UNIVERSITATEA DE ŞTIINŢE AGRICOLE ŞI MEDICINĂ VETERINARĂ CLUJ-NAPOCA
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No._____of _____ **USAMV** form **0702020105**

SUBJECT OUTLINE

1. General data

1.1. Higher Education Institution	University of Agricultural Sciences and Veterinary Medicine from Cluj-Napoca
1.2. Faculty	Food Science and Technology
1.3. Departament	Food Engineering
1.4.Domain of study	Food Engineering
1.5.level of study[1)]	Bachelor
1.6.Specialization/ Program of study	Food control and Expertise
1.7. Form of teaching	Full Time

2. Information on the discipline

2.1. Name of the discipline	Unit Operation in Food Industry – part 1							
2.2. Course coordinator				Assoc. professor MUNTEAN MIRCEA-VALENTIN				
2.3. Seminar / laboratory/project coordinator				Assoc. professor MUNTEAN MIRCEA-VALENTIN				
2.4. Year of study	II	2.5. Semester	**III**	2.6. Type of Evaluation	Continuous	2.7. Course regime	Content[2]	DD
							Level of complulsorine ss[3]	DI

3. Total estimated time (teaching hours per semester)

3.1. Hours per week – full time programme	4	of which care: 3.2. lecture	2	3.3. seminar/ laboratory/ project	2
3.4. Total number of hours in the curriculum	56	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					14
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					12
3.4.4.Tutorials					4
3.4.5.Examination					4
3.4.6. Other activities					
3.7. Total hours of individual study	44				
3.8. Total hours per semester	100				
3.9. Number of credits [4]	4				

4. Prerequisites (is applicable)

4.1. curriculum-related	Physical science, Technical drawing, Special mathematics
4.2. skills-related	The student should have knowledge of Inorganic and organic chemistry, Physical and colloidal chemistry, Technical drawing

5. Conditions (if applicable)

5.1. for the lecture	It follows a direct response of the information presented in question and answer from both students and teachers. Academic discipline enforce the time start and end

	of the course. We do not allow any other activities during the lecture, mobile phones are closed .
5.2. for the seminar / laboratory / project	Practical work is compulsory to wear dressing gown, consulting advisor practical work, each student will develop an individual activity with laboratory materials made available and described in practice. Academic discipline is required for the duration of works.

6. Specific competences acquired

Professional competences	C.2.1. Description and use of basic concepts, theories and methods in the field of unit operations for process control and operation of agri-food chain facilities. C2.2.Explanation and interpretation of basic engineering concepts, methods and models in equipment exploitation issues in the agri-food industry. C.2.3.Application of basic principles and methods within unitary operations for solving engineering and technological problems. C 2.5. Elaboration of projects related to unitary operations in the food industry.
Transversal competences	CT1 Apply the 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 of norms and values of the code of professional ethics in the food field. CT2 Application of interrelation techniques within a team; amplifying and refining the empathic capacities of interpersonal communication and of assuming specific attributions in carrying out the group activity in order to treat / resolve individual / group conflicts, as well as the optimal time management; CT 3 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 an international language, as well as assessing the need and usefulness of extrinsic and intrinsic motivations of education continue; Elaboration of an individual project based on a technical study through the efficient use of relevant and current documentation resources (internet, databases, courses, etc.).

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

7.1. Overall lecture objective	Able to know unit operation of food industry branch of manufacture. Know the devices and equipments that occur transforming raw materials into finished product; Able to know the specific installaion used in food industry branch.
7.2. Specific objective	Able to know and use the latest equipment, methods and measurement systems that are used in heat transfer processes that occur in the processing of agricultural products in specific installations; Have known about the operation of the equipment and facilities in food industry branch, to develop the skills to use the theoretical concepts and principles in addressing practical problems found in operations and the devices used in food industry.

	Analyze and evaluate the characteristics, performance and limitations of processes and technological equipment of the food industry. Know the important factors with which it develops, implements and monitors the technical projects and some new technological; To develop a project specific process or machine food industry using concepts, theories and methods based on food industry field; To solve concrete problems of food science based on an algorithm.

