Faculty of Agriculture and Food Technology of the University of Mostar

Graduate study program:
Food Technology
Course: Food engineering

Mostar, 2018

1. Introduction

1.1. Needs, opportunities and conditions for the introduction of a new study program

The food industry represents one of the important branches of the economy of Bosnia and Herzegovina and in recent years has recorded the dynamic development of the economy. There are all preconditions for this statement, as the development of certain branches of the economy, evident a food industry at very significant business in the economic development of Bosnia and Herzegovina. The food industry is primary leader of the development of primary agricultural production whose products are processed and packet for market in existing factory. This is especially true for some agricultural products, such as milk, meat, certain types of fruits and vegetables, poultry, etc. Due to the possibility of approaching B&H with European integrations, and therefore a great competition in the field of production, it is very important to have experts who will be able to provide quality and safe food, competitive in every aspect of the increasingly demanding global market. The study programs conducted at the Faculty of Agriculture and Food Technology educate experts trained in all tasks related to food production and preservation; development of new food products, quality control of raw materials and finished products and nutrition planning. Completion of these study programs provides the knowledge needed to work in other related industries.

1.2. Comparability with related curricula

The degree program is comparable in structure and conductance to the programs of the European Union.
The study program of Food Technology, course of Food engineering at the Faculty of Agriculture and Food Technology is comparable in structure and conductance to the study programs of Food Technology at the Faculty of Food Technology, University of Josip Juraj Strossmayer in Osijek and the Faculty of Food Technology and Biotechnology, University of Zagreb.

1.3. Assessing the labor market and justifying the opening of the study program

Food production in a broad sense encompasses the process or the chain from field to the table of the consumer. This complex, naturally highly demanding process and the relatively long path of food production, according to the nature of technological and economic links, was divide into three segments, namely:

a) Primary agricultural production comprising the process of working on the field and in the barn,
b) The processing industry of agricultural and food products and raw materials, and
c) The marketing of agricultural and food products

This fact supported by the knowledge that the food industry (secondary) and trade in agricultural and food products (tertiary sector) are increasingly entering primary food production unable to realize their intended goals.

Today, consumers are increasingly buying products that come directly from agricultural production and increasingly from the food industry. The increasing employment of women and the decreasing time to prepare food in the household, with rising standards, are leading us to consume ready meals. Technological and technological advancements lead food production to sudden changes reflected in the application of accelerated growth strategy with the use of innovation, research and the use of marketing methods. This changes searching for employing more and more people in the processing and commercialization of products.

1.4. Alignment with the mission and strategy of the University of Mostar

This program is fully in line with the mission and vision of the University of Mostar, as it is of great importance for the development of the food industry and the education of high-level personnel in the food industry in Bosnia and Herzegovina. It offers students the opportunity for quality and effective education based on learning outcomes and the concept of lifelong learning. A logical sequence after finishing a bachelor's degree program is existence and graduate degree, and it is necessary to work on the opening of the doctoral program of the mentioned course.

1.5. Possible study collaborates outside the higher education system

The Faculty of Agriculture and Food Technology is an institution that has been educating professional staff in the field of agricultural production for 25 years. Engineers who are in various state institutions, faculties, institutes, schools, inspections, etc. Experts who have completed their education at the Faculty of Agriculture and Food Technology successfully continue their education at many European universities. We are convinced that the entire food and chemical industry of the region, as well as other various institutions, is interested in the education of students in the undergraduate and graduate studies of this Faculty.

1.6. Student mobility

Students from related biotechnical faculties in B&H and students from related faculties from around the world can enroll university Graduate Study Program in Food Technology, Course of Food Engineering at the Faculty of Agronomy and Food Technology.
Specific enrollment requirements defined after a comparison of the programs of individual undergraduate studies and for this purpose, the Faculty Council will appoint a Committee.
Students have opportunity to use Ceepus and Erasmus + KA1 mobility programs during their undergraduate and graduate studies. Programs vary in both the length of mobility and the amount of financial support. Within the Erasmus + program, it is possible to obtain a study visit and a professional internship, while CEEPUS's mobility program allows only a study visit. Outgoing student mobility achieved for the purpose of a study visit, which involves attending a course and taking an exam or research / practice under the supervision of a mentor at a host foreign institution. After mobility, the student returns to the organizational unit of the University, where he continues and ends her/his studies. The purpose of outgoing student mobility may also be to conduct professional internships at a host foreign institution. In most cases, students pursue an Erasmus + scholarship. The opportunity to pursue professional internships in foreign firms offered to students through the IAESTA International Student Exchange Association. The organizational unit and the University also offer other scholarships promoted through the Office for International Cooperation, through which

individuals can achieve their ambitions and advance knowledge and skills in their area of interest.

2. General part

2. 1. Name of the study program

Graduate university study program in food technology course ***Food Engineering.***

2. 2. Holder of the study program

Holder of the University Graduate Study Program in Food Technology, course: ***Food Engineering*** is a Faculty of Agriculture and Food Technology, University of Mostar

2.3. Field of study program

Filed of biotechnical science.

2. 4. Study duration

Graduate study program in Food Technology, course: Food Engineering lasts for 2 years (IV semester). It ends with the completion of all exams and the defense of the diploma thesis, i.e., awarded with 120 ECTS credits.

2.5. Language of study program

Croatian.

2.5.1. Modules in foreign language

If special interest shown for a particular subject (course) in agreement with the subject teacher, an English language course will be organized.

2. 6. Admission requirements for study program

Graduate Study Program in Food Technology, course: Food Engineering can be enrolled by students who have completed undergraduate study programs in Food Technology (180 ECTS credits), as well as students who have completed university undergraduate study programs of related study groups, taking different courses.
Enrollment made based on a public tender.

2. 7. Academic degree

Completion of the Graduate's Degree Program in Food Technology, course of Food Engineering students gain the title of

Master of Food Engineering

2.8. Learning outcomes

Learning Outcomes after Completing the Graduate Study in Food Engineering:

- communicate and present work using modern information technologies,
- select analytical methods and procedures for solving practical problems within the field of food engineering and further research,
- search the professional literature, databases and other sources of information, collect, and interpret relevant data,
- Effectively use various methods of communication with the engineering community and society as a whole,
- recognize the need and willingness to engage in lifelong learning,
- apply the principles and processes of scientific disciplines related to the processing of plant and animal raw materials,
- apply the acquired knowledge to identify, design and solve engineering problems and practical problems in the field of food industry,
- apply the acquired knowledge in leading the process of the food industry,
- Independently organize work activities and make decisions within a narrower area of expertise.

2.9. Competencies

The graduates of this study program acquire sufficient general and professional knowledge in basic natural sciences and in food engineering, food and nutrition sciences and other disciplines to enable them to deal with food processing and production issues.
They trained in:

- To managing technological processes in the food industry,
- To improve existing processes and technologies, that is, to introduce new ones and to design industrial units.

In addition, the experts in the above profile are also able to work on the improvement of existing and development of new food products and quality assurance and control. The experts who complete this graduate study are also qualified to work in scientific and professional institutions (faculties, institutes, agencies) in the field of research and development, as well as in schools where they can teach certain professional subjects.

2.10. Teachers

Distinguished scientists of the Faculty of Agriculture and Food Technology in Mostar, Faculty of Mechanical Engineering, University of Mostar, Faculty of Civil Engineering, University of Mostar, Faculty of Science, University of Mostar, Faculty of Food Technology, Josip Juross University of Osijek, Faculty of Food Technology and Biotechnology, University of Zagreb, as well as external associates from the economy and public institutions from Bosnia and Herzegovina and the Republic of Croatia. All teachers, course holders, who are involved in undergraduate and graduate study, are PhDs and recognized scientific staff.

2.11. Study structure and student obligation

The Rules of Study of the University of Mostar, the Rules of Study at the Graduate Studies of the Faculty of Agriculture and Food Technology of the University of Mostar and the syllabus programs determine the course of study and the students' obligations. The study conducted in 4 semesters; all courses one-semester, in one academic year the teaching was accept out through two semesters. Graduate study in Food Technology, in the field of Food Engineering, lasts 2 years or 4 semesters in total and carries a 120 ECTS credits.

Compulsory courses and elective courses distinguished within the direction of the study program. The core characteristics of the profession compulsory courses narrowly focused on theoretical knowledge and achievements of practice in this specific field were carry out in the first year of study. Elective courses provide students with the opportunity to focus in narrower areas and taught in the second year of study. By choosing elective courses, students create their own educational profile depending on their affinities and future employment plans.

The course description includes: course title, code and semester in which the course is taught, the title and first and last name of the course holder, number of hours of lectures, seminars and exercises, ECTS credits, course content, general and specific knowledge acquired at the course. The way to take the exam, and the required and recommended literature for the course.

The student chooses the topic of the thesis in agreement with the mentor so that they apply the acquired knowledge to the broader issues of food engineering. The diploma thesis carries 20 ECTS credits, within the framework of the IV semester of study. By producing a diploma paper, the student proves that he / she knows the theory and practice of this specific field, which is confirmed by the processing and defense of the diploma thesis in front of a specially selected expert committee.

2.12. Conditions for transferring from other study programs within the same or related fields and the possibility of continuing studies at a higher level

The Rules of Study and Decisions regulate conditions of transfer from other study programs within the same or related fields.

After completing the University Graduate Study in Food Engineering, students have the opportunity to enroll in a postgraduate doctoral study or some form of specialist postgraduate study or a lifelong learning program.

2.13. Employment opportunities

Upon completion of the study program, there will be great employment opportunities since such a program is not available in the wider region, and knowledge of this kind is indispensable in all spheres of the food industry from basic to upgrading. The graduate program designed to provide relevant knowledge for performing the highest-level jobs in the food sector, which in modern conditions were develop on the principles of sustainable development. In this way, Masters of Food Engineering will be able to lead technological processes in the food industry, to improve existing processes and technologies, i.e. to introduce new ones, to design industrial plans, to improve existing and develop new food products, and to ensure and control quality.

Masters of Food Engineering will also be qualified to work in scientific and professional institutions (faculties, institutes, agencies) in R&D as well as in schools and other related activities that embrace the principles of sustainable development.

2.14. Evaluation of the study program

Senate of the University of Mostar No. 01-648 / 12 of 10 May 2012 and 01-649 / 12 of May 10, 2012, Faculty of Agriculture and Food Technology has been approved for the implementation of the curriculum of the graduate study program in food technology, course of ***Food Engineering***, which is in accordance with the provisions of the Bologna Process.

By monitoring and improving study programs, adjustments made to new research, labor market needs, in accordance with the continuous conduct and monitoring of student surveys and the recommendations of accreditation bodies.

The development of study plans and programs is a continuous process, and the alignment of learning goals and outcomes under a continuous system of scrutiny by each subject teacher and quality assurance and improvement systems at both the University and APTF levels.

