No._____of _____ **USAMV form 0701040103**

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]	**Bachelor**
1.6.Specialization/ Study programme	**Technology of Agricultural Products Processing (TPPA)**
1.7. Form of education	**IF**

2. Information on the discipline

2.1. Name of the discipline	**Extractive technology - oil**							
2.2. Course coordinator				Vlad Mureşan, PhD, habil., Professor				
2.3. Seminar/ laboratory/ project coordinator				Vlad Mureşan, PhD, habil., Professor Georgiana Smaranda Marţiş, PhD, Assistant Professor				
2.4. Year of study	**IV**	2.5. Semester	**VII**	2.6. Type of evaluation	Continuous	2.7. Discipline status	Content[2]	DS
							Compulsoriness[3]	DI

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					25
3.4.2. Additional documentation in the library, specialized electronic platforms and field					18
3.4.3. Preparing seminars/ laboratories/ projects, subjects, reports, portfolios and essays					20
3.4.4.Tutorials					2
3.4.5.Examinations					4
3.4.6. Other activities					
3.7. Total hours of individual study	69				
3.8. Total hours per semester	125				
3.9. Number of credits[4]	5				

4. Prerequisites (if applicable)

4.1. curriculum-related	Operations and equipment in the food industry; Transfer phenomena; Raw vegetable materials; Food chemistry; Mathematics; Food biochemistry.
4.2. skills-related	The student should have knowledge of Food Industry unit operations and machines, as well as knowing the physical and chemical properties of lipids.

5. Conditions (if applicable)

5.1. for the lecture	Room with projector and internet connection. The course is interactive; students can ask questions regarding the content of the statement. Academic discipline requires compliance of starting time and end of the course. There are not allowed any other activities during the lecture, mobile phones to be closed.
5.2. for the seminar/ laboratory/ project	For practical works each student will carry out an application / technological computation / chemical analysis specific to Lipid technology. Academic discipline is imposed for the duration of works. Specially designed laboratory (equipped with specific glassware, sink, drying oven, balance, refractometer, oil press);

6. Specific competences acquired

Professional competences	C3.2. Explaining and interpreting the principles and methods used in technological processes in the food chain C2.3. Application of basic engineering principles and methods for solving technological problems in the agri-food chain C3.5. Elaboration of projects related to technologies and products specific to the agri-food industry
Transversal competences	CT1 Apply strategies for perseverance, rigor , efficiency and responsibility in work , punctuality and personal accountability for its performance , creativity, common sense, analytical and critical thinking , problem solving, etc., based on principles, norms and values code of professional ethics from food industry;

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

7.1. Overall course objective	To acquire the knowledge concerning the raw materials, production technologies, equipment and facilities involved in sunflower oil production.
7.2. Specific objectives	Knowledge of quality parameters of sunflower seed and sunflower oil finished product; Knowledge of operations and operating principles of the equipment from oil factories; Using and understanding the methods, analysis techniques, applications and technological computations from extraction technology (oil) field; Interpretation of results obtained by analysing the raw materials, intermediate and finished products from oil industry.

8. Content

8.1.LECTURE **Number of hours – 28**	Teaching methods	Notes
1. Structure and composition of oils and fats Structure - Simple complex derived lipids. Physical properties. Viscosity. Density. Melting point. Thermal and optical properties. Chemical Properties. 2. Oils crops. Morphological and botanical classification.	Lecture, explanation, conversation, debate	2 Lectures
3. Preparing the oil seeds for grinding. Technological schemes for the preparation of sunflower seeds for milling.	Lecture, explanation, conversation, debate	2 Lectures
4. Oilseeds milling. Methods for milling. Structural changes in seeds during grinding. Chemical transformations during seeds grinding. Grinding rollers. Milling schemes for main oilseeds . 5. Roasting - pressing. The aim of roasting. Optimum conditions for roasting. Physico-chemical changes during roasting. Roasting equipment. Roasted seed features. Pre-pressing, pressing. Aim. Conditions. Methods and devices. Technological schemes.	Lecture, explanation, conversation, debate	2 Lectures
6. Extraction. The theory of extraction. Solvents used for vegetable oils. Extraction schemes. Broken preparation for extraction. Extraction process description. DeSmet extractor. Distillation of miscella. Recovery of solvents	Lecture, explanation, conversation, debate	3 Lectures

from press cakes. Solvents removing from press cakes. Condensers, Separators, Dephlegmators.		
7. Crude oil refining. Neutralization schemes. Degumming. Neutralization. Washing. Drying. Bleaching. Dewaxing. Deodorization.	Lecture, explanation, conversation, debate	3 Lectures
8. Hydrogenation of vegetable oils. The hydrogenation process. Raw and auxiliaries materials. Manufacture of margarine.	Lecture, explanation, conversation, debate	1 Lecture
9. Valorification of by-products in the manufacturing of sunflower oil.	Lecture, explanation, conversation, debate	1 Lecture