8. Content

8.1. LECTURE **Number of hours – 28**	Methods of teaching	Observations
Introduction to the "unit operations in the food industry." Domain and particularities of the food industry. Technical and scientific progress in the food industry.	Lectures	1 lecture = 2 hours
Pneumatic transport. Storage of fluids, gases, solid materials and the packaging. Grinding. Calculating elements for roller mills.	Lectures	1 lecture = 2 hours
Homogenisation and emulsification. Colloid mills. Mechanical homogeniser's pressure. Jet homogeniser's. Adiabatic and ultrasonic homogenisers.	Lectures	1 lecture = 2 hours
Pressing operation. Pressing tools. Pressing calculation elements.	Lectures	1 lecture = 2 hours
Thermoplastic extrusion in food industry. Extrusion - equipments, calculation elements.	Lectures	1 lecture = 2 hours
Purification of the solid-gas mixtures. Purification of wet gas. Packed column. Purification of gas by filtration.	Lectures	1 lecture = 2 hours
Electric gas purification. Sonic gas purification. Sedimentation in a liquid-liquid system	Lectures	1 lecture = 2 hours
Heat exchangers used in food industry. Constructive types of heat exchangers. Calculation elements of exchangers. Choice of type of heat exchanger.	Lectures	4 lectures = 8 hours
Evaporation (concentration). Evaporating columns. Constructive types of evaporating columns. Calculation elements of evaporating columns.	Lectures	1 lecture = 2 hours
The condensation. Condensers**.** Constructive types of condensers. Calculation elements of condensers.	Lectures	1 lecture = 2 hours
Distillation. Mixtures and basic laws of distillation. Distillation methods and distillation apparatus.	Lectures	1 lecture = 2 hours

8.2. PRACTICAL WORK **Number of hours – 14**		
Introduction. Laboratory safety rules.	Analysis MSDS and PCC.	1 lecture = 2 hours
Types of pumps and fans. Fluid transport by pumps. Centrifugal pump. Hydro engines, fans, compressors.	Analysis of component parts and pump and fan operation within the laboratory;	
Types of compressors. The main parameters of pumps and fans. Devices without moving parts (the siphon, injecting nozzle, ejector nozzle)	Analysis of component parts of compressors. Using the parameters of the pumps and fans in determination of the pumps and fans characteristics. Presenting the components and use of devices without moving parts in the food industry.	1 lecture = 2 hours
Grinding materials. Mills and choppers.	Determination of the grinding energy at the mills in the laboratory;Presenting the components and use of	1 lecture = 2 hours

Mixing materials. Mixers. Power calculation of mixing. Analysis mixing operation by practical measurements. **Filtration.** Simplified scheme of the filtration. Hydrostatic filters. Discontinuously and continuous filters. **Sorting and sieving operation.** Sieving apparatus with rotational motion. **Separation.** Magnetic separation. Hydraulic separation. Separation by centrifugal action. Hidrocyclone.	mills and choppers in the food industry. Determination of mixing power, flow regime and sizing of mixers on laboratory equipment. Presenting the components and use of filters in the food industry. Determination of filter parameters using laboratory filters. Determining the functioning and efficiency of laboratory equipment sifting. Presenting the components and use of separation equipments in the food industry. Determination of the influence of mass and centrifugal force on centrifugal separation.	1 lecture = 2 hours 1 lecture = 2 hours 1 lecture = 2 hours 1 lecture = 2 hours
8.3. PROJECT **Number of hours – 14** Individual project – Unit operations with mass transfer	Determining the type of pump and its characteristics needed to transport a given fluid considering the physicochemical characteristics, organoleptic characteristics of the fluid and constructive and functional characteristics of the chosen pump.	7 lectures = 14 hours

Compulsory bibliography:

1. *Muntean, M-V – Operații Unitare în Industria Alimentară, manual didactic,Editura Risoprint, 2015*
2. *Cătunescu Giorgiana, Muntean, M-V – Îndrumător de lucrări practice și aplicații în industria alimentară, Ed. AcademicPres, 2016*
3. *Banu, C-tin si colab. – Manualul inginerului de industrie alimentara, Ed Tehnica, Bucureşti, 1999*
4. *Ioancea, L. şi colab – Maşini şi instalaţii în industria alimentară, Ed. Ceres, Bucureşti, 1986*

Facultative bibliography:

1. *Amarfi, Rodica – Economia de energie în industria alimentară, Ed. Tehnica, Bucureşti, 1991*
2. *Amarfi, Rodica – Procesarea minimă atermică şi termică în industria alimentară, Ed. Alma, Galaţi, 1996*
3. *Banu, C-tin si colab. – Tehnologia cărnii şi a subproduselor, EDP, Bucureşti, 1980*
5. *Banu, C-tin şi colab – Progrese tehnice, tehnologice şi ştiinţifice în industria alimentară, vol. I, Ed.*
4. *Tehnica, Bucureşti, 1992*
5. *Băcăuanu, Ana – Operaţii şi utilaje în industria chimică şi alimentară, curs Lito, Universitatea Tehnica « Gh. Asachi », Iaşi, 1996*
6. Cojocaru, C. si colab. – Manualul inginerului din industria alimentara, Ed. Tehnica, Bucuresti, 1998
7. Florea, O., Jinescu, G., *Procedee intensive în operaţiile unitare de transfer,* Editura Tehnică, Bucureşti, 1975;
8. GEANKOPLIS, C.J., *Transport processes and unit operations,* Prentice-Hall International, Inc., New Jersey, 1993;
9. *Iliescu, I. şi colab. – Procese şi utilaje în industria alimentara, EDP, Bucureşti, 1975*
10. *Ioancea, L. si Kathrein, I. – Condiţionarea şi valorificarea superioară a materiilor prime vegetale în scopuri alimentare – Tehnologii şi instalaţii, Ed. Ceres, Bucureşti, 1986*
11. *Jascanu, V. – Aparate şi procese în industria alimentară, Curs litografiat, vol. I si II, Universitatea din Galaţi, 1980*
12. Muntean Mircea, Gherman Vasile – Fenomene de transfer – Note de curs si lucrari practice, Ed. AcademicPress 2010
13. *Răsnescu, I. – Operaţii şi utilaje în industria alimentară, vol I si II, Ed. Tehnica, Bucureşti, 1972*
14. RASENESCU,A., *Fenomene de transfer,* Editura Universităţii din Galaţi, 1979;
15. ŞTEFĂNESCU, D., MARINESCU, M., *Transferul de căldură în tehnică - culegere de probleme pentru ingineri,* Editura Tehnică, Bucureşti, 1983;
16. ŞTEFĂNESCU, D., ş.a., *Transfer de căldură şi masă – teorie şi aplicaţii,* Editura Didactică şi Pedagogică, Bucureşti, 1983;

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 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 Romanian Association of Food Industry Engineers where issues are discussed current and future technologies in Romania and Europe.

10. Assessment

Type of activity	10.1. Assessment criteria	10.2. Assessment methods	10.3. Percentage of the final grade
10.4. Lecture	Knowing the types of unit operations in the food industry studied in semester 1; Knowing compenent parts, installations function, apparatus and tools studied. Knowledge of general concepts concerning unit operations analysis; Knowledge of the factors influencing the food industry specific unit operations;	During the semester assesment 1 During the semester assesment 2	30% 30%
10.5. Proiect	Determining the type of pump and its characteristics needed to transport a given fluid considering the physicochemical characteristics, organoleptic characteristics of the fluid and constructive and functional characteristics of the chosen pump.	Project presentation	20%
Practical Work	Understanding the ways of determining, processing and interpreting measurements in simulated processes in the food industry.	Laboratory colloquium	10%
Attendance course			10%
10.6. Minimum performance standards			
Mastery of scientific information transmitted through lectures and practical work at an acceptable level. Obtaining the pass mark in test evaluation of the project presentation is the condition of graduation. The final grade is the weighted average of ongoing checks, practical papers, project support and attendance at the course, and is calculated with the relationship: Final evaluation: Note Vp1 x 30% + Note Vp2 x 30% + Project Note x 20% + Note Colloquium Laboratory x 10% + 10% attendance course, with a minimum of one of the notes from the assesments to be at least 5 and the project evaluation should be at least 5.			

[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).

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

Filled in on
06.09.2021

Course coordinator
Mircea-Valentin Muntean

Laboratory work/seminar coordinator
Assoc. Professor Mircea-Valentin Muntean

Subject coordinator
Assoc. Professor Mircea-Valentin Muntean

Approved by the Department on
22.09.2021

Head of the Department
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Approved by the Faculty
Council on
28.09.2021

Dean
Prof. Elena Mudura