3. Curriculum

I. SEMESTAR

Ordinal no.	Code	Module name	Number of hours			ECTS
			L	T	S	
1.	FE111	FOOD ENGEENERING	45	30	-	5
2.	FE112	MODELING AND MANAGING BY PROCCESS IN FOOD TECHNOLGY	45	30	-	5
3.	FE114	TECHNOLOGICAL DESIGN II	45	15	-	5
4.	FE115	PRODUCT DEVELOPMENT IN FOOD INDUSTRY	30		15	4
5.	FE116	INTRODUCTION TO SCIENTIFIC RESEARCH	15	15	-	3
6.	FE126	BUSINESS MANAGEMENT	30	15	-	4
7.	FE125	INSTRUMENTAL METHODS OF ANALYSIS	30	15	-	4
		Total	240	120	15	**30**
		TOTAL	**375**			

II.SEMESTAR

Ordinal no.	Code	Module name	Number of hours			ECTS
			L	T	S	
1.	FE121	APPLIED MATHEMATICS	30	30		5
2.	FE122	BIOTECHNOLOGICAL FOOD PRODUCTION	30	15	15	6
3.	FE123	FOOD HAZARDS	30	15	15	5
4.	FE113	UNITE OPERATIONS IN FOOD ENGINEERING	45	15	15	6
5.	FE124	FOOD PREPARATION PROCESSES	30	30	5	5
6.	FE127	GREEN CHEMISTRY	15	15	-	3
		Total	80	105	50	**30**
		TOTAL	**335**			

III. SEMESTAR
Elective modules – total 30 ECTS

Ordinal no.	Code	Module name	Number of hours			ECTS
			L	T	S	
1.	MB	OIL AND FATS TECHNOLOGY	45	30		6
2.	MB	MEAT AND FISH TECHNOLOGY	45	30	-	6
3.	MB	TECHNOLOGY OF MILK AND DAIRY PRODUCTS	45	30	-	6
4.	MB	MOLD AND BEER TECHNOLOGY	45	30	-	6
5.	MB	FLOUR PRODUCTION AND PROCESSING TECHNOLOGY	45	30	-	6
6.	MB	MEDICINAL AND AROMATIC PLANTS - biology and processing	15	15	-	3
7.	MB	WINE SENSORY AND ANALYTICS	15	15		3
8.	MB	FOOD ADDITIVES	15	15		3
9.	MB	NUTRITION AND HEALTH	15	15		3
10.	MB	GMO IN FOOD PRODUCTION	22	5	3	3

IV. SEMESTAR

elective moduls – 10 ECTS
MSc Thesis 20 ECTS

Ordinal no.	Code	Module name	BROJ SATI			ECTS
			P	V	S	
1.	MB	AUTOCHOTONE DAIRY PRODUCTS	30	30	-	5
2.	MB	AUTOCHONTIC MEAT PRODUCTS	30	30	-	5
3.	MB	FUNCTIONAL FOOD AND FOOD SUPPLEMENTS	30	15		5
4.	MB	TECHNOLOGY OF CARBON AND CONDITIONERS PRODUCTS	30	30		5

4. Module overview

Course title	***FOOD ENGEENERING***				**Course code**	FE111
Study program Cycle	Food technology, course Food engineering, II				**Year of study**	1
ECTS point value:	**5**	*Semester*	winter		Hours per semester (L+T+S)	(45+30+0)
Course status:	obligatory	*Prerequisites:*		*Comparative conditions:*		
Course access:				*Class schedule:*		
Course teacher:	Dr. sc. Anita Jurić, docent					
Contact hours/consultations:	According the agreement					
E-mail and phone number:	ajuric2@gmail.com; + 387 63 315 680					
Assistant						
Contact hours/consultations:						
E-mail and phone number:						

Course objectives:	The objectives of this course are to gain: - knowledge of the processes, devices and applications of particular processes in the food industry, - general knowledge of specific processes in the food industry, separation processes and concentration of food ingredients, and - General knowledge of new food preservation processes and the production of minimally processed food.
Learning outcomes (general and specific competences):	After completing and taking this course, students will: - clarify the basic concepts of operations and processes in the food industry (mechanical, physical, thermal, chemical, enzymatic and fermentation processes), - carry out specific processes that applied in the food industry (homogenization, extrusion, rolling, finishing, tempering…), - To produce and interpret material and energy balances of various processes in the food industry. - describe and apply new food processing methods and clarify the concept of minimally processed food, - process food with high hydrostatic pressure, - process food by pulsed electric field and high voltage electric discharge, - process food with high and low intensity ultrasound, - process food with pulsed and UV light, - clarify the possibilities of oscillating magnetic field, ohm heating and electromagnetic radiation in food processing, - determine the specific packaging material required for the packaging of food obtained by new processing operations.
Content of the syllabus/performanc	Processes in Food Technology:

e plan (in short):	Mechanical (peeling, grinding, separation, etc.) and physical processes (sifting, agglomeration, emulsifying, etc.). Thermal processes (blanching, cooking, frying, baking). Solid-liquid separation (sedimentation, filtration, pressing). Chemical processes: hydrolysis, hydrogenation, neutralization, esterification. Enzymatic processes: depectinization, protein hydrolysis, hydrolysis of carbohydrates. Microbial processes - different types of ferments. Thermal processes with direct or radiation energy. Dielectric heating - principle, application, equipment. Ω Heating - principle, application, equipment. Infrared heating - principle, application, equipment. Electric food processing - Principle and equipment. High Hydrostatic Pressure Food Processing - Principle and Equipment. Ultrasound food processing - principle and equipment. Pulse Light Food Processing - Principle and Equipment.

Evaluation in detail within European Credit Transfer System
(Example)

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and activity in classroom	75	2,5	10%
Seminar paper	30	1	10%
Midterm (2) or Written exams	30	1	40%
Oral exam	15	0,5	40%
TOTAL	150	5	100%
Additional clarification:			

Compulsory literature:	Z. Herceg: Procesi u prehrambenoj industriji (Prehrambeno-procesno inženjerstvo 1), Plejada, Zagreb 2011. Z. Herceg: Procesi konzerviranja hrane – novi postupci, Golden marketing-tehnička knjiga, Zagreb 2009.
Additional literature:	T. Lovrić: Procesi u prehrambnoj industriji s osnovama prehrambenog inženjerstva, Hinus, Zagreb, 2003.

Course title	**MODELING AND MANAGING BY PROCCESS IN FOOD TECHNOLGY**				**Course code**	FE112
Study program Cycle	Food technology course Food engeenering, II				**Study year**	1
ECTS point value:	**5**	*Semester*	I		Hours per semester (L+T+S)	45+30+0
Course status:		*Prerequisites:*		*Comparative conditions:*		
Course access:				*Class schedule:*	According the agreement	
Course teacher:	doc. prof. dr. sc. Miroslav Grubišić					
Contact hours/consultations:	According the agreement					
E-mail and phone number:	Miroslav.grubisic@fsre.sum.ba					
Assistant						
Contact hours/consultations:						
E-mail and phone number:						
Course objectives:	The objectives of this course are to gain knowledge of the tasks and methodology of mathematical and computer modeling of technological processes. Practical experience were gain in the application of elemental balance models, degree of reduction, heat balance, enzymatic kinetics, homogeneous and structural models. Numerical methods applied to calculate the characteristic parameters of models of different technological processes according to the available models. Practical modeling experiences gained through examples of industrial food technology models. Observing process management stability. Application of advanced modeling methods with the help of artificial intelligence algorithms for monitoring and control of technological processes (neural networks, fuzzy logic, genetic algorithm). Gaining basic knowledge of optimal process management according to economic and environmental criteria by applying deterministic and stochastic optimization algorithms. Through computer exercises experience gained with the use of numerical algorithms and chemo metrics to model technological processes.						
Learning outcomes (general and specific competences):	After completing this course, students will be able to: **Propose** a methodology for mathematical and computer modeling of technological processes. **Illustrate** the main tasks when designing and setting up a model **Display** graphically the complexity levels of individual models with respect to the required knowledge **Formulate** elemental balance models, reduction balances, heat balances, and enzymatic kinetics. **Expose** basic enzymatic kinetic models and consider the influence of pH and temperature. **Set up** a model of basic reactions, a model of basic physical processes					

	and a kinetic model of processes necessary for optimizing the process according to economic and ecological criteria. **Review** the impact of variation of input parameters on process efficiency by applying the model. **Select** numerical methods for estimation of technological process model parameters. **Select** computer support to evaluate model parameters in technological processes. **Apply** methods and procedures for model evaluation and validation **Estimate** the maximum error of the created model
Content of the syllabus/performance plan (in short):	A systematic approach to modeling technological processes. Stoichiometric models of technological processes. Models and analysis of individual technological processes. Models with concentrated and distributed state sizes. Non-structural dynamic models of technological processes. Structural and segregated models of technological processes. Empirical (statistical) models. Model parameter estimation. Model validation. Model accuracy check. Model sensitivity analysis. Optimization and management of technological processes using mathematical models. Application of evolutionary algorithms (neural networks, fuzzy logic, genetic algorithm) for modeling, control and control of technological processes. Application of regression statistical models and chemo metrics for control and control of processes.

Evaluation in detail within European Credit Transfer System
(Example)

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and activity in classroom	75	2,5	
Seminar paper	30	1	20%
Midterm (2) or Written exams	30	1	60%
Oral exam	15	0,5	20%
TOTAL	150	5	100%

Students write the exams with a minimum score of 54%. After they take the oral exam. Students in the written exam solve theoretical and computational tasks from individual chapters, which divided into sub-questions, each of which scored with a certain number of points depending on the difficulty (from 2 to 8). The maximum number of points in the written exam is 60 points. Oral exam 20 points and Seminar paper 20 points.

According to the Rulebook on studying, the final grade is obtained as follows:
A = 91-100% 5 (excellent)
B = 79 to 90% 4 (very good)
C = 67 to 78% 3 (good)
D = 55 to 66% 2 (sufficient)
F = 0 to 54% 1 (insufficient)

Compulsory literature:	M. Čurlin Modeliranje biotehnoloških procesa, podloge za predavanja PBF, Zagreb2014/2015. Ž. Kurtanjek Matematičko modeliranje procesa , PBF, Zagreb

Additional literature:	V. Čerić, Simulacijsko modeliranje Školska knjiga, Zagreb, 1993 T. Stuart Matematical modelling od food processing operations, Elsevier Applied Science Publishers Ltd. London New York, 1992.

Course title	**Tehnološko projektiranje II**				**Course code**	
Study program Cycle	Food technology course Food engineering, II				**Study year**	1
ECTS point value:	5	*Semester*	winter		Hours per semester (L+T+S)	45+15+0
Course status:	obligatory	*Prerequisites:*	-	*Comparative conditions:*		
Course access:	Written and oral exam			*Class schedule:*		
Course teacher:	Prof. dr. sc. Mate Bilić					
Course associate / teacher	Izv.prof. dr. sc. Stela Jokić					
Contact hours/consultations:	daily (by e-mailom)					
E-mail and phone number:	mate.bilic@ptfos.hr stela.jokic@ptfos.hr 0038531224320					
Assistant	-					
Contact hours/consultations:	-					
E-mail and phone number:	-					
Course objectives:	Advanced engineering knowledge of food industry device design. Detailed design. Application of computers in food industry device design. Acquisition of good engineering-manufacturing practice.					
Learning outcomes (general and specific competences):	1. Define and differentiate the basic design principles of food processing devices 2. Define and clarify the role of the food engineer in designing devices for the food industry 3. Apply acquired knowledge for designing devices related to fluid transport and mechanical transport 4. Apply acquired knowledge to solve design tasks related to mechanical-physical and separation processes 5. Apply acquired knowledge to designing heat and substance transfer devices 6. Apply acquired knowledge to design membrane separation devices 7. Apply the acquired knowledge to designing measurement and control devices 8. Apply computers in food industry device design 9. Give examples of good engineering practice 10. Compare and analyze practical examples of food industry device design.					
Content of the syllabus/performance plan (in short):	Design of transportation and storage devices: pipelines, pumps, pneumatic, hydraulic and mechanical conveyors, tanks. Design of mechanical processing devices: peeling, cutting, grinding, sorting, sifting, mixing, mixing, emulsifying, agglomeration, extrusion, molding. Design of mechanical separation devices: screening,					

	cleaning, washing, filtering, centrifuging. Design of heat transfer devices: heating, blanching, cooking, frying, pasteurization, sterilization, evaporation, cooling, freezing. Design of transfer devices: drying, extraction, distillation, crystallization. Design of packaging devices: filling, sealing, aseptic packaging. Designing Cleaning and Sanitation Devices: CIP Systems. Design of measuring and control devices. Food industry device optimization: energy analysis and recovery. Practical examples. Practical examples of food industry device design. Finding criteria equations, coefficients and exponents based on experimental results. R&D in design. Computer drawing (CAD): devices, process and P&I schemes, 2D and 3D schematics, arrangement of devices in operation. Video projections and animations. Examples of computer simulation of different food industry devices.

Evaluation in detail within European Credit Transfer System

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and activity	**60**	**2**	
Midterm or written exam	**30**	**1**	**40%**
Oral exam	**60**	**2**	**60%**
TOTAL	**150**	**5**	**100%**

Additional clarification:
According to the Rulebook on studying, the final grade is obtained as follows:
A = 91-100% 5 (excellent)
B = 79 to 90% 4 (very good)
C = 67 to 78% 3 (good)
D = 55 to 66% 2 (sufficient)
F = 0 to 54% 1 (insufficient)

Compulsory literature:	1. Z. B. Maroulis, G. D. Saravacos: Food Process Design, Marcel Dekker, 2003. 2. R. P. Singh, D. R. Heldman: Introduction to Food Engineering, 3. ed., Marcel Dekker, 2001. 3. E. Beer: Prirucnik za dimenzioniranje uređaja u kemijskoj industriji, Kemija u industriji, Zagreb, 1985. 4. Mate Bilić, Darko Velić: Projektiranje uređaja, interna skripta, Prehrambeno-tehnološki fakultet Osijek, 2003. 5. R. H. Perry, D. W. Green: Perry's Chemical Engineer's Handbook. 7. ed.,McGraw Hill, New York, 1997.
Additional literature:	1. P. J. Fellows: Food processing technology; Principles and practice, Second Edition, Woodhead Publishing Limited, 2000. 2. G. D. Saravacos, A. E. Kostaropoulos: Handbook Of Food Processing Equipment, Marcel Dekker, 2003. 3. W. D. Seider, J. D. Seader, D. R. Lewin: Proces Design Principles

	Synthesis, Analysis and Evaluation of Process Flowsheets, J. Wiley & Sons, 2000.

