No._____of _____ **USAMV form 0701030109**

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	**Full time**

2. Information on the discipline

2.1. Name of the discipline	**Starch technology - confectionery**							
2.2. Course coordinator				**Vlad Mureșan, PhD, habil., Professor**				
2.3. Seminar/ laboratory/ project coordinator				**Vlad Mureșan, PhD, habil., Professor / Georgiana Smaranda Marțiș, PhD, Assistant Professor**				
2.4. Year of study	**III**	2.5. Semester	**VI**	2.6. Type of evaluation	summative	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					7
3.4.2. Additional documentation in the library, specialized electronic platforms and field					5
3.4.3. Preparing seminars/ laboratories/ projects, subjects, reports, portfolios and essays					4
3.4.4.Tutorials					1
3.4.5.Examinations					2
3.4.6. Other activities					

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

4. Prerequisites (is applicable)

4.1. curriculum-related	Extractive Technology 1 – Sugar; 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	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 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; Knowledge of operations and operating principles of the equipment used in confectionery and starch technology; 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 – 28**	Teaching methods	Notes	
Part. 1 **<u>Starch Technology</u>** **Ch. I Starch production. Raw materials used in the starch industry.** General. A brief history of starch use Starch production worldwide, in the European Union and in Romania Raw materials in the starch industry **Ch. II Manufacture of raw starch** Physical and chemical structure of starch. Raw potato starch manufacture. Raw corn starch manufacture. Purification and concentration starch slurry. **Ch. III Manufacture of dry starch** Centrifugation and filtration drying Manufacture of wheat starch Manufacture of rice starch Grinding, sifting and packaging starch. Starches	Lecture, explanation, conversation, debate	3 Lectures	

Part II **<u>Confectionery Technology</u>** **Ch. IV. Definition and classification of sugar products** **Ch. V. Chemistry and technological functionality of the main raw materials in the sugar industry** Sugar Inverted sugar Glucose - Glucose syrup fructose 80 Other sweeteners Gelling agents	Lecture, explanation, conversation, debate	1 Lectures
Ch. VI. Technology process manufacturing candy products specific equipment Preparation of candy syrup Preparing the caramel mass Caramel mass processing - Flavoring, coloring and acidification Preparation of fillings Forming candies by pressing with the help of rollers Candy formation by rolling - calibration - stamping Candy formation by extrusion Forming candies by direct molding	Lecture, explanation, conversation, debate	3 Lectures
Ch. VII. Dragee manufacturing technology Characteristics and classification of dragees The technological process of making dragees Dragee manufacturing equipment	Lecture, explanation, conversation, debate	1 Lectures
Ch. VIII. Laboratory technology Fondant preparation Preparation of nuclei Preparation of candis syrup Pavement manufacturing Manufacture of salmon creams and candies Making sherbet Manufacture of gelled products (jellies, shit) Installations and machinery used in the manufacture of laboratory products	Lecture, explanation, conversation, debate	2 Lectures
Ch. IX. Chocolate making technology The characteristics of chocolate Technological scheme for the manufacture of chocolate products Preparation of cocoa mass Preparation of chocolate mass Chocolate modelling	Lecture, explanation, conversation, debate	3 Lectures
Ch. X. Halva manufacturing technology Brief history of halva-type sugar products Oily raw materials used in the manufacture of halva The technological process of making halva Quality and storage conditions of the halva	Lecture, explanation, conversation, debate	1 Lectures

8.2. PRACTICAL WORK **Number of hours – 28**		
Determination of potato starch. Polarimetric method.	Experiment, conversation, explanation	2 Practical works
Moisture analysis of starch. Analysis of starch acidity.	Experiment, conversation,	1 Practical work

Determination of dry substance in glucose syrup (refractometry). Determination of dextrose in glucose syrup (Luff-Schoorl)	explanation	
Manufacture of pectin jellies. Analysis on manufacturing flow.	Experiment, conversation, explanation	1 Practical work
Case study: Manufacturing of confectionery (halva, expanded cereals, jelly, Turkish delight, glucose) in S.C. AMYLON S.A. Sibiu	Debate, questioning, explanation	1 Practical work
Processing chocolate mass and mass-type "compound". The manually chocolate tempering, moulding, cooling, unmolding. Compare tablets made from chocolate mass and "compound" mass type	Experiment, conversation, explanation	1 Practical work
Knowledge checking	Debate, questioning, explanation	1 Practical work
Project 1. Presentation of project content themes and references; 2. The material balance; 3. Calculation of machinery for the operation of diffusion; 4. Calculation of machinery for purifying operation; 5. Calculation of machinery for the evaporation operation; 6. Calculation of machinery for the crystallization operation; 7. The calculation of machines centrifuge operation; 8. Confectionery machines Calculation.	Debate, questioning, explanation	6 Project seminars
support projects	Debate, questioning, explanation	1 Project seminar

Compulsory bibliography:

1. Mureșan Vlad, "*Tehnologia amidonului - produse zaharoase"*, Ed. Mega 2018;
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;

Optional bibliography:

1. Hartel, R.W., J.H. von Elbe, and R. Hofberger, Confectionery Science and Technology, Cham, Switzerland: Springer International Publishing, 2018
2. Schwartz, D. and R.L. Whistler, Chapter 1 - History and Future of Starch, in Starch (Third Edition), J. BeMiller and R. Whistler, Editors. 2009, Academic Press: San Diego. p. 1-10.
3. Grommers, H.E. and D.A. van der Krogt, Chapter 11 - Potato Starch: Production, Modifications and Uses, in Starch (Third Edition), J. BeMiller and R. Whistler, Editors. 2009, Academic Press: San Diego. p. 511-539.
4. Eckhoff, S.R. and S.A. Watson, Chapter 9 - Corn and Sorghum Starches: Production, in Starch (Third Edition), J. BeMiller and R. Whistler, Editors. 2009, Academic Press: San Diego. p. 373-439.
5. Asadi M., Beet-Sugar Handbook, John Wiley & Sons, Inc., Hoboken, New Jersey, 2007.

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	Exam	50%
10.5. Seminar/Laboratory	Description of a specific analysis for starch and sugar confectionery / a technological process for obtaining confectionery product	Continuous assessment of skills for making applications and analytical methods specific to confectionery technology	20%
	Making a technology applications specific of sugar; Calculations of specific operations for sugar technology / confectionery by applying the equations of material balance total or partial.	Project defense	30%
10.6. Minimum performance standards			
Knowledge of qualitative indices of raw materials and the finished products of the starch industry and glucose. Knowledge of general technological scheme for obtaining starch from potatoes, wheat and corn. Knowledge of general technological scheme for obtaining main confectionery products (candy products, dragees, chocolate, halva, fondant)			

[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
Vlad Mureșan, PhD, habil., Professor

Filled in on
07.09.2021

Course coordinator
Vlad Mureșan, PhD, habil., Professor

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