8.2. PRACTICAL WORK **Number of hours – 28**		
1. Presentation of the safety rules to be respected during the practical works. Training for pilot plant oil press and laboratory oven. Sampling for quality control. Packaging, labelling, shipping and storage of the laboratory samples. Technical assessment of the quality of raw materials used to produce vegetable oils. Organoleptic examination. Determination of impurities in oilseeds. Methods for analysis of oil crops.	Experiment , conversation, explanation	1 Practical work
2. Samples conditioning for laboratory analysis. Determination of water and volatile substances content (moisture content) of oil crops, of broken and meal. Determination of test weight.	Experiment , conversation, explanation	1 Practical work
3. Obtaining industrial crude oil by pressing sunflower seeds (oil press pilot station). Calculation, total material balance, partly material balance, losses, efficiency.	Experiment , conversation, explanation	1 Practical work
4. Control analysis of the pressing operation. The determination of the fat content of sunflower seeds and broken (Soxhlet method).	Experiment , conversation, explanation	1 Practical work
5. Quality analysis of the crude and refined fats and oils: a comparison. Measurement of free fatty acid. Determination of peroxide value.	Experiment , conversation, explanation	1 Practical work
6. Quality analysis of refined fats and oils on the technological flow. Determination of the dissolved soap content. Determination of saponification index of fats.	Experiment , conversation, explanation	1 Practical work
7. Knowledge checking.		1 Meeting/ Case study
8. A department from a certain process phase will be designed. The parts to be included in the project will be treated and exposed: *The written part.* Documentation. Description of the technological process. Justification of the calculation premises considered Rules of operation and maintenance of equipment. Norms of labour protection and analytical control of the frying process *The calculation part.*	Debate, questioning, explanation	6 Project Meetings

Total and partial material balance. Determination of the number of main machines. Establishing the main dimensions for the main machine in the process phase. Establishment of auxiliary equipment and their dimensions. *The drawn part.* Technological scheme adopted. Technological flow. Drawing of the main machine in the process phase. 9. Verification of knowledge - project defense.		1 Project Meeting

Compulsory bibliography:

1. Racolța Emil, 2014. Tehnologia uleiurilor vegetale și a margarinei (Curs didactic). Editura AcademicPres, Cluj-Napoca
2. Racolța Emil, Crina Muresan, 2002. Tehnologia uleiului si margarinei. Caiet de lucrari practice. Editura Academic Pres Cluj-Napoca.
3. Vintila Iuliana: Tehnologia si controlul calitatii uleiurilor si grasimilor vegetale, Vol.I. Materii oleaginoase si materii auxiliare. 2001, Ed. Fundatiei Universitatii "Dunarea de jos", Galati.

Morar, M.V.: Controlul calității uleiurilor si grăsimilor vegetale. Îndrumător de laborator, Ed. Todesco, Cluj, 2003

Optional bibliography:

1. Mureșan V (2019) Oleogelifierea – Tehnologii disponibile și aplicabilitate în produse alimentare, Editura MEGA, Cluj-Napoca. ISBN: 978-606-020-098-7
2. Mureșan V* et al. (2017) Processing Sunflower Seeds into Kernels, Hulls, and Paste, In: Sunflower Oil: Interactions, Applications and Research, Ed. Monwar Hossain, NOVA Science Publishers, New York. ISBN: 978-1-53611-889-6.
3. Banu C, Manualul inginerului din industria alimentara, Ed.Tehnică, București, 1999

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 the demands of specific national professional associations; the teaching staff regularly attend international fairs and undertake field visits on food industry specific establishments (sunflower oil and halva factories)

10. Assessment

Type of activity	10.1. Assessment criteria	10.2. Assessment methods	10.3. Percentage of the final grade
10.4. Lecture	Knowledge acquired; level of understanding; Solving specific problems related to soil technology.	Continuous assessment	50%
10.5. Seminar/Laboratory	Description of specific analytical methods specific to oil industry.	Continuous assessment of skills to perform analysis methods specific to oil technology;	20%
	Designing a department of a certain stage of the process on a given topic specific to oil technology.	Project defense	30%
10.6. Minimum performance standards			
Knowledge of quality indices of raw material (sunflower seeds) and finished product.(sunflower oil) Knowledge of technological general scheme for obtaining oil from sunflower seeds.			

[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).

Project / Laboratory work coordinator
Vlad Mureșan, PhD, habil., Professor

Course coordinator
Vlad Mureșan, PhD, habil., Professor

Filled in on
07.09.2021

Georgiana Smaranda Marțiș, PhD,
Assistant Professor

Subject coordinator
Vlad Mureșan, PhD, habil., Associate Professor

Head of the Department
Sevastița Muste, PhD, habil., Professor

Approved by the
Department on
22.09.2021

Dean
Elena Mudura, PhD, habil., Professor

Approved by the Faculty
Council on
28.09.2021