Course title	**PRODUCT DEVELOPMENT IN FOOD INDUSTRY**			**Course code**	FE114
Study program Cycle	Food technology course Food engineering, II			**Study year**	1
ECTS point value:	**4**	*Semester*	I.	Hours per semester (L+T+S)	30+0+15
Course status:	Obligatory	*Prerequisites:*		*Comparative conditions:*	
Course access:				*Class schedule:*	
Course teacher:	prof. dr. sc. Mirela Kopjar				
Contact hours/consultations:	e-mail				
E-mail and phone number:	mirela.kopjar@ptfos.hr; 00385 31 224 309				
Assistant	Josipa Vukoja, mag. ing. aliment.				
Contact hours/consultations:					
E-mail and phone number:					
Course objectives:	Students receive information on the development of new products and new production processes, or the improvement of existing ones, and gain insight into the possible reasons on which the success or failure of new products depends.				
Learning outcomes (general and specific competences):	1. Define the concept of a new product in the food industry. 2. Explain the importance of developing a new product in the food industry. 3. Outline strategies for new product development in the food industry. 4. List the stages of development of a new product in the food industry and explain them. 5. Define and explain the factors that lead to a successful product in the market. 6. Develop a program for the development of a new product according to the methodological instruction for the development of the program.				
Content of the syllabus/performance plan (in short):	New product definition. Importance of research and development of new products. Basics for the analysis of innovations and trends in the field of food production. Fundamentals of the innovation process. The role of science, experience and methodology in new product development. The role of multidisciplinary teams. Phases (methodology) of new product development. New Product Success Factors. Role and influence of management on new product development.				

Evaluation in detail within European Credit Transfer System

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and activity in classroom	45	1,5	0
Seminar paper	30	1	40%
Midterm (2) or	45	1,5	60%

Written exams			
TOTAL	120	4	100%

Additional clarification:
Seminar work and presentation is obligatory. The final grade includes the results of the final exam and the evaluation of the seminar paper.
Seminar paper and presentation of seminar paper is evaluated as follows:
10% = The paper has been partially read and unprepared, with major deficiencies in the content plan.
20% = The paper satisfies both formally and substantively, but greater grammatical and spelling errors were observed and major defects in oral presentation were noted.
30% = The paper satisfies both formally and substantively, but less grammatical and spelling errors were observed and the presentation was well prepared, but with minor spelling errors.
40% = The paper is comprehensive, grammatically and spelling-correct, and the oral presentation is well prepared
Written exams is evaluated as follows
60% - 70% = up to 30% of grade
71% - 80% = up to 40% of grade
81% - 90% = up to 50% of grade
91% - 100% = up to 60% of grade
According to the Rulebook on studying, the final grade is obtained as follows:
A = 90 − 100% 5 (excellent)
B = 80 − 89,9% 4 (very good)
C = 70 − 79,9% 3 (good)
D = 60 − 69,9% 2 (sufficient)

Compulsory literature:	Moskowitz, H.R., Saguy, I.S., Straus, T.: An integrated approach to New Food Product Development. CRC Press. 2009. Side, C.: Food Product Development: Based on Experience. Iowa State Press, A Blackwell Publishing Company. 2002. Beckley , J.H., Foley, M. M., Topp, E.J., Huang, J.C., Prinyawiwatkul W.: Accelerating New Food Product Design and Development. IFT Press, Blackwell Publishing. 2007.
Additional literature:	Sci Journals; Internet

Course title	**INTRODUCTION TO SCIENTIFIC RESEARCH**			**Course code**	
Study program Cycle	Food technology, course Food engineering, II			**Study year**	1.+.2.
ECTS point value:	**3**	*Semester*	1.+3.	Hours per semester (L+T+S)	15+15
Course status:	Obligatory + elective	*Prerequisites:*		*Comparative conditions:*	
Course access:				*Class schedule:*	

Course teacher:	prof.dr.sc.Zrinka Knezović
Contact hours/consultations:	2 time per (1 h) week
E-mail and phone number:	zrinka.knezovic@aptf.sum.ba 036 337-104
Assistant	Marija Lasić; dipl. oec.; dipl novinar
Contact hours/consultations:	2 time per (1 h) week
E-mail and phone number:	marija.lasic@aptf.sum.ba 036 337 110
Course objectives:	The aim of the course is to provide students with basic knowledge of scientific and research work (theoretical and practical) and to enable them to apply this knowledge independently in the preparation of diploma papers, i.e. in their own research.
Learning outcomes (general and specific competences):	to clarify the basic concepts in the methodology of scientific work, - use a scientific style, - independently search, analyze and use various bibliographic sources, - make critical judgments and arguments, - draft your own research, - applied what learned in one's own research; especially in the design of graduate work within the study program.
Content of the syllabus/performance plan (in short):	Lectures: Definition of Science. Characteristics of science. Classification of scientific work. Categories of scientific research. Research methods. Literature review and review. Classification of publications. Electronic literature search of literature. Setting a working hypothesis. Experiment planning and implementation. Processing the results. Drafting of the manuscript of scientific work. Writing diploma thesis and other qualification papers. Congresses, symposia and other scientific conferences. Scientific projects. Valuation and classification of scientific papers. Selection procedure for scientific-research and scientific-teaching titles. Law on Scientific Research. Classification and search of primary, secondary and tertiary databases. News and latest developments in science in B&H and worldwide. Seminar: Designing a seminar paper according to a proposed or selected topic.

Evaluation in detail within European Credit Transfer System

STUDENT	LESSON HOURS	ECTS	GRADE

OBLIGATIONS	(ASSESSMENT)		
Class attendance and activity	30	1	
Seminar paper (written and oral)	30	1	10%
Written exams	30	1	90%
TOTAL	90	3	100%

The seminar paper is evaluated as follows:
0% = The work was not written.
1% = The paper does not meet the formal criteria.
2% = The paper meets the formal criteria, but major deficiencies in the content plan were noted.
3% = The paper is formal and substantive, but more grammatical and spelling errors are noted.
4% = The paper is formal and substantive, but minor grammatical and spelling errors were observed.
5% = The work is comprehensive, grammatically and spelling correct.
The presentation of the seminar paper is evaluated as follows:
0% = Paper is not presented orally.
1% = Paper read.
2% = Paper partially read and unprepared.
3% = Paper not read, but major deficiencies in oral presentation were noted.
4% = Exposure is well prepared, but minor oration errors are noted.
5% = Oral presentation is well prepared.
Written exams are evaluated as follows
less than 50% correct answers = 0% marks
from 51% to 60% = up to 18% of grade
from 61% to 70% = up to 36% of grade
from 71% to 80% = up to 54% of grade
from 81% to 90% = up to 72% of grade
from 91% to 100% = up to 90% of grad
According to the Rulebook on studying, the final grade is obtained as follows:
A = 91-100% 5 (excellent)
B = 79 to 90% 4 (very good)
C = 67 to 78% 3 (good)
D = 55 to 66% 2 (sufficient)
F = 0 to 54% 1 (insufficient)

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Seminar paper	**10**	**1**	**10%**
Written exams	**20**	**2**	**90%**

Compulsory literature:	Kniewald, J. *Metodika znanstvenog rada* (sveučilišni udžbenik), Multigraf, Zagreb. (1993) Žugaj, Miroslav, Dumičić, Ksenija, Dušak, Vesna: *Temelji znanstvenoistraživačkog rada*, Fakultet organizacije i informatike, Varaždin, 1999. Silobrčić V. *Kako sastaviti i objaviti znanstveno djelo* Jugoslovenska medicinska naklada Zagreb (1989.)

	Knežević, I.; Mijić, Pero *Uvod u znanstveni rad Poljoprivredni fakultet* Osije*k 2006.*
Additional literature:	Instruction for writing the thesis Grupa autora (1996) *Protecting Biotechnological Inventions - Recent Development in Law and Practice in EC and USA*, IBC Technical Series, London. • Grubb, P. W. (1999) *Patents for Chemicals, Pharmacia*
Additional information on course:	Part of the exercises is held in the IT classroom - searching bibliographic sources

Course title	**BUSINESS MANAGEMENT**				**Course code**	
Study program Cycle	Food technology, course Food engineering, II				**Study year**	4
ECTS point value:	**4**	*Semester*	I		Hours per semester (L+T+S)	30+15+0
Course status:		*Prerequisites:*		*Comparative conditions:*		
Course access:				*Class schedule:*		
Course teacher:	Doc.dr.sc. Ivan Spužević					
Contact hours/consultations:						
E-mail and phone number:	ivan.spuzevic@gmail.com					
Assistant						
Contact hours/consultations:						
E-mail and phone number:						

Course objectives:	The objectives of this course are: Acquiring knowledge of the basic concepts and functions of managing and running an SME. Skills based on managerial knowledge needed to identify and solve problem situations in small and medium-sized enterprises.
Learning outcomes (general and specific competences):	After completing this course, students will be able to: Properly describe and interpret the term SME. Identify and clarify key aspects of human resource management in SMEs. Recognize and clarify the specifics of family businesses and the perspectives of family entrepreneurship in the context of SMEs
Content of the syllabus/performance plan (in short):	Management, Strategic and Tactical Management, Entrepreneurship, Risk Management in Agriculture, Forms of Business Organization, Financial Statements, Benchmarks of Business, Production Theory, Investment in Agriculture, Methods of Assessing Financial Efficiency of Investments, Creating Business Plans and Investment Studies.

Evaluation in detail within European Credit Transfer System
(Example)

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and activity in classroom	45	1,5	20%
Seminar paper	30	1	20%
Midterm (2) or Written exams	45	1,5	60%
TOTAL	120	4	100%

Additional clarification:

According to the Rulebook on studying, the final grade is obtained as follows:
A = 91-100% 5 (excellent)

B = 79 to 90% 4 (very good) C = 67 to 78% 3 (good) D = 55 to 66% 2 (sufficient) F = 0 to 54% 1 (insufficient)	
Compulsory literature:	Siropolis, N. C.: „Menadžment malog poduzeća“; Mate, Zagreb, 1995.
Additional literature:	Uprava poljoprivrednih gospodarstava autori Lari Hadelan, dipl.ing i dr.sc. Mario Njavro
Additional information on course:	

Course title	**INSTRUMENTAL METHODS OF ANALYSIS**			**Course code**	
Study program Cycle	Food technology course Food engineering, II			**Study year**	I
ECTS point value:	**4**	*Semester*	II	Hours per semester (L+T+S)	30+15+0
Course status:	obligatory	*Prerequisites:*		*Comparative conditions:*	
Course access:	All students enrolled in the first year of graduate study			*Class schedule:*	According to the agreed course of the lecture

Course teacher:	Anita Martinović Bevanda
Contact hours/consultations:	According the agreement
E-mail and phone number:	Anita.martinovic@fpmoz.ba
Assistant	Kristina Batinić
Contact hours/consultations:	According the agreement
E-mail and phone number:	kbatinic@faz.ba
Course objectives:	The objectives of this course are: - qualify the student to work in analytical, product and environmental quality control laboratories. Furthermore, the acquired knowledge and skills from this course provide the competence for continuing higher education
Learning outcomes (general and specific competences):	After completing this course, students will be able to: Define a representative sample, explain sample preparation for analysis and preparation of calibration directions. Explain the chemical and physico-chemical principles underlying the work of analytical instruments and State the characteristics of their application in the analysis of real samples.
Content of the syllabus/performance plan (in short):	Introduction to Instrumental Analysis Methods-Glossary. Samples and sampling. Basic features of each analytical method. Electro analytical techniques. Potentiometric. Conductimetry. Electrogravimetry. Voltammetry. Biosensors. Introduction to spectrometry. Molecular spectrometry in the UV-Vis and IC regions of EMZ. Raman spectrometry. Fluorescence spectrometry. Atomic absorption spectrometry (AFS, PAAS, GF AAS). Mass spectrometry. Modern Non-Invasive Techniques-DESI, DART. Nuclear magnetic resonance imaging. Thermal analysis. Chromatographic techniques. Gas, liquid, ion chromatography. Connected systems. Electrophoresis. Flow analysis methods (FIA, SIA, LOV).

