UNIVERSITATEA DE ŞTIINŢE AGRICOLE ŞI MEDICINĂ VETERINARĂ CLUJ-NAPOCA
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No._____of _____ **USAMV form CN-0702030218**

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 Science
1.4. Field of study	Food Engineering
1.5.Education level	Bachelor
1.6.Specialization/ Study programme	**Control and expertise of food products**
1.7. Form of education	Full time

2. Information on the discipline

2.1. Name of the discipline	Molecular methods applied in food science							
2.2. Course coordinator				Prof PhD, Ramona Suharoschi				
2.3. Seminar/ laboratory/ project coordinator				Lecturer PhD, Oana Lelia Pop				
2.4. Year of study	III	2.5. Semester	**V**	2.6. Type of evaluation	continuous	2.7. Discipline status	Content[2]	DS
							Compulsoriness[3]	DO

3. Total estimated time (teaching hours per semester)

3.1. Hours per week – full time programme	2	out of which: 3.2. lecture	1	3.3. seminar/ laboratory/ project	1
3.4.Total number of hours in the curriculum	28	Out of which: 3.5.lecture	14	3.6.seminar/laboratory	14
Distribution of the time allotted					hours
3.4.1. Study based on book, textbook, bibliography and notes					8
3.4.2. Additional documentation in the library, specialized electronic platforms and field					10
3.4.3. Preparing seminars/ laboratories/ projects, subjects, reports, portfolios and essays					10
3.4.4.Tutorials					2
3.4.5.Examinations					2
3.4.6. Other activities					0
3.7. Total hours of individual study	22				
3.8. Total hours per semester	50				
3.9. Number of credits[4]	2				

4. Prerequisites (is applicable)

4.1. curriculum-related	Organic Chemistry, Food Chemistry, Bio Chemistry, Mathematics and Statistics
4.2. skills-related	The student must have knowledge of the chemical and biochemical characteristics of compounds specific to living matter; operating IT; office use (xls); Internet browsing; qualities of individual work and participation in professional development

5. Conditions (if applicable)

5.1. for the lecture	The classroom of an appropriate seating capacity will be equipped with multimedia equipment and internet connection.
5.2. for the seminar/ laboratory/ project	During practical works, each student will develop an individual activity with laboratory materials (made available in the book that describes the laboratory work). Academic discipline is imposed throughout the course of practical works.

6. Specific competences acquired

Professional competences	C1.1. Description and use of basic concepts, theories and methods in food science (defined in multidisciplinary terms), regarding the structure, properties and transformations of food components and contaminants during the agri-food chain. C3 -Supervision, management, analysis and design of a nutritional study.
Transversal competences	-CT2. - Applying interrelationship techniques within a team; amplifying and refining the empathic capacities of interpersonal communication and assuming specific attributions in carrying out group activities in order to resolve individual / group conflicts, as well as optimal time management.

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

7.1. Overall course objective	The main objective is to provide students with a broad experimental approach to various techniques for isolation, analysis, and manipulation of biological material (genetic, etc.) with food science and technology applications. Students are encouraged to obtain fundamental information relevant for use in their research and projects. Students will learn to be involved simultaneously in different experiments. Peer-learning collaboration with colleagues in the project team in both the experimental and documentation parts is an essential prerequisite for successfully implementing the module.
7.2. Specific objectives	Understanding of molecular analysis techniques and being able to apply them (experimental models/case studies). To be able to interpret the results of studies using molecular techniques and make recommendations for additional approaches to analytical techniques. Understand the importance of validation of molecular methods.

8. Content

8.1. LECTURE **Number of hours - 14**	Teaching methods	Notes
Introduction; Silabus; course conditions, evaluation; presentations. Discussion: Lab project proposals, CSS abstract preparation	Blended learning courses: combinations of active learning methods and group discussions	1 hour
Cell biology: food science applications Agarose Gel electrophoresis: safety, principles, and practical applications; Restriction of endonucleases, other enzymes in molecular biology **Draft of the CSS abstract**	Blended learning courses: combinations of active learning methods and group discussions	1 hour
VP: Theoretical Exam/Practical Exam (Fundamental Techniques 1) **Discussion and review of CSS abstracts**	Blended learning courses: combinations of active learning methods and group discussions	1 hour

AND/ARN: food science applications Principles of PCR technique: Nucleic acid purification, quantification; Polymerase Chain Reaction, other DNA amplification methods.	Blended learning courses: combinations of active learning methods and group discussions	1 hour
CSS Abstract submission - submission deadline (Abstract must be approved by instructor before submission) Poster printing schedule	Blended learning courses: combinations of active learning methods and group discussions	1 hour
Microarray technique: principles Genomics (whole genome sequencing), Gibson cloning, functional genomics (microarrays, mutant KO, RNA interference).	Blended learning courses: combinations of active learning methods and group discussions	1 hour
DNA sequencing and applications in food science	Blended learning courses: combinations of active learning methods and group discussions	1 hour
DNA sequencing and applications in food science: DNA sequencing and screening based on computational analysis: Automation of DNA sequencing; use of genomic DNA databases	Blended learning courses: combinations of active learning methods and group discussions	1 hour
NGS - next-generation sequencing: applications in food science	Blended learning courses: combinations of active learning methods and group discussions	1 hour
Transcriptomics/epigenomics: applications in food science	Blended learning courses: combinations of active learning methods and group discussions	1 hour
Amino acids/proteins/metabolites	Blended learning courses: combinations of active learning methods and group discussions	1 hour
Proteomics: principles	Blended learning courses: combinations of active learning methods and group discussions	1 hour
Biomarkers: Metabolic/immunological	Blended learning courses: combinations of active learning methods and group discussions	1 hour
Applications in Food Science: Genomics, Transcriptomics, Proteomics, Metabolomics	Blended learning courses: combinations of active learning methods and group discussions	1 hour

8.2. PRACTICAL WORK **Number of hours – 28**	Theoretical presentation of practical works	lab work
Lab: SOP, Safety rules, basic techniques: pipetting, sterile techniques, weighing, centrifugation, autoclaving, cell cultures and bacterial cultures (for next lab: check/autoclave plates, tubes, cell culture falsks). Discussion and selection of research projects. Applications in Food Science: Genomics, Transcriptomics, Proteomics, Metabolomics	Lucrari in format blended learning: metode de invatare activa si prezentarea/ discutarea rezultatelor Studii de caz	LL: 1 hour
Lab: sequence databases, bioinformatics fundamentals: sequence finding, simple pairwise alignment, multiple sequence alignment (laptop) Report 1 basic sequence analysis	Blended learning courses: combinations of active learning methods and group discussions	LL: 2 hour
Genome sequence analysis: gene-search, BLAST search,	Case studies	LL: 2 hour

genome annotation **Report 2 basic sequence analysis**		
Building a genomic DNA library	Blended learning courses: combinations of active learning methods and group discussions	LL: 1 hour
PCR: RT-PCR; qPCR	Blended learning courses: combinations of active learning methods and group discussions	LL: 2 hour
DNA, RNA microarray (principle and interpretation)	Case studies	LL: 2 hour
DNA sequencing; next gen sequencing : aplications	Blended learning courses: combinations of active learning methods and group discussions	LL:2 ore
Microbiome : phylogenetic sequencing of genetic markers Metagenomics	Blended learning courses: combinations of active learning methods and group discussions	LL: 2 ore
Compulsory bibliography: 1. https://www.snapgene.com/products/snapgene/about_snapgene/ 2. http://insilico.ehu.es 3. http://biol.dgbm.unina.it/web_labbm/indice_virtlab.html 4. http://www.phschool.com/science/biology_place/labbench/lab6/intro.html 5. Molecular Biology of the Cell. 4th edition. Alberts B, Johnson A, Lewis J, et al. New York: Garland Science; 2002 6. Molecular Cell Biology. 4th edition. Lodish H, Berk A, Zipursky SL, et al. New York: W. H. Freeman; 2000.		
Optional bibliography 1. The Cell: A Molecular Approach. 2nd edition. Cooper GM. Sunderland (MA): Sinauer Associates; 2000. 2. Madame Curie Bioscience Database [Internet]. Austin (TX): Landes Bioscience; 2000-. 3. Human Molecular Genetics. 2nd edition. Strachan T, Read AP. New York: Wiley-Liss; 1999.		

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

The knowledge taught in the course is necessary to know and understand the role of molecular techniques in food science.

10. Assessment

Type of activity	10.1. Assessment criteria	10.2. Assessment methods	10.3. Percentage of the final grade
10.4. Lecture	periodic or partial tests	Verification along semester - a number of 4 verifications are scheduled	35%
	participation in scientific circles and / or professional competitions	Practical and theoretical skills	5%
10.5. Seminar/Laboratory	Evaluation during the semester	Assignments	20%
	Final evaluation (the scheduled assignments)	Written exam	40%
10.6. Minimum performance standards			
• Solving a concrete food science problem based on a given algorithm • Carrying out a literature study (nutrition and health).			

[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 the 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).

Filled in on
08.09.2021

Course coordinator
Prof. PhD, SUHAROSCHI Ramona

Laboratory work/seminar coordinator
Lecturer. PhD, POP Oana Lelia

Subject coordinator
Prof PhD, SUHAROSCHI Ramona

Approved by the Department on
22.09.2021

Head of the Department
Prof PhD, SUHAROSCHI Ramona

Approved by the Faculty Council on
28.09.2021

Dean
Prof PhD, MUDURA Elena