UNIVERSITATEA DE ȘTIINȚE AGRICOLE ȘI MEDICINĂ VETERINARĂ CLUJ-NAPOCA
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No._____of _____ **USAMV form 0703030217**

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	**Food Engineering (IPA)**
1.7. Form of education	**Full time**

2. Information on the discipline

2.1. Name of the discipline	**Starch technology**							
2.2. Course coordinator				**Vlad Mureșan, PhD, habil., Associate Professor**				
2.3. Seminar/ laboratory/ project coordinator				**Georgiana Smaranda Marțiș, PhD, Assistant Professor**				
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					4
3.4.3. Preparing seminars/ laboratories/ projects, subjects, reports, portfolios and essays					5
3.4.4.Tutorials					2
3.4.5.Examinations					3
3.4.6. Other activities					

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	Operations and equipment in the food industry; Transfer phenomena; Food chemistry; Food biochemistry.
4.2. skills-related	The student should have knowledge of Food Industry unit operations and equipment, as well as knowing the physical and chemical properties of sugars.

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 confectionery and starch technology. Academic discipline is imposed for the duration of works. Specially designed laboratory (equipped with specific glassware, oven, balance, sink, refractometer, polarimeter); Confectionery Pilot Plant (vertical mixer, blender, fondant making equipment, moulds for jellies, Turkish delight and chocolate).

6. Specific competences acquired

Professional competences	C2.1. Description and use of basic concepts, theories and methods in the field of processes and operation of plants in the agri-food chain. C2.3. Application of basic engineering principles and methods for solving technological problems in the agri-food chain.
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 confectionery and starch technology.
7.2. Specific objectives	Knowledge of quality parameters of starch and vegetable raw material used for starch extraction; Knowledge of quality parameters of raw and auxiliary materials used in confectionery; Using and understanding the methods, analysis techniques, applications and technological computations from confectionery and starch technology; Interpretation of results obtained by analysing the raw materials, intermediate and finished products from confectionery and starch industry.

8. Content

8.1.LECTURE **Number of hours – 14**	Teaching methods	Notes
Ch. I Raw materials in starch industry 1.1. Potatoes. Chemical composition. 1.2. Corn. General. Chemical composition.	Lecture, explanation, conversation, debate	1 Lecture
Ch. II Manufacture of raw starch 2.1. General. Physical and chemical structure of starch. 2.2. Raw potato starch manufacture. Raw material preparation. Transport. Impurities. Wash. Weighing. Grinding. Removing cell juice. Extraction of starch from Grist. Removing fine cellulosic substances. Purification and concentration of the starch suspension. 2.3. Raw corn starch manufacture. Storage and preparation of raw materials. Maize Soaking. Extracting starch from Grist. Purification and concentration starch slurry. 2.4. Manufacture of starch from other raw materials.	Lecture, explanation, conversation, debate	3 Lectures

Wheat flour. Rice. **Ch. III Manufacture of dry starch** 3.1. Raw starch mechanically dehydration, heat. 3.2. Grinding, sifting and packaging starch. 3.3. Starches	Lecture, explanation, conversation, debate	1,5 Lectures
Ch. IV Obtaining dextrins and glucose syrups	Lecture, explanation, conversation, debate	1,5 Lectures

8.2. PRACTICAL WORK **Number of hours – 14**		
Determination of potato starch. Polarimetric method. Moisture analysis of starch.	Experiment, conversation, explanation	2 Practical works
Determination of potato starch. Titrimetric method. Analysis of starch acidity.	Experiment, conversation, explanation	2 Practical works
Analysis of starch syrups. Determination of dry substance in glucose syrup (refractometry). Determination of dextrose in glucose syrup (Luff-Schoorl). Rheological properties of starch suspensions. Rhododilating fluid.	Experiment, conversation, explanation	2 Practical works
Knowledge checking	Experiment, conversation, explanation	1 Practical works

Compulsory bibliography:

1. Racolţa Emil," *Tehnologia amidonului şi a produselor zaharoase*:, Ed. Risoprint 2008;
2. Racolţa Emil, Marta Hodrea, Teodora Şchiop, "*Îndrumător de lucrări practice pentru produse zaharoase"*, Ed.Risoprint, 2008;
3. Racolţa Emil, *"Tehnologii generale în industria alimentară*", " *Aplicatii si calcule tehnologi*ce" Ed.Risoprint, 2007;
4. Racolţa Emil, *"Tehnologii generale în industria alimentară*", Ed.Risoprint, 2007;
5. "*Manualul inginerului de industria alimentara*", Ed. Tehnica Bucuresti, 2002;
6. Banu C., "*Progrese tehnice, tehnologice şi ştiinţifice în industria alimentară*", Ed. Tehnică,Bucureşti, 1993;
7. Dominica Culache, Vasile Platon, "*Tehnologia zahărului*", Ed. Tehnică, Bucureşti, 1987;
8. "*Îndrumar pentru industria alimentară*", Lexicon, Ed. Tehnică, 1987
9. Luca Gh., "*Probleme de operaţii şi utilaje în industria alimentară*", Ed. Tehnică,Bucureşti, 1978;
10. Crawford NC, Popp LB, Johns KE, Caire LM, Peterson BN, Liberatore MW. 2013. Shear thickening of corn starch suspensions: does concentration matter? J Colloid Interface Sci. 2013 Apr 15;396:83-9.

Optional bibliography:

1. Bratu Em. A., Operaţii şi utilaje în industria chimică, Ed. Tehnică, Bucureşti, 1970

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 national professional associations specific applications; teachers regularly attend international fairs in the field of food industry and undertake visits to specific units (starch manufacturing, glucose, jellies, candy products, halva, chocolate, expanded cereals)

10. Assessment

Type of activity	10.1. Assessment criteria	10.2. Assessment methods	10.3. Percentage of the final grade
10.4. Lecture	Degree of understanding the Knowledge acquired; Solving specific problems for starch and sugar confectionery	Continuous assessment	70%
10.5. Seminar/Laboratory	Description of a specific analysis for starch and sugar confectionery / a technological process for obtaining	Continuous assessment of skills for making applications and analytical	30%

	confectionery product	methods specific	

10.6. Minimum performance standards
Knowledge of quality indices of raw materials and finished products in the starch and glucose industry. Knowledge of the general technological scheme for obtaining starch from potatoes, wheat and corn.

[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
07.09.2021

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

Laboratory work/seminar coordinator
Georgiana Smaranda Marțiș, PhD, Assistant Professor

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

Approved by the Department on
22.09.2021

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

Approved by the Faculty Council on
28.09.2021

Dean
Elena Mudura, PhD, habil., Professor