development	The course is interactive, students can ask questions about the content of the

	presentation. The university discipline requires the observance of the start and end time of the course. No other activities are tolerated during the lecture, mobile phones must be switched off.
5.2. of seminar/laboratory/project development	At the practical works it is mandatory to consult the practical guide, each student will carry out an individual activity with the laboratory materials provided and described in the Practical works guide. Academic discipline is required throughout the work.

6. Specific acquired competences

Proffesional competences	C1. Identify, describe and use appropriately the specific notions of food science and food safety. C2. Management of general engineering processes, operation of food industry facilities and equipment. C3. Supervision, management, analysis and design of food technologies from raw materials to the finished product. C4. Planning, organizing and coordinating agri-food marketing activities. C5. New food design, implementation and project management. C6. Carrying out management and marketing activities on the agri-food chain.
Transversal competences	CT1. Applying strategies of perseverance, rigor, efficiency and responsibility at work, punctuality and taking responsibility for the results of personal activity, 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 field. CT2. Applying interrelationship techniques within a team; amplifying and refining the empathic capacities of interpersonal communication and assuming specific attributions in carrying out the group activity in order to treat / resolve individual / group conflicts, as well as the optimal time management. CT3. Efficient use of various ways and techniques of learning - training for the acquisition of information from bibliographic and electronic databases, both in Romanian and in a language of international circulation, as well as assessing the need and usefulness of extrinsic and intrinsic motivations of continuing education.

7. Subject Objectives (as a result of the specific acquired competences)

7.1. Subject general objectives	To acquire particular knowledge about the field of current food biotechnologies applied to food.
7.2. Specific objectives	To understand the enzymatic processes. To be able to make bioactive packaging and smart labels with antimicrobial activity. To know the modern biotechnological systems so that they can make innovative products on the Romanian market.

8. Content

8.1. COURSE	Teaching methods	Observations
Number of hours – 28		
Introduction in biotechnology Introduction. The main directions of biotechnology. What is biotechnology? Biotechnology: a multidisciplinary science. Product safety. Public perception of biotechnology. Biotechnology and the developing world.	Lecture	2 Lectures
Biomass – a biotechnological substrate Biomass production strategy. Natural raw materials. Availability of by-products. The impact of biomass on the future of biotechnologies.	Lecture	2 Lectures
Bioprocesses / Fermentative technologies Introduction. Principles of cell growth. Bioreactors. Classification. Industrial bioreactors. Design of fermentation processes. Fermentation on solid substrate. Metabolic engineering. Separation processes of the obtained product.	Lecture	3 Lectures
Enzymatic biotechnologies and enzymes used in the food industry General classification of enzymes and their nature. Units of measurement of enzymatic activity. Enzymatic	Lecture	3 Lectures

preparations. Immobilized enzymes. Enzymes important for the food industry. Biosensors. **Microorganisms used in the food industry** Introduction. Bacteria. Yeasts. Fungi. **Biotechnologies applied to obtain food additives** Microbial polysaccharides. The structure, composition and properties of more important types of microbial polysaccharides. Classification of microbial polysaccharides.	Lecture Lecture	2 Lectures 2 Lectures

8.2. PRACTICAL WORK **Number of hours – 14**		
Characterization of lactic fermentations on selective culture media.	The study of fermentations	1 practical work
Lactic acid production on residual plant substrate.	The study of metabolites	1 practical work
Extraction of DNA from fruits and vegetables.	The study of genetic coding	1 practical work
Formulation of active biofilms with antimicrobial effect.	The study of biofilms	1 practical work
Development of yogurts with microencapsulated probiotic bacteria.	Food development	1 practical work
Development of bioactive labels for the labeling of fruits and vegetables.	Study of labels	1 practical work
Jelly formulation with microencapsulated probiotic bacteria.	Food projection	1 practical work

Compulsory bibliography:
1. Vodnar Dan Cristian. Notiuni de Biotehnologii Alimentare. AcademicPress, ClujNapoca, 2013.
2.Vodnar Dan Cristian. In vitro survivability of probiotic bacteria during exposure to gastrointestinal tract conditions. Academic Pres, ClujNapoca, Romania, 2014.
3.Vodnar Dan Cristian. Biotehnologii alimentare – Lucrări practice. AcademicPress, ClujNapoca, 2013.
4. Banu,C. (coordonator) – Biotehnologii în industria alimentară, Editura Tehnică, Bucureşti, 2000.
5. Banu, C. (coordonator) – Biotehnologii în industria alimentară, Editura Tehnică, Bucureşti, 2004.
6. Jurcoane, Ştefana (coordonator) – Tratat de biotehnologie, volumul I, Editura Tehnică, Bucureşti, 2004.
7.Jurcoane, Ştefana (coordonator) – Tratat de biotehnologie, volumul II, Editura Tehnică, Bucureşti, 2006.

Optional bibliography:
1. Mencinicopschi,Gh.,Kathrein,I.Teodoru,V. – Biotehnologii în prelucrarea produselor agroalimentare, Editura Ceres, Bucureşti, 1987.

9. Correlations between the subject against the expectations of the epistemic communitiy representatives, of the professional associations and employers' representatives in the domain

In order to identify ways to modernize and continuously improve the teaching and content of the courses, with the most current topics and practical problems, teachers consult the international literature.

10. Evaluation

Type of activity	10.1. Evaluation criteria	10.2. Evaluation methods	10.3. Percent of the final grade
10.4. Course	Knowledge of fermentation processes on solid substrate. Characterization of biotechnologies for polysaccharide production. Aspects of carotenoid production by genetic recombination. Characterization of phenolic antimicrobials. Knowledge of biosensors. Aspects related to anaerobic processes involved in waste treatment.	Exam	70%
10.5. Seminar / Laborator	Cunosc tehnicile de imobilizare. Formulează etichete și ambalaje bioactive.	Colloquim	20 %

	Realizează alimente prin biotehnologie. Determinarea activității antimicrobiene. Proiect.	Project	10%

10.6. Minimal standard of performance

Mastery of scientific information transmitted through lectures and practical work at an acceptable level. Obtaining the pass mark for the ongoing checks is a condition of passing the exam.

[1] level of study – to be chosen one of the following – Bachelor /Post graduate/Doctoral

[2] Course regime (content)- for bachelor level it will be chosen one of the following - **DF** (fundamental subject), **DD** (subject in teh domain), **DS** (specific subject), **DC** (complementary subject).

[3] Course regime (compulsory level)- to be chosen one of the following – **DI** (compulsory subject) **DO** (Optional subject) **DFac** (Facultative subject).

[4] One ECTS is equivalent with 25-30 de hours of study (didactical and individual study).

Date of completion
09.09.2021

Course coordinator
Prof. dr. Dan C. Vodnar

Leader of the laboratory/seminar
Assist. Dr. Lavinia MUREȘAN

Approved by the Department on
22.09.2021

Head of the Department
Proffesor PhD. Ramona Suharoschi

Approved by the Faculty Council on
28.09.2021

Dean
Proffesor PhD. Elena Mudura