UNIVERSITY OF AGRICULTURAL SCIENCE AND VETERINARY MEDICINE CLUJ-NAPOCA
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No._____/ _____ **Form code USAMV 0703020114**

SUBJECT OUTLINE

1. General data

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 Sciences
1.4. Domain of study	Food Engineering
1.5. Level of study[1)]	Bachelor of Science
1.6. Specialization	Food Engineering
1.7. Form of education	IF

2. Date despre disciplină

2.1. Name of the course	Food biochemistry							
2.2. Course coordinator				Lecturer.dr. Zorita Diaconeasa				
2.3. Coordinator of the laboratory/seminar activity				Lecturert.dr. Zorita Diaconeasa				
2.4. Year of study	II	2.5. Semester	**4**	2.6. Type of evaluation	Continuous Summative	2.7. Course regime	Content[2]	DF
							Compulsory level[3]	DI

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

3.1. Number of hours/week– full time form	4	out of which: 3.2. course	2	3.3. seminar/ laboratory/ project	2
3.4. Total hours in the teaching curricula	56	out of which: 3.5. course	28	3.6. seminar/laboratory	28

Distribution of time	hrs.
3.4.1. Study based on hand book, notes, bibliography	5
3.4.2. Extra documentation in library, on specific electronic platforms and on field	5
3.4.3. Preparation of seminars / laboratories / projects, essays, reports, portfolios	5
3.4.4. Tutorial	2
3.4.5. Examination	2
3.4.6. Other activities	

3.7. Total hours of individual study	19
3.8. Total hours on semester	75
3.9. Number of credits [4]	3

4. Pre-conditions (where relevant)

4.1. for curriculum	Organic Chemistry
4.2. for competences	The student must have knowledge regarding general chemisty and organic chemistry from highschool order to understand important food chemistry principles

5. Conditions (where relevant)

5.1. for course	The course is interactive; students can ask questions regarding the content of the exposure. Academic discipline enforces time start and end of the course. Any other activities are forbidden during course, the mobile phones must be switched off.
5.2. for seminar/laboratory/project	In the laboratory students must consult the practical guide, every student will perform individual activity using the laboratory equipment which is described in the practical guide. During the practical activities the academic discipline must be maintainted.

6. Specific competences acquired

Competențe profesionale	-Description and use of concepts, theories and basic methods used in quality control of food products; the concepts are refering to the chemical compounds that assure the product quality, their transformation during processing, transportation and storage, the equipment and the quantification methods used for determining these compounds -Description and use of concepts, theories and methods of basic Food science (defined in multidisciplinary terms), on the structure, properties and transformations of food compounds and contaminants throughout the food chain -Explanation and interpretation of concepts, processes, models and methods of food science, using basic knowledge on the composition, structure, properties and transformations of food compounds and their interaction with other systems throughout the food chain
Competențe transversale	- Applying strategies like perseverance, rigor, efficiency and responsibility in work, punctuality and personal assumption of responsibility for business results, creativity, common sense, analytical and critical thinking, problem solving and so on, based on principles, norms and code values applied for ethics in food. - Applying networking techniques within a team; amplification and shaping of empathic capacities of interpersonal communication and ownership of specific tasks in this activity group for treatment / conflict solving individual / group, and optimal management of time.

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

7.1. . General objectives	Assimilation of fundamental concepts of biochemistry required for engineers in the food industry in order to understand and learn other disciplines (nutrition, toxicology, food control, etc.); knowledge of organic compounds involved in the proper functioning of plant and animal organisms.
7.2. Specific objectives	Food Biochemistry course aims to prepare sudents for senior years, help them to achieve an understanding of the chemical changes that take place with food components during processing and storage. The study of biochemistry is necessary for arming students with the knowledge and practical skills on the handling of laboratory tools, identification or determination of chemical compounds based on its content.

8. Conținuturi

8.1. COURSE **Number of hours – 14**	Teaching methods	Observation
1. The chemical composition of vegetable and animal organisms: inorganic and organic compounds founds in food. Bioelements. Hierarchy of molecular organization of organisms. Biomolecule relationship - cell structure	Lectures	1 Lecture
2.Carbohydrate metabolism: carbohydrates anabolism; Photosynthesis and chemosynthesis; Oligoglucidelor and poliglucidelor biosynthesis. Carbohydrate catabolism: Glycolysis. Krebs's cycle. Oxidative phosphorylation and tissue respiration; Pentosophosphates cycle and fermentative degradations; Vitamin C biosynthesis.	Lectures	1 Lecture
3.Lipid metabolism: The role of lipids in plant organism. Glycerol metabolism. The biosynthesis of saturated and unsaturated fatty acid . The biosynthesis of triglycerides. Glycerides Catabolism: degradation of saturated and unsaturated fatty acids through ß-oxidation and α-oxidation. Biosynthesis and degradation of phosphatides and sfingoglicolipid	Lectures	1 Lecture
4. Protein metabolism:The role of proteins in the body. Amino acids anabolism; General methods for the biosynthesis of amino acids (reductive amination IVb) Amino acids catabolism . Degradation by deamination and decarboxylation. Ammonia metabolism. Ureogenetic cycle and glutamic acid cycle. Biosynthesis and degradation of	Lectures	1 Lecture