Evaluation in detail within European Credit Transfer System
(Example)

STUDENT	**LESSON HOURS**	**ECTS**	**GRADE**

OBLIGATIONS	**(ASSESSMENT)**		
Class attendance and activity in classroom	45	1,5	0 %
Practical part	15	0,5	20%
Midterm (2) or Written exams	45	1,5	60%
Oral exam	15	0,5	20%
TOTAL	120	4	100%

Additional clarification:
According to the Rulebook on studying, the final grade is obtained as follows:
A = 91-100% 5 (excellent)
B = 79 to 90% 4 (very good)
C = 67 to 78% 3 (good)
D = 55 to 66% 2 (sufficient)
F = 0 to 54% 1 (insufficient)

Compulsory literature:	M. Kaštelan-Macan, *Kemijska analiza u sustavu kvalitete*, prvo izdanje, Školska knjiga, Zagreb 2003. D. A. Skoog, D. M. West, F. J. Holler: Osnove analitičke kemije. Školska knjiga, Zagreb, 1999 D. A. Skog, F. J. Holler, S.R.Crouch, Principles of Instrumental Analysis. Thomson Brooks/cole, Sixth Ed., 2007. D.C.Harris, Quantitative Chemical Analysis, Fifth Edition, W.H.Freeman and Company, New York, 1999. F.Rouessac, A.Rouessac, *Chemical Analysis-Modern Instrumentation and Techniques*, Sec.Ed. JohnWiley & Sons, 2007. I.Piljac, Elektroanalitičke metode: Teorijske osnove, mjerne naprave i primjena, RMC, Zagreb, 1995 E. Pungor, K. Toth, Ion-selective sensors, Dostupno na: http://media.iupac.org/ publications/pac/1972/pdf/3104×0521.pdf The THGA Graphite Furnace: techniques and recommended conditions, Third edition, Perkin Elmer Instruments, Norwalk, CT, USA, 1999. R. D. Beaty, J. D. Kerber, Concepts, instrumentation and techniques in atomic absorption spectrometry, Second editiion, The Perkin-Elmer Corporation, Norwalk, CT, USA, 1993. J. Ružička, E.H. Hansen, Flow injection analysis, Second edition, John Wiley&Sons, Inc, New York, 1988. J.Ruzicka, E.H.Hansen, *Anal. Chim. Acta* **78** (1975) 145. J.Ruzicka, *Analyst* **125** (2000) 1053. E. H. Hansen, *Talanta* **64** (2004) 1076. E.H.Hansen, M. Miro, *Trends Anal. Chem.* **26** (2007) 18 J.Cazes, G.W. Ewing, Ed.; Ewing´s analytical instrumentation handbook, Chapter: E.H. Hansen, J. Wang, Flow injection/sequential Injection Analysis, Third edition, Marcel Dekker, New York 2004.
Additional literature:	Review and scientific papers available D. Harvey, *Modern Analytical Chemisltry*, First Edition, Mc Graw Hill, 2000.

Additional information on course:	

Course title	**APPLIED MATHEMATICS**				*Course code*		
Study program Cycle	2. Cycle				*Study year*	1	
ECTS point value:	5	*Semester*	2.		*Hours per semester (L+T+S)*	30+30+0	
Course status:	Obligatory	*Prerequisites:*		*Comparative conditions:*			
Course access:				*Class schedule:*			
Course teacher:	Dr. sc. Ljiljanka Kvesić, izv. prof.						
Contact hours/consultations:							
E-mail and phone number:	ljiljanka.kvesic@fpmoz.sum.ba						
Assistant							
Contact hours/consultations:							
E-mail and phone number:							
Course objectives:	Introduce students to the basic ideas and methods of numerical mathematics, probability theory and statistics.						
Learning outcomes (general and specific competences):	After successfully mastering the course content, the student is expected to communicate mathematically knowledge and ideas in a reasoned and effective manner such as: - apply interpolation - master the solving of nonlinear equations - apply the least squares problem - master numerical integration - use descriptive statistics - master discrete probability and discrete distributions - apply statistics problems: estimates, confidence intervals By developing a positive attitude towards learning and teaching, the student is expected to build a solid foundation for lifelong learning and continued education.						
Content of the syllabus/performance plan (in short):	Interpolation: Lagrange and Newtonian form of interpolation polynomial. Error rating. Linear interpolation splines. Cubic interpolation spline. Solving the Nonlinear Equation: A bisection method. Simple iterations method. Newton's method and modifications. Least-squares problems: Problem definition and examples. Linear least squares problem. Nonlinear least squares problems. Gauss-Newton method. Numerical integration: The trapezoidal rule. Newton-Cotes formula. The Simpson Rule. Numerical solution of ordinary differential						

	equations: Euler's method. Runge - Kutta method. Descriptive statistics: Graphical representation of data. Mean, median, mode, standard deviation, histogram, and frequency polygon. Discrete probability. Fundamentals of set theory and combinatory. Conditional Probability and Independent Events. Random variables. Discrete distributions: binomial, Poisson and geometric. Continuous distributions: uniform, exponential and Gauss. Problems in statistics, estimates, confidence intervals, tests.

Evaluation in detail within European Credit Transfer System

STUDENT OBLIGATIONS	LESSON HOURS (ASSESSMENT)	ECTS	GRADE
Class attendance and activity	60	2	10%
Midterm or written exam or final written exams	45	1.5	40%
Oral exam	45	1.5	50%
TOTAL	150	5	100%

Additional clarification:

According to the Rulebook on studying, the final grade is obtained as follows:
0 – 54% insufficient (1)
55 – 66% sufficient (2)
67 – 78% good (3)
79 – 90% very good (4)
91 – 100% excellent (5).

Compulsory literature:	1. *R.Scitovski, Numericka matematika, Odjel za matematiku, Osijek, 2000.* 2. *G.R. Iversen, Statistics, The Conceptual Approach, Springer, Berlin, 1997.*
Additional literature:	1. *D.Kincaid, W.Cheney, Numerical Analysis, Brooks/Cole Publishing Company, New York, 1996.* 2. *J.Stoer, R.Bulirsch, Introduction to Numerical Analysis, 2^{nd} Ed.,Springer Verlag, New York, 1993.*
Additional information on course:	Lectures and exercises are required. The exam consists of a written and oral part, and it is taken after the lectures and exercises have been completed. Midterm or written exam results, which students write during the semester, replace the written part of the exam .

<table>
<tr><td>Course title</td><td colspan="3">BIOTECHNOLOGICAL FOOD PRODUCTION</td><td>Course code</td><td></td></tr>
<tr><td>Study program Cycle</td><td colspan="3">Food technology, course Food engineering, II</td><td>Study year</td><td>I</td></tr>
<tr><td>ECTS point value:</td><td>6</td><td>Semester</td><td>II</td><td>Hours per semester (L+T+S)</td><td>30+15+15</td></tr>
<tr><td>Course status:</td><td>obligatory</td><td>Prerequisites:</td><td></td><td>Comparative conditions:</td><td></td></tr>
<tr><td>Course access:</td><td colspan="3"></td><td>Class schedule:</td><td></td></tr>
<tr><td colspan="2">Course teacher:</td><td colspan="4">Prof. dr. sc. Jagoda Šušković/
Prof. dr. sc. Blaženka Kos</td></tr>
<tr><td colspan="2">Contact hours/consultations:</td><td colspan="4"></td></tr>
<tr><td colspan="2">E-mail and phone number:</td><td colspan="4">jsusko@pbf.hr; 00 385 1 4605 291</td></tr>
<tr><td colspan="2">Assistant</td><td colspan="4">Mario Kovač</td></tr>
<tr><td colspan="2">Contact hours/consultations:</td><td colspan="4"></td></tr>
<tr><td colspan="2">E-mail and phone number:</td><td colspan="4"></td></tr>
<tr><td colspan="2">Course objectives:</td><td colspan="4">The objectives of this course are:
- acquisition of engineering knowledge for planning, preparation and management of biotechnological processes for food production
- application of new strategies in biotechnological production of fermented foods
- application of theoretical knowledge of probiotics and prebiotics in the production of functional foods</td></tr>
<tr><td colspan="2">Learning outcomes (general and specific competences):</td><td colspan="4">After completing this course, students will be able to:
- describe and schematically display all phases of the biotechnological process
- explain the use of amyolytic and protolithic enzymes in the food industry
- to relate the metabolic activity of lactic acid bacteria to their role in the production of fermented foods
- select a starter culture to obtain various fermented foods
- explain the probiotic and prebiotic concept in the production of functional foods
- critically evaluate the reasons for using lyophilization over other methods of preparing dried biomass of probiotic and starter cultures
- Explain new strategies in biotechnological food production
- critically evaluate the benefits of using concentrated biomass with bacitracin activity for the production of fermented foods and bacitracin preparations as a bio preservative in the food industry</td></tr>
<tr><td colspan="2">Content of the syllabus/performance plan (in short):</td><td colspan="4">Definition of biotechnology. Historic milestones in biotechnology product acquisition. Division and review of bioprocesses by working microorganisms and product type. Bioreactors / fermenters and living</td></tr>
</table>

	cell as bioreactor. Preparation and sterilization of nutrient media. Selection of working microorganism and preparation of inoculum. Growth kinetics and product synthesis. Batch and continuous breeding. Bioprocess regulation and control. The influence of environmental conditions on the process flow and product quality. Aerobic microbial processes. Anaerobic microbial processes. Microbial production of enzymes and their application in the food industry. Microbial production of amino acids. Application of starter cultures in the production of fermented food (fermented vegetables, fermented dairy and meat products, apple-milk fermentation). Selection and production of starter cultures. New strategies in biotechnological food production. Use of microbial systems in the production of functional foods. Selection and production of probiotic cultures. Types of prebiotic substrates and mechanism of action of prebiotics. Production and use of nisin as a bio-preservative in food. exercises: Morphological and physiological characteristics of lactic acid bacteria as probiotic and starter cultures. Determination of antimicrobial activity of probiotics and starter cultures. Determination of the number of living probiotic bacteria in lyophilized probiotic preparations after drying the bacterial cells by sublimation of ice in vacuum.

Evaluation in detail within European Credit Transfer System

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and activity in classroom	60	2	0%
Midterm exam or Written exams	120	4	100%
TOTAL	180	6	100%

Additional clarification:

According to the Rulebook on studying, the final grade is obtained as follows:
A = 91-100% 5 (excellent)
B = 79 to 90% 4 (very good)
C = 67 to 78% 3 (good)
D = 55 to 66% 2 (sufficient)
F = 0 to 54% 1 (insufficient)

Compulsory literature:	1. M.J.Nout, W.M.de Vos, Food Fermentation, Wageningen Academic Publishers, The Netherlands, 2005. 2. Buchholz, K., Kasche, V., Bornscheuer U.T. (2012) : Biocatalysts and Enzyme Technology, 2nd ed., John Wiley & Sons, Weinheim. 3. J. Šušković, B. Kos, J. Beganović, A. Leboš Pavunc, K. Habjanič, Antimicrobial Activity – the Most Important Property of Probiotic and Starter Lactic Acid Bacteria (review), *Food Technol. Biotechnol. 48* (2010) 296-307.

	4. V.Marić, B. Šantek., Biokemijsko inženjerstvo, Golden marketing – Tehnička knjiga, 2009. 5. E. Tsakalidou, K. Papadimitriou (ured.): Stress Responses of Lactic Acid Bacteria, Food Microbiology and Food Safety, Springer, 2011. 6. B.J.B.Wood (ured.), Microbiology of Fermented Foods, 2nd edition (volume 1 and 2), Blackie Academic & professional, London, 1998. 7. D. Charalampopoulos, R.A. Rastall: Prebiotics and Probiotics Science and Technology, Springer, New York (2009).
Additional literature:	1. J. Šušković, Kos, B., Frece, J., Beganović, J., Leboš Pavunc, A. (2009) Probiotički koncept – probiotici kao dodaci hrani i probiotici kao bioterapeutici, *Hrvatski časopis za prehrambenu tehnologiju, biotehnologiju i nutricionizam*, 4, 77-84. 2. W.M.de Vos, M. Kleerebezem, O.P. Kupiers: Lactic acid bacteria: genetic, metabolism and applications, Elsevier, Amsterdam, 2005. 3. M.D.Doran, Bioprocess Engineering Principles, AP, NY, 1995. 4. D.G.Springham et al., Biotechnology- The Science and the Business,HAP, Amsterdam, 1999.

Course title	**FOOD HAZARDS**			**Course code**	FE121
Study program Cycle	Food technology, course Food engineering, II			**Study year**	1.
ECTS point value:	5	*Semester*	II.	Hours per semester (L+T+S)	30+15+15
Course status:	Obligatory	*Prerequisites:*		*Comparative conditions:*	
Course access:	1st year graduate students in Food Engineering			*Class schedule:*	Weekly Schedule
Course teacher:	doc.dr.sc. Anita Jurić				
Contact hours/consultations:	-				
E-mail and phone number:	ajuric2@googlemail.com				
Assistant					
Contact hours/consultations:					
E-mail and phone number:					
Course objectives:	Introduce students to the sources, detection, decontamination, prevention, adverse effects and legal regulations of substances that endanger food safety.				
Learning outcomes (general and specific competences):	- clarify legal regulations in the food safety system - indicate hazards, sources of danger and hazard analysis - To clarify the properties of microorganisms, sources of contamination, diseases and ways of preventing foodborne diseases. - clarify the types, sources of danger and ways of reducing the risk of physical contaminants in food - clarify the types, sources of danger and ways of reducing the risk of chemical contaminants in food - Perform necessary pre-treatment and methods of detection of selected food toxicants.				
Content of the syllabus/performance plan (in short):	- legislation, roles and responsibilities in the food safety system - chemical, physical and biological (microbiological) hazards in food - the impact of micro-organisms on food health and consumer health - Measures to prevent food contamination, destroy pathogenic biological factors, remove chemical and physical contaminants from food - Establishment of a self-control system based on HACCP principles				

Evaluation in detail within European Credit Transfer System

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and activity in classroom	60	2	15 %
Seminar paper	30	1	10 %

Written exams	45	1,5	60 %
Oral exam	15	0,5	15 %
TOTAL	150	5	100%

Additional clarification:

Seminar paper can achieve 25% share of the final grade, 18% for Seminar paper in writing and 7% for presentation.

Seminar paper	**GRADE**
The paper is not written or plagiarized	0 %
The paper meets the formal criteria	6 %
The paper is formal but satisfies major grammatical or spelling mistakes	9 %
The paper is formal and substantive, but contains minor grammatical and spelling mistakes	12 %
The work is good, the subject matter excellently addressed	18 %

Presentation	**GRADE**
The paper is not presented	0 %
The paper is well presented with some errors	4 %
The work is very well presented, the topics well addressed	6 %
The work is superbly presented, without errors	7 %

Written exams

SUCCESS AT THE EXAM	**GRADE**
< FROM 50 % CORR. ANSWER	0 %
51 % - 60 %	10 %
61 % - 70 %	20 %
71 % - 80 %	35 %
81 % - 90 %	50 %
91 % - 100 %	60 %

According to the Rulebook on studying, the final grade is obtained as follows:

A = 91-100 % 5 (excellent)
B = 79 - 90 % 4 (very good)
C = 67 - 78 % 3 (good)
D = 55 - 66 % 2 (sufficient)
E = 0 - 54 % 1 (insufficient)

Compulsory literature:	Kemijske i fizikalne opasnosti u hrani, Šarkanj, Kipčić, Delaš, Galić, Katalenić, Dimitrov, Klapec, Osijek 2010. Biološke opasnosti u hrani, Marinculić, Habrun, Barbić, Beck, Osijek 2009. Uvod u sigurnost hrane, Babić i Đugum sa suradnicima, Ljubljana, Slovenija, 2014.

Additional literature:	P.A.Luning, K.Devlieghere, R.Verhe: *Safety in agri-food chain*, Wageningen Academic Publishers, Wageningen, 2006. S.S.Deshpande: *Handbook of Food Toxicology*, Marcel Dekker, Inc., New York/Basel, 2002.
Additional information on course:	Students are required to attend lectures and fieldwork. Seminar paper should be submitted in writing and presented before the written part of the exam.

Course title	**UNITE OPERATIONS IN FOOD ENGINEERING**				**Course code**	
Study program Cycle	Food technology course Food engineering, II				**Study year**	4.
ECTS point value:	**6**	*Semester*	II.		Hours per semester (L+T+S)	75
Course status:	Obligatory	*Prerequisites:*		*Comparative conditions:*		
Course access:				*Class schedule:*		
Course teacher:	dr.sc. Srećko Tomas, red.prof.					
Contact hours/consultations:						
E-mail and phone number:	srecko.tomas@ptfos.hr					
Assistant	Josipa Krezić, mag.ing.					
Contact hours/consultations:						
E-mail and phone number:	jjosipa.vukoja@gmail.com					
Course objectives:	The objectives of this course are: Introduce students to mechanical and physical operations, and substance and energy transfer operations, most commonly used in the food industry.					
Learning outcomes (general and specific competences):	After completing this course, students will be able to: - explain the basic principles of mechanical operations and operations in which heat and matter transfer occur, - explain the laws that accompany the most commonly used unit operations in the food industry, - explain the influence of process parameters on the implementation of an operation, - list the most commonly used devices for performing unit operations and describe the principle of their operation, - indicate possible problems when performing a specific unit operation.					
Content of the syllabus/performance plan (in short):	Mechanical - physical operations: Raw material cleaning, Shredding, Classification, Sorting, Sedimentation and decantation, Filtration, Centrifugation, Spraying, Mixing and mixing. Operations with transfer of heat and matter: Evaporation, Drying (dehydration), Extraction (leaching), dissolving and flushing, Crystallization, Distillation. Absorption. Adsorption and ion exchange. Seminar: introduction to devices in the food industry. Exercises: Exercises - solving computational examples.					

Evaluation in detail within European Credit Transfer System

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and	75	2,5	

activity in classroom			
Seminar paper	30	1	20%
Midterm (2) or Written exams	75	2,5	80%
TOTAL	180	6	100%

Additional clarification:
According to the Rulebook on studying, the final grade is obtained as follows:
A = 91-100% 5 (excellent)
B = 79 to 90% 4 (very good)
C = 67 to 78% 3 (good)
D = 55 to 66% 2 (sufficient)
F = 0 to 54% 1 (insufficient)

Compulsory literature:	S. Tomas: Mehaničko fizikalne operacije. Interna skripta, Osijek, 1999. S. Tomas: Operacije uz prijenos topline - Uparavanje. Interna skripta, Osijek, 1999. S. Tomas: Ekstrakcija (izluživanje) i otapanje, kristalizacija i destilacija. Interna skripta, Osijek, 1997. S. Tomas: Sušenje. Apsorpcija plinova. Interna skripta, Osijek, 1999. S. Tomas: Mapa aparata – Jedinične operacije. Interna skripta, Osijek, 2001.
Additional literature:	R. H. Perry, D. W. Green: Perry's Chemical Engineer's Handbook. 7nd ed, McGraw-Hill, New York, 1997. J. M. Coulson, et al.: Chemical Engineering I-V. Pergamon Press, Oxford. 1999. M. Hraste: Mehaničke operacije. Tehnološki fakultet, Zagreb, 1990. J. G. Brennan, et al.: Food Engineering operations. 3rd ed., Elsevier Applied Science, London and New York, 1990. A. Ibarz, G.V. Barbosa-Canovas: Unit Operations in Food Engineering, CRC Press LLC, Boca Raton, London, New York, Washington D.C., 2003.

Course title	**FOOD PREPARATION PROCESSES**				**Course code**	
Study program Cycle	Food technology course Food engineering, II				**Study year**	1
ECTS point value:	**5**	*Semester*	2		Hours per semester (L+T+S)	30+30+5
Course status:	Obligatory	*Prerequisites:*	-	*Comparative conditions:*		-
Course access:				*Class schedule:*		
Course teacher:	izv.prof.dr.sc. Jurislav Babić					
Contact hours/consultations:	1 h per week					
E-mail and phone number:	jbabic@ptfos.hr; +385 31 224 333					
Assistant	Nikolina Kajić					
Contact hours/consultations:	1 h per week					
E-mail and phone number:	nikolina.kajic@aptf.sum.ba					
Course objectives:	The objectives of this course are: Students acquire knowledge and skills with the basics of preparing different types of food. Furthermore, knowledge of the effect of processing on the changes of particular ingredients during processing.					
Learning outcomes (general and specific competences):	After completing this course, students will be able to: Clarify the parameters that affect the quality of raw materials for these changes of particular ingredients during processing. Differentiate the preparation of food (raw materials) of plant and animal origin for the needs of different consumers. Explain the different processing and packaging of food for the needs of the hotel industry, public social institutions (schools, hospitals, children's homes, the elderly, etc.), air and other modes of transport, restaurants and the like. Describe and apply semi-prepared and prepared foods. Apply acquired knowledge to practically carry out certain food preparation processes					
Content of the syllabus/performance plan (in short):	Preparation of foodstuffs (raw materials) of plant and animal origin for the needs of different consumers. Processing for the needs of the hotel industry, public social institutions (schools, hospitals, children's homes, the elderly, etc.), airplane and other modes of transport, restaurants and the like.					

Evaluation in detail within European Credit Transfer System

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and activity in classroom	65	2	
Seminar paper	30	1	30%
Midterm (2) or Written exams	45	1,5	50%
Oral exam	15	0,5	20%

TOTAL	150	5	100%

Additional clarification:

The student must complete 70% of the lecture hour and 100% of the seminar hour in order to be eligible for signature in the index and exit to the colloquiums, i.e. final written exams.
Assessment: The colloquium is optional. Exit to II. the colloquium is not conditional on taking the I colloquium. Students have the right to go to one of the corrective tests, where they can take or improve their grades II or I. Exit to the corrective exam is conditioned by passing the first or second exam. Colloquium. If the student passed both tests (and satisfied by the Total grade), the final exam released - the total grade in this case the arithmetic mean of the grades of both tests. The final exam (consisting of the written part) is compulsory for students who have not taken the course through a midterm exam.
The final grade includes the results of the midterm or final written, engagement during the class, and evaluation of the seminar paper.
Evaluation of Seminar paper:
0% = The work was not written.
2% = The paper does not meet the formal criteria.
6% = The paper meets the formal criteria, but major deficiencies in the content plan were noted.
8% = The paper is formal and substantive, but more grammatical and spelling errors are noted.
12% = The paper is formal and substantive, but minor grammatical and spelling errors were observed.
15% = The work is comprehensive, grammatically and spelling correct.
Assessment of seminar paper presentation:
0% = Paper is not presented orally.
2% = Paper read.
4% = Paper partially read and unprepared.
6% = Paper not read, but major deficiencies in oral presentation were noted.
8% = Exposure is well prepared, but minor orthogonal errors are noted.
10% = Oral presentation is well prepared.

According to the Rulebook on studying, the final grade is obtained as follows:
A = 91-100% 5 (excellent)
B = 79 to 90% 4 (very good)
C = 67 to 78% 3 (good)
D = 55 to 66% 2 (sufficient)
F = 0 to 54% 1 (insufficient)

Compulsory literature:	***V. Lelas: Procesi pripreme hrane. Golden marketing-Tehnička knjiga, 2008. Zagreb***
Additional literature:	Lecture materials

Course title	**GREEN CHEMISTRY**				**Course code**	FE127
Study program Cycle	Food technology, course Food engineering, II				**Study year**	I
ECTS point value:	**3**	*Semester*	II		Hours per semester (L+T+S)	15+15
Course status:	Obligatory	*Prerequisites:*	-	*Comparative conditions:*		-
Course access:	-			*Class schedule:*		-
Course teacher:	dr.sc. Anita Ivanković, izv.prof.					
Contact hours/consultations:	15+15 contact hours, 1 h per week					
E-mail and phone number:	anita.ivankovic@aptf.sum.ba, 036 337 117					
Assistant						
Contact hours/consultations:						
E-mail and phone number:						

Course objectives:	The objectives of this course are: Educate students in environmental and economic sustainability through several dominant trends. Some of them are: biocatalysts, catalysis, use of alternative renewable raw materials (biomass), alternative reaction media (water, ionic liquids, and supercritical liquids), alternative reaction conditions (activation by microwave radiation) as well as new photo catalytic reactions.
Learning outcomes (general and specific competences):	After completing this course, students will be able to: • Analyze existing chemical synthetic processes based on E-factor and per-atom usability • define the catalytic action of new types of green catalysts • Apply catalytic reactions in alternative reaction media to use less toxic substances • define the advantages of chemo-, regio- and enantioselectivity of bio catalytic transformations of synthetic and natural materials in relation to classical chemical processes • select green non-toxic chemical substances and carry out green synthetic processes • apply photo catalytic processes for the degradation of organic pollutants resulting from human activity that pollute the geo-system
Content of the syllabus/performance plan (in short):	12 Principles of Green Chemistry. Familiarization with the dominant trends of the green program such as: • research in the field of catalytic and bio catalytic reactions in order to obtain highly selective, pure products without the formation of toxic by-products • finding and testing new alternative reaction media, non-toxic and renewable such as water, ionic liquids and supercritical fluids • finding and testing alternative reaction conditions in order to save

	energy (activation of reactions by microwave radiation, ultrasound and light) • designing less toxic eco-compatible chemicals • Search for new raw materials, harmless and renewable, such as biomass • exploring alternative routes for purification of contaminated air and water to improve their quality, such as photo catalytic reactions In the practicum students will do the following exercises: • Photochemical decomposition of methylene blue by photo-Fenton reaction • Natural dye extraction • Kinetics of hydrolysis of tert-butyl chloride

Evaluation in detail within European Credit Transfer System
(Example)

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and activity in classroom	30	1	
Seminar paper	30	1	40%
Midterm or Written exams	30	1	60%
TOTAL	90	3	100%

Additional clarification:
In order to pass the final exam, students are required to attend 80% of the class, submit a completed laboratory diary, write and present a Seminar paper. The final grade includes the results of the seminar paper and the final exam. Students can choose whether to take the final exam in writing or orally.
The seminars are evaluated as follows:
Paper not written = 0% of grade
The paper does not meet the formal criteria = up to 10% of grade
The paper meets the formal criteria, but major deficiencies in the content plan were observed = up to 20% of grade
The paper is formal and substantive but not exhaustive = up to 30% of grade
The paper is formal and substantive and thoroughly covers the topic = up to 40% of the grade
According to the Rulebook on studying, the final grade is obtained as follows:
A = 91-100% 5 (excellent)
B = 79 to 90% 4 (very good)
C = 67 to 78% 3 (good)
D = 55 to 66% 2 (sufficient)
F = 0 to 54% 1 (insufficient)

Compulsory literature:	Green Chemistry, Theory and Practice, Paul T. Anastas, John C. Warner, OxfordUniversity Press, 1998. Green Organic Chemistry: Strategies, Tools, and Laboratory Experiments,"Kenneth M. Doxsee, James E. Hutchison, Brooks/Cole, ISBN: 0-759-31418-7 (2004). Interna skripta/prezentacije (A. Ivanković)
Additional literature:	Green Chemistry at Work: Product can be made from Glucose Insted of Benzene, J. Frost , EPA Journal **20** (3) 1994, 22

	Environmental Education from an Industrial Perspective, J. C.- Tully, ACS Preprints, Division of Environmental Chemistry 34, 1994 No 2, 203 Pollution Prevention in the Organic And Inorganic Chemistry Laboratory: Microscale Approach, M M Singh et al, *ASC Preprints, Division of Environmental Chemistry*, 1994,
Additional information on course:	

<table>
<tr><td>Course title</td><td colspan="3">OIL AND FATS TECHNOLOGY</td><td>Course code</td><td>MB212</td></tr>
<tr><td>Study program Cycle</td><td colspan="3">Food technology, course Food engineering, II</td><td>Study year</td><td>2</td></tr>
<tr><td>ECTS point value:</td><td>6</td><td>Semester</td><td>III</td><td>Hours per semester (L+T+S)</td><td>3+2+0 (45+30+0)</td></tr>
<tr><td>Course status:</td><td>elective A</td><td>Prerequisites:</td><td></td><td>Comparative conditions:</td><td></td></tr>
<tr><td>Course access:</td><td colspan="3"></td><td>Class schedule:</td><td></td></tr>
<tr><td colspan="2">Course teacher:</td><td colspan="4">prof.dr.sc. Tihomir Moslavac</td></tr>
<tr><td colspan="2">Contact hours/consultations:</td><td colspan="4">Students will be informed about the dates of consultations in lectures, exercises and via e-mail.</td></tr>
<tr><td colspan="2">E-mail and phone number:</td><td colspan="4">Tihomir.Moslavac@ptfos.hr +385 31 224 313</td></tr>
<tr><td colspan="2">Assistant</td><td colspan="4">Ivana Bošnjak</td></tr>
<tr><td colspan="2">Contact hours/consultations:</td><td colspan="4">-</td></tr>
<tr><td colspan="2">E-mail and phone number:</td><td colspan="4">ivana.ivankovic777@gmail.com</td></tr>
<tr><td>Course objectives:</td><td colspan="5">Upgrading specific knowledge gained from natural sciences and engineering that enables students to understand the technology of producing vegetable oils and animal fats by processing different raw materials (vegetable, animal). Through the course students, acquire the necessary knowledge about the preparation and storage of oilseeds, the management of the processes of production and storage of edible oils and fats, types of spoilage, oxidation stability, as well as their application in certain branches of the food industry. Develop work to improve existing and develop new technologies and food products based on oils and oilseeds. Acquiring knowledge and understanding of the process of modifying edible vegetable oils and the chemical reactions that take place in these processes.
Through the work in the laboratory, enable training in the production of vegetable oils and the introduction of standard methods for the identification of oils and fats, methods for assessing the quality of edible oils, fats and raw materials for their production.</td></tr>
<tr><td>Learning outcomes (general and specific competences):</td><td colspan="5">After completing this course, students will be able to:

Clarify the importance of oils and fats in the diet.
Analyze the chemical composition and properties of oils and fats.
Differentiate the criteria for evaluation of oil raw materials.
Know the importance of oilseed storage.
Explain the preparation of raw materials for processing and their impact on oil quality.
Differentiate the technological process of production of crude oils (pressing, extraction, devices, and schemes).
Define and apply the process of refining crude vegetable oils (chemical, physical).
Define the process of fatty tissue processing of terrestrial animals and the production of fish oils.</td></tr>
</table>

	Apply adequate storage for oils and fats and their stabilization (antioxidants, synergists). Analyze the application of by-products of the oil industry (lecithin, cake, and shotgun). Identify the processes and causes of oil and fat deterioration. Apply analytical methods to evaluate the degree of oxidation of oils and determine the viability of oils and fats. Define and distinguish between the production of unrefined and cold-pressed vegetable oils and their quality control. Describe and guide the processes of oil modification and the technology of application of edible oils (margarine, mayonnaise, salad dressing, spread and butter of various oilseeds).
Content of the syllabus/performance plan (in short):	The importance of oils and fats in the diet. Trends in production and consumption of oils and fats. Oil and fat composition. Properties of oils and fats (chemical, physical). Raw materials for oil and fat production (division, chemical composition). Preparation of oilseeds for storage. Oilseed storage conditions. Preparation of raw materials for processing. Processing of seeds, pits, fruits, and production of vegetable oils. Production of crude oil by pressing (pre-press, final press, cold press). Production of crude oil by extraction with organic solvent. Crude oil refining (chemical, physical). Oil refining by-products (lecithin, cake, shotgun). Production of animal fat. Oil and fat stabilization. Packaging. Storage and transportation of oils and fats. Types of oil and fat deterioration. Determination of oxidation stability of oils and fats. Modification of vegetable oils (hydrogenation, interesterification, fractionation). Production of various types of oils: sunflower oil, soybean oil, olive oil, etc. Products and technology of application of edible vegetable oils (margarine, mayonnaise, shortening). Legislation. Exercises: Analytical methods in oil and fat technology. Methods for testing the quality of oils and fats. Property determination methods for the identification of oils and fats. Degree of oxidation of oils and fats. The deterioration and sustainability of oils and fats. Laboratory technological exercises: production of crude oil by pressing and extraction, oil deglutination, neutralization, bleaching, winterization). Production of mayonnaise and salad dressing. Rheological properties of vegetable oils, fats and products.

Evaluation in detail within European Credit Transfer System
(Example)

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and activity in classroom	75	2,5	0%
Midterm (2) or Written exams	60	2	70%
Oral exam	45	1,5	30%
TOTAL	180	6	100%

Additional clarification:
According to the Rulebook on studying, the final grade is obtained as follows:

A = 91-100% 5 (excellent) B = 79 to 90% 4 (very good) C = 67 to 78% 3 (good) D = 55 to 66% 2 (sufficient) F = 0 to 54% 1 (insufficient)	
Compulsory literature:	1. D. Swern: Industrijski proizvodi ulja i masti po Baileyju, Znanje, Zagreb, 1972. 2. S. Čorbo: Tehnologija ulja i masti, Poljoprivredno-prehrambeni fakultet Univerziteta u Sarajevu, 2008. 3. B.O.Matijašević, J.Turkulov: Tehnologija ulja i masti, Univerzitet u Novom Sadu, Tehnološki fakultet, Novi Sad, 1980. 4. O. Koprivnjak: Djevičansko maslinovo ulje: od masline do stola, MIH, Poreč, 2006. 5. D. Rade, Ž. Mokrovčak, D. Štrucelj: Priručnik za vježbe iz kemije i tehnologije lipida, Durieux, Zagreb, 2001.
Additional literature:	1. F. Shahidi: Bailey´s industrial oil and fat product, Sixth Edition, Volume 1-6, Edible Oil and Fat Product, Wiley-Interscience, A John Wiley & Sons, Inc., Publication, 2005. 2. W. Hamm, R.J. Hamilton: Edible Oil Processing, Sheffield Academic Press, 2000. 3. D.F.Gunstone: Vegetable Oils in Food Technology: Composition, Properties and Uses, C.H.I.P.S., 2002.

Course title	**MEAT AND FISH TECHNOLOGY**				**Course code**	
Study program Cycle	Food technology course Food engineering, II				**Study year**	II
ECTS point value:	**6**	*Semester*	III		Hours per semester (L+T+S)	45L+30T
Course status:		*Prerequisites:*	Ne	*Comparative conditions:*		Ne
Course access:	Students enrolled in module			*Class schedule:*		web
Course teacher:	Doc.dr.sc. Jozo Grbavac					
Contact hours/consultations:	6					
E-mail and phone number:	grbavacj@yahoo.com					
Assistant	Leona Puljić, dipl. ing.					
Contact hours/consultations:	6					
E-mail and phone number:	leona.puljic@aptf.sum.ba ; 036/ 337-129					
Course objectives:	The objectives of this course are: The module introduces the characteristics of meat and fish, post-mortem changes and all stages of industrial processing. The fact that consumers nowadays require as much food information as possible, as little processed foods, biologically as valuable foods, we appreciate that students will acquire basic knowledge about meat and fish and meat and fish products.					
Learning outcomes (general and specific competences):	After completing this course, students will be able to: Define meat and fish products and state legal regulations related to the production of meat and fish products. List and describe methods of preserving meat and fish. Define (in accordance with legal regulations) the systematization of meat and fish products and list individual products. Describe technological processes and devices for the production and preservation of certain meat and fish products (according to systematization). Provide processing options for offal by-products and offal. List and describe veterinary health surveillance in the meat and fish processing industry. List and describe the latest developments in meat and fish packaging.					
Content of the syllabus/performance plan (in short):	lectures: The concept of meat. Slaughterhouses and their importance in the technology of slaughtering and processing livestock for slaughter. Slaughtering and slaughtering of livestock for slaughter. Structure and chemical composition of meat. Carcass quality on the slaughter line. Meat cooling, meat freezing and industrial meat cutting. Meat ripening. Brewing meat. Preserving meat; salting, brining, smoking, drying and thermal preserving of meat. Other methods of preserving meat. Preferred micro flora in meat processing. Machines and equipment in meat technology. Additives and spices in meat processing. Systematization of meat products. Sausage products. Delicatessen. Canned meat. Meat and meat products. Processing of					

	meat by-products. Technological computing in meat technology. Structure and chemical composition of fish. Industrial fishing and fishing gear. Procedure with fish after fishing. Nutritional value of fish, crustaceans and mollusks. Spoilage of fish. Basic raw materials and additives for the production of fish products. Methods of preserving fish. Systematization of fish products. Veterinary and health surveillance in the meat and fish processing industry (ISO standards and HACCP). Achievements in meat and fish packaging. Legislation in meat and fish technology. Meat and fish packaging and packaging. exercises: Fieldwork - a visit to the meat or fish processing industry. Development of technological schemes with norms and technological account for individual meat or fish products. Laboratory exercises - determination of physical, chemical and organoleptic properties of meat and fish.

Evaluation in detail within European Credit Transfer System
(Example)

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and activity in classroom	75	2,5	0%
Midterm or written exam	60	2	50%
Oral exam	45	1,5	50%
TOTAL	180	6	100%

Additional clarification: In order to take the final exam, students are required to attend 80% of class hours and 100% of class hours. Students can choose whether to take the final exam in writing or orally.
The final exam is assessed in the following ways:

less than 50% correct answers = 0% marks
from 51% to 60% = up to 10% of grade
from 61% to 70% = up to 20% of grade
from 71% to 80% = up to 30% of grade
from 81% to 90% = up to 40% of grade
from 91% to 100% = up to 50% of grade

According to the Rulebook on studying, the final grade is obtained as follows:
A = 91-100% 5 (excellent)
B = 79 to 90% 4 (very good)
C = 67 to 78% 3 (good)
D = 55 to 66% 2 (sufficient)
F = 0 to 54% 1 (insufficient)

Compulsory literature:	1. Kovačević, D. (2001) Kemija i tehnologija mesa i ribe, Sveučilište J.J. Strossmayera, Prehrambeno-tehnološki fakultet, Osijek.

	2. Pearson, M., Dutson, R. (1996): HACCP in Meat, Poultry and Fish Processing. Blackie Academic & Professionals (Vol. 10). 3. Živković, J. (1986) Higijena i tehnologija mesa II dio. – Kakvoća i prerada, Udžbenici Sveučilište u Zagrebu, Tipografija, Đakovo.
Additional literature:	1. Pearson, A.M. (1985) Advances in meat research, Avi INC. Westport, Conneticut. 2. Milišić, N. (2003) Sva riba Jadranskog mora,Marjan tisak, Split.

Course title	**TECHNOLOGY OF MILK AND DAIRY PRODUCTS**				**Course code**	
Study program Cycle	Food technology course Food engineering, II				**Study year**	II
ECTS point value:	**6**	*Semester*	III		Hours per semester (L+T+S)	45L+30T
Course status:	obligatory	*Prerequisites:*	No	*Comparative conditions:*		No
Course access:	Students enrolled in the course			*Class schedule:*		According to the advertised terms on the bulletin board and web portal
Course teacher:	Doc.dr.sc. Marija Jukić Grbavac					
Contact hours/consultations:	6					
E-mail and phone number:	jgmarija@gmail.com					
Assistant	Leona Puljić, dipl. ing.					
Contact hours/consultations:	6					
E-mail and phone number:	leonapuljic224@gmail.com ; 036/ 337-129					
Course objectives:	The composition, properties, nutritional value and differences of the main types of milk studied. Methods and efficiency of mechanical, thermal and membrane processing of milk in the production of pasteurized and sterilized milk and powdered milk. Milk fermentation with mesophilic, thermophilic and therapeutic bacterial cultures and mixed cultures of bacteria, yeasts and molds. Influence of technological processes of production on the characteristics of fermented milk and cream. The role of probiotics and prebiotics in fermented products. Food and health value of fermented milk. Cheese division. Milking methods. The role of microbial cultures and other supplements in milk for cheese production. Technological procedures for the production of certain types of cheese. Conditions and care of cheeses during ripening. Biochemical processes during primary and secondary ripening, ways to protect cheeses and possible defects. Composition and nutrition value of cheese, whey, and the possibility of processing whey. Production of butter and ice cream. Veterinary and sanitary measures and controls in milk processing. HACCP and quality assurance, as well as milk processing safety. Milk processing facilities. Legislation in the field of milk and dairy technology.					

Learning outcomes (general and specific competences):	After attending and passing this course, students will know / be able to: -Define the differences and recognize the benefits of certain types of milk; -Explain the effectiveness of mechanical, thermal and membrane processing of milk or whey during the production of traditional and new functional dairy products; -Choose optimal microbial culture, rennet and other functional supplements in dairy; -Analyze the impact of technology, biochemistry or microbiology on the composition and quality of certain dairy products; -Define the nutritional and health value of dairy products; -Recognize the technological processes of some dairy products in the industry; -Analyze milk and dairy products in the laboratory.
Content of the syllabus/performance plan (in short):	Improvement of the technology of production of milk and fermented dairy products. Types and forms of dairy cultures. Therapeutic properties of bio fermented milk. The role of supplements in milk for fermentation. Nutritional and health value of functional fermented dairy products. Fermentation of goat's milk. Possibilities of using newer technologies for milk processing for cheeses. The role of new Rennet preparations, traditional and probiotic microbial cultures and other functional additives in the production of cheeses. Application of continuous lines in the production of certain types of cheeses. Benefits of applying alternative, non-thermal methods of processing, as well as the processing of whey into the production of functional whey products. Functional and biological value of whey protein, isolation methods and application possibilities.

Evaluation in detail within European Credit Transfer System
(Example)

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and activity in classroom	75	2,5	
Seminar paper	30	1	20%
Midterm (2) or Written exams	45	1,5	60%
Oral exam	30	1	20%
TOTAL	180	6	100%

Additional clarification:

According to the Rulebook on studying, the final grade is obtained as follows:
A = 91-100% 5 (excellent)
B = 79 to 90% 4 (very good)
C = 67 to 78% 3 (good)
D = 55 to 66% 2 (sufficient)
F = 0 to 54% 1 (insufficient)

Compulsory literature:	- Tratnik, Lj., Božanić, R.: *Mlijeko i mliječni proizvodi*, Hrvatska mljekarska udruga, Zagreb, (2012) - D. Samaržija (2015) *Fermentitana mlijeka*.

	Hrvatska mljekarska udruga, Zagreb - Barukčić, Irena; Božanić, Rajka; Kalit, Samir; Lisak Jakopović, Katarina; Magdić, Višnja; Matijević, Bojan; Perko, Bogdan; Rogelj, Irena; Stručić, Danijela. *Sirarstvo u teoriji i praksi* . Karlovac : Veleučilište u Karlovcu, 2015 (priručnik). - Gregurek, Ljerka: Proizvodnja sireva-teorija i praksa. Probiotik, Zagreb, 2016. - Havranek, Kalit, Antunac, Samardžija:Sirarstvo, Hrvatska mljekarska udruga, Zagreb,2014. - Sabadoš,Dimitrije: Kontrola i ocjenjivanje kakvoće mlijeka i mliječnih proizvoda. Hrvatsko mljekarsko društvo,Zagreb,1996.

Additional literature:	- Bylund, G: *Dairy processing handbook*, Tetra-Pak, Processing Systems AB, Lund, Sweeden, (1995) ili **CD** - Fox, P. F.(Ed.): *Chesse: Chemistry, Physics and Microbiology*, (Vol. 1. i 2.) Chapman and Hall, (1993.) - Early, R.: *The technology of dairy products*, Blackie Academic and Professional, London, (1998.) - Robinson, R. K.: *Dairy Microbiology Handbook* , Ed. III. John Wiley and Sons., Inc., New Jork, (2002.) - *Encyclopedia of Dairy Science*, Academic Press, (Vol. 1.- 5.), Animprint of Elsevier Science, London, (2oo3) - Goff, D.: *Dairy Science and Technology*. http://www.foodsci.uoguelph.ca/dairyedu/home.html

Course title	**MOLD AND BEER TECHNOLOGY**				**Course code**	
Study program Cycle	Food technology course Food engineering, II				**Study year**	II.
ECTS point value:	**6**	*Semester*	III		Hours per semester (L+T+S)	45+ 30+0
Course status:	elective	*Prerequisites:*	-	*Comparative conditions:*		-
Course access:				*Class schedule:*		
Course teacher:	Anita Jurić					
Contact hours/consultations:						
E-mail and phone number:	ajuric2@googlemail.com					
Assistant						
Contact hours/consultations:						
E-mail and phone number:						
Course objectives:	The objectives of this course are to familiarize students with the basics of the sweetening process and the basics of the brewing process, as well as the quality control of barley, malt and beer.					
Learning outcomes (general and specific competences):	After completing this course, students will be able to: - Define the terms barley, malt, hops, unsweetened cereals, brewer's yeast, water, beer, waste streams in the brewing industry (waste water, beer trope, waste yeast) - List and distinguish barley varieties, types of hop preparations, types of brewer's yeast - List and distinguish types of beer, and explain the basic characteristics of the basic types of beer - List the main constituents of barley grain and explain their role - Explain the sweetening process and explain what happens to the morphology and chemical composition of the barley grain during each sweetening phase - Define and explain the quality parameters of barley and malt - Explain the basic technological stages of beer production from receiving raw material at the brewery to transporting the finished product - Explain the characteristics of the infusion and decoction procedure - Explain and analyze the fermentation process, the way fermenters work - List and explain the by-products of alcoholic fermentation - Explain and analyze the brewing, maturing and finishing procedures of beer - Indicate the types of packaging, distinguish the advantages					

	and disadvantages of individual packaging - Explain the sensory properties of beer - State the basics of beer marketing - Clarify existing and advanced technologies for processing waste streams of the brewing industry
Content of the syllabus/performance plan (in short):	Classes will take the form of lectures, laboratory exercises and fieldwork as part of which students will visit an industrial facility (Herzegovinian Brewery).

Evaluation in detail within European Credit Transfer System
(Example)

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and activity in classroom	75	2,5	10%
Seminar paper	30	1	10%
Midterm (2) or Written exams	45	1,5	60%
Oral exam	30	1	20%
TOTAL	180	6	100%

Additional clarification:

According to the Rulebook on studying, the final grade is obtained as follows:
A = 91-100% 5 (excellent)
B = 79 to 90% 4 (very good)
C = 67 to 78% 3 (good)
D = 55 to 66% 2 (sufficient)
F = 0 to 54% 1 (insufficient)

Compulsory literature:	Marić V.: Tehnologijapiva (2009.). Veleučilište u Karlovcu. Marić V.: Biotehnologijaisirovine (2000). Stručnaiposlovnaknjiga, Zagreb. Kunze W.: Technology Brewing and Malting (1999). VLB Berlin.
Additional literature:	-

Course title	**FLOUR PRODUCTION AND PROCESSING TECHNOLOGY**				**Course code**	
Study program Cycle	Food technology course Food engineering, II				**Study year**	2.
ECTS point value:	**6**	*Semester*	3		Hours per semester (L+T+S)	45+30+0
Course status:	elective	*Prerequisites:*	-	*Comparative conditions:*		-
Course access:				*Class schedule:*		-
Course teacher:	izv. prof. dr. sc. Marko Jukić					
Contact hours/consultations:	2 h per week					
E-mail and phone number:	marko.jukic@ptfos.hr; +385 31 224 308					
Assistant						
Contact hours/consultations:						
E-mail and phone number:						
Course objectives:	The objectives of this course are: to introduce the student to modern technologies and problems in the production and processing of flour and to enable him / her to apply the acquired knowledge in production facilities as a precondition for standardization of quality and improvement of the technology of production of products based on cereals, as well as the application of the latest technological achievements in production.					
Learning outcomes (general and specific competences):	After completing this course, students will be able to: • state the chemical composition of wheat and describe the importance of individual components in the evaluation of the technological quality of the grain • Explain the technological process of preparing, storing and grinding grain • define baking properties and describe rheological properties of flour • describe the role of certain raw materials and additives in the production of bakery, biscuit and pasta products • describe the basic stages of technological processes for the production of bakery, biscuit and pastry products • Explain biochemical and physicochemical changes during the process of production of flour products • Classify and describe different bakery, biscuit and pastry products • Apply physicochemical methods for testing flour and dough and finished products					
Content of the syllabus/performance plan (in short):	Lectures: Chemical composition and importance of individual components in the evaluation of technological grain quality. Flour storage and production. Rheological properties of dough and baking quality of flour. Technological procedures for bread and pastry production. Quality assessment, transportation, packaging and storage of bakery products. Raw materials, operations and processes in pasta production technology and biscuit and wafer production technology. Exercises: Physic-chemical testing of flour and dough and finished					

	products.

Evaluation in detail within European Credit Transfer System

STUDENT OBLIGATIONS	LESSON HOURS (ASSESSMENT)	ECTS	GRADE
Class attendance and activity in classroom	75	2,5	0%
Seminar paper	30	1	10%
Midterm (2) or Oral exam	75	2,5	90%
TOTAL	180	6	100%

Additional clarification:
The student must complete 70% of the class schedule and 100% of the class schedule in order to be eligible for the signature in the index.
During the semester, two colloquiums and one corrective colloquium written. The colloquium is optional. A student at a remedial colloquium may repeat only one of two colloquiums. Students who have scored more than 55% of the possible credits at each individual exam are exempt from the final exam. Seminar paper made in the form of presentation and oral presentation. Seminar work is optional. The percentages of points obtained from both tests (max. 90% of the grade) summed up with the points obtained through the seminar presentation (max. 10% of the grade).
The final Oral exam is compulsory for students who have not taken the course through a midterm exam.

According to the Rulebook on studying, the final grade is obtained as follows:
A = 91-100% 5 (excellent)
B = 79 to 90% 4 (very good)
C = 67 to 78% 3 (good)
D = 55 to 66% 2 (sufficient)
F = 0 to 54% 1 (insufficient)

Compulsory literature:	1. Interni nastavni materijali s predavanja 2. C. R. Reed: Managing stored grain. American Association of Cereal Chemists, St. Paul, Minnesota, 2006. 3. S. Kljusurić: Uvod u tehnologiju mljevenja pšenice. Prehrambeno tehnološki fakultet Sveučilišta Josipa Jurja Strossmayer-a u Osijeku, Osijek, 2000. 4. E. S. Posner, A.N. Hibbs: Wheat Flour Milling. American Association of Cereal Chemists, Inc. St. Paul, Minnesota, U.S.D. 1997. 5. Y. Pomeranz: Wheat: Chemistry and Technology. Volumen I i II. American Association of Cereal Chemists, St. Paul, Minnesota, 1988. 6. J. E. Kruger and R.B. Matsuo: Pasta and Noodle Technology, American Association of Cereal Chemists, St. Paul, Minnesota, 1996.
Additional literature:	1. R. Lásztity: Cereal Chemistry, Akadémiai Kiado, Budapest, Hungary, 1999. 2. S. A. Matz: Bakery Technology: Packaging, Nutrition, Product

	Development, Quality Assurance. Elsevier Science Publishers, Essex, U.K., 1989. 3. G. Fabriano, C. Lintas: Durum Wheat: Chemistry and Technology. American Association of Cereal Chemists, St. Paul, Minnesota, 1988. 4. P. Sluimer: Principles of Breadmaking Functionality of Raw Materials and Process Steps, American Association of Cereal Chemists, St. Paul, Minnesota, 2005.

Course title	**MEDICINAL AND AROMATIC PLANTS - biology and processing**				**Course code**	
Study program Cycle	Food technology course Food engineering, II				**Study year**	
ECTS point value:	**3**	*Semester*			Hours per semester (L+T+S)	15+15
Course status:	elective	*Prerequisites:*		*Comparative conditions:*		
Course access:				*Class schedule:*		
Course teacher:	prof.dr.sc. Stjepan Pliestić, prof. .dr.sc. Danijela Petrović					
Contact hours/consultations:	Accoording to agreement					
E-mail and phone number:	Danijela.petrovic@aptf.sum.ba / spliestic@agr.hr					
Assistant						
Contact hours/consultations:						
E-mail and phone number:						
Course objectives:	The objectives of this course are: Introduce students to the biology and ecology of medicinal and aromatic plants					
Learning outcomes (general and specific competences):	After completing this course, students will be able to: List and describe medicinal and aromatic herbs and group them according to their medicinal properties Recognize medicinal and aromatic plants in natural habitats Select and apply a specific model of production technology depending on the main characteristics of the species, medium of cultivation and agro-ecological factors Identify diseases and pests of medicinal and spice plants and implement measures for their control Manage the process of production, finishing and processing and finalization of products Predict product yields and volumes and select product markets					

Evaluation in detail within European Credit Transfer System
(Example)

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and activity	30	1	-
Midterm (2) or Written exams	30	1	60%
Oral exam	30	1	40%
TOTAL	90	3	100%

According to the Rulebook on studying, the final grade is obtained as follows:
A = 91-100% 5 (excellent)
B = 79 to 90% 4 (very good)
C = 67 to 78% 3 (good)

D = 55 to 66% 2 (sufficient) F = 0 to 54% 1 (insufficient)	
Compulsory literature:	Parađiković, N. (2014): Ljekovito i začinsko bilje – online interna skripta, Poljoprivredni fakultet u Osijeku. Pliestić, S. (2018.): Strojevi, uređaji i oprema u doradi i preradi ljekovitog i aromatičnog bilja, Priručnik XIV. dopunjeno izdanje, Pučko otvoreno učilište (POU) Samobor. Toplak Galle, K. (2009): Domaće ljekovito bilje, Mladinska knjiga Založba, Ljubljana. Šilješ, I., Grozdanić, Đ., Grgesina, I. (1992.): Poznavanje, uzgoj i prerada ljekovitog bilja. Školska knjiga. Zagreb
Additional literature:	Kišgeci, J. (2005): Lekovite i aromatične biljke, Partenon, Beograd. Leung, Y., Albert (1984.): Chinese herbal remedies. Universe books. Ney York. Foster, S. i Chongxi, Y. (1992): Herbal Emissaries – bringign chinese herbs to the west. USA. Perry, H. R.; Green, D. (1997.): Perry's Chemical Engineers' Handbook, 6th ed. (2nd printing), Published by McGraw Hill Book Company, New York, USA, 1997.

Course title	**WINE SENSORY AND ANALYTICS**				**Course code**	
Study program Cycle	Food technology, course Food engineering, II				**Study year**	II.
ECTS point value:	3	*Semester*	III.		Hours per semester (L+T+S)	15 + 15
Course status:	elective	*Prerequisites:*	-	*Comparative conditions:*		
Course access:				*Class schedule:*		
Course teacher:	doc. dr. sc. Tihomir Prusina					
Contact hours/consultations:	According the agreement					
E-mail and phone number:	tiho@vinarija-citluk.ba mob.: 063 313 952					
Assistant	Kristian Raguž					
Contact hours/consultations:	According the agreement					
E-mail and phone number:	kristian.raguz@gmail.com mob.: 063 216 280					
Course objectives:	Through this course, students will acquire the necessary theoretical knowledge of the senses, sensory properties and the proper way to evaluate and describe wine. In this way, they will be able to properly monitor and evaluate their production, as well as participate in the work of expert commissions for sensory evaluation. Introduction to the basics of instrumental methods of analysis, with special emphasis on the application of the same in the analysis of wine ingredients.					
Learning outcomes (general and specific competences):	- clarify the basic methods of wine evaluation and description, - demonstrate ways of evaluating wine, - apply wine evaluation and evaluation methods.					
Content of the syllabus/performance plan (in short):	Experiences of wine sensing, description, terminology and how we describe sensory wine. Characteristics and description of the clarity and color of the wine. Characteristics and aroma description, types of aromas and their intensity, fineness and persistence of aroma of wine. The taste of the wine, the components that form the taste of the wine, the harmony of the taste between the individual constituents of the wine, the retronasal taste. Familiarity with the methods of scoring wine. Checklists and wine rating techniques. Comparison Systems: Ranking, Pairing, Two-Three Test, Triple Test. Tasting Test Methods. Recognizing healthy wines in relation to defective aromas and flavors of wine. Tasting and describing white, red and rose wines, young, mature and archival wines, predicate, special and sparkling wines. Tasting and description of wines from B&H with emphasis on wines of autochthonous Žilavka					

	and Blatina varieties. Guided tastings. Physic-chemical analyzes of musts and wines. Instrumental analyzes of the sensory properties of wine with emphasis on gas, liquid chromatography and spectrophotometry.

Evaluation in detail within European Credit Transfer System

STUDENT OBLIGATIONS	LESSON HOURS (ASSESSMENT)	ECTS	GRADE
Class attendance and activity	**30**	**1**	
Midterm or written exam	**30**	**1**	**50%**
Oral exam	**30**	**1**	**50%**
TOTAL		**3**	**100%**

he final exam is graded as follows
less than 50% correct answers = 0% marks
from 51% to 60% = up to 6% of grade
from 61% to 70% = up to 12% of grade
from 71% to 80% = up to 18% of grade
from 81% to 90% = up to 24% of grade
from 91% to 100% = up to 30% of grade
According to the Rules of Evaluation, the final grade is obtained as follows:
A = 90 − 100% 5 (excellent)
B = 80 − 89,9% 4 (very good)
C = 70 − 79,9% 3 (good)
D = 60 − 69,9% 2 (sufficient)
E = 50 − 59,9% 1 (insufficient)

Compulsory literature:	1. Sokolić, I., (2002): Tek i slast vina, Novi Vinodolski: vlastita naklada. 2. Meilgaard, M., Vance Civille, G., Carr, B.T. (1999): Sensory Evaluation techniques. CRC Press, Boca aton, FA. USA. 3. Skoog, D. A., West, D. M., Holler, F. J. (1999): Osnove analitičke kemije, Školska knjiga, Zagreb. 4. Pine, S. H. (1994): Organska kemija, Školska knjiga, Zagreb.
Additional literature:	1. Ubligi, M., (1998): I profilli del vino. Introduzione all'analisi sensoriale. Edagricole, Bologna. 2. Pagliarini, E. (2002): Valutazione Sensoriale, Hoepli Editore SpA, Milano. Italia 3. Kellner, R. A., Mermet, J. M., Otto, M, Widmer, H. M. (1998): Analytical Chemistry, Verlag Chemie, Weinheim. 4. Heftman, E. (1992): Chromatography, Part A: Fudamentals and Techniques, Journal of Chromatography Library, Vol. 51A, Elsevier,

	Amsterdam.
Additional information on course:	Classes are taught within lectures and exercises. The lectures give theoretical basics of descriptive and scoring tastings. The exercises aim to equip students to properly describe and evaluate wine. The student's knowledge is tested by monitoring the work through exercises and at the oral exam.

Course title	**FOOD ADDITIVES**			**Course code**	MB
Study program Cycle	Food technology course Food engineering, II			**Study year**	2
ECTS point value:	**3**	*Semester*	III	Hours per semester (L+T+S)	1+1+0 (15+15+0)
Course status:	elective	*Prerequisites:*	-	*Comparative conditions:*	-
Course access:	Students who have enrolled in the course			*Class schedule:*	According to advertised bulletin board and website terms

Course teacher:	prof. dr. sc. Drago Šubarić
Course associate / teacher	doc. dr. sc. Antun Jozinović
Contact hours / consultations:	Students will be informed about the dates of the consultation at lectures, exercises and e-mail.
E-mail and phone number:	drago.subaric@ptfos.hr +385 31 224 312
Assistant	doc. dr. sc. Antun Jozinović
Contact hours / consultations:	Students will be informed about the dates of the consultation at lectures, exercises and e-mail.
E-mail and phone number:	ajozinovic@ptfos.hr +385 31 224 336
Course objectives:	he objectives of this course are: The aim of the course is to deepen the knowledge about additives in food production, impact on product quality and consumer health. Particular attention paid to the interaction of food constituents and additives and the legislation regarding the use of additives in food production.
Learning outcomes (general and specific competences):	After completing this course, students will be able to: • Clarify and apply current European and world regulations on food additives, • classify additives into individual groups, • link the interaction of additives with food ingredients and the application of additives in production.
Content of the syllabus/performance plan (in short):	Food Additives. Legislation regarding the use of additives in food production (in our country and in the world). Classification and physicochemical properties of particular groups of food additives (preservatives, stabilizers, emulsifiers, thickeners, gelling agents, colors, flavors, antioxidants, sweeteners, flavor enhancers, acids and alkalis, enzymatic preparations, auxiliaries in food production…). Reaction with food ingredients. Perspectives on the application of additives in food production. Seminar: Additives in the production of certain products. Industrial exercises.

Evaluation in detail within European Credit Transfer System			
STUDENT	**LESSON HOURS**	**ECTS**	**GRADE**

OBLIGATIONS	**(ASSESSMENT)**		
Class attendance and activity in classroom	30	1	
Seminar paper	15	0