nitrogenous bases. Biosynthesis and degradation of DNA and RNAs. The mechanism of proteins biosynthesis.		
5. Biochemistry degradation processes: Influence of light on the chemical composition of food (degradation of proteins, fats, pigments, vitamins).	Lectures	1 Lecture
6. Changes occurring in food as a result of heat treatment: the thermal degradation of sugars, proteins, lipids, vitamins	Lectures	1 Lecture
7. Non-enzymatic oxidative degradation of foodstuffs: Processes of oxidative rancidity of fat, of carotenoids, tanning substances, substances der flavor. Prevention of autoxidation processes.	Lectures	1 Lecture
8. Food degradation under the action of heavy metals and polluted them with pesticides	Lectures	1 Lecture
9. Food spoilage caused by enzymes and prevent these processes.	Lectures	1 Lecture
10. Biochemistry preservation processes: Freezing food; Biochemical transformations of proteins, lipids, vitamins freezing process. The enzymatic activity in congelate.Transformări products occurring in the milk, fish, meat, eggs, dairy products during freezing and storage. Conservation by lactic fermentation and antiseptic food.	Lectures	1 Lecture
11. Changes and degradation of dehydrated food: Correlations between water activity and lipid oxidation, browning carbohydrates, enzyme reactions. Biochemical changes occurring in plant products, milk, dairy products and dehydrated meat.	Lectures	1 Lecture
12. Conservation through chemical sterilization: Influence of thermal sterilization of canned vegetables, the meat and milk.	Lectures	1 Lecture
13. Special Biochemistry: biochemical transformations during storage of fruits and vegetables - carbohydrates transformations; their pectin substances, organic acids, carotenoids, vitamins.	Lectures	1 Lecture
14. Special Biochemistry: The coagulation of milk, cheese ripening, maturation of meat, milk and crops biochemical processes in fermented dairy products.	Lectures	1 Lecture

8.2. PRACTICAL WORK **Number of hours – 28**		
1. Quantification of carbohydrates in food by HPLC; The pectin from fruits used for jellies obtaining.	Practical work	2 Practical work
2 . Lipids extraction from chocolate, chips and sunflower seeds.	Practical work	2 Practical work
3. Determination of the main constants of glycerides: saponification, iodine, acid value, peroxide index.	Practical work	3. Practical work
4. The separation of a mixture of amino acids by paper chromatography. Quantification of meat proteins by	Practical work	2 Practical work

spectrophotometric method. 5. Evaluation of enzymatic activity depending on temperature and pH . 6. Determination of biochemical changes in plant pigments by heat treatment; Biochemistry of pigments in meat 7. Practical examination	Practical work Practical work Exam	2 Practical work 2 Practical work Practical examination

Compulsory bibliography:

1. G. Neamţu - "Biochimie Alimentara" - Edit. Ceres, Bucureşti, 1997
2. Andreea Stănilă, Carmen Socaciu, - „Biochimia alimentelor- Lucrări practice şi teste" , Editura Academic Press, Cluj-Napoca, 2004
3. Andreea Stănilă – Analiza compusilor bioactivi din alimente; Ed.Academic Press Cluj-Napoca; 2013 -

Facultative bibliography:

1) L.Stryer –**"Biochemistry"**-fourth edition, W.H.Freeman & Co., New York, 1995
2) Doina Miere – Chimia si igiena alimentelor; Ed.Medicală Universitara Iuliu Hatieganu, Cluj-Napoca, 2002

9. Corroboration of the subject content with the expectations of the epistemic community representatives, of the professional associations and representative employers in the domain

In order to identify ways of modernization and continuous improvement of teaching and course content, with the current issues and practical problems, teachers attend the annual meeting of the Association of Specialists in Food Industry of Romania as well as business meetings with members of food industry.

10. Evaluation

Type of activity	10.1. Evaluation criteria	10.2. Evaluation methods	10.3. Percent of the final grade
10.4. Course	Identify the main classes of organic compounds. Knowledge of organic chemical reactions, identification of mechanisms reaction. Knowing the properties of classes of organic compounds found in the food industry	Oral Exam	75%
10.5. Seminar/Laboratory	Theoretical and practical knowledge of the methods of analysis used in the chemistry lab. Troubleshooting stoichiometric with practical applicability (concentration, purity, yield).	periodic evaluation / colloquy	25%
10.6. Minimal standard of performance			
Mastering scientific information conveyed through lectures and practical work at an acceptable level. Obtaining the pass mark in continuous assessment is the condition of graduation.			

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

[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).

[5 / *] Disciplines: AK- Advanced knowledge, CT- Complementary Training, S- Synthesis

Filled in on 8.09.2021

Course coordinator
Lecturer.dr. Zorita Diaconeasa

Laboratory work/seminar coordinator
Lecturer.dr. Zorita Diaconeasa

Subject coordinator
Lecturer.dr. Zorita Diaconeasa

Approved by the
Department on
22.09.2021

Head of the Department
Prof.dr. Ramona Suharoschi

Approved by the Faculty
Council on
28.09.2021

Dean
.Prof.dr. Elena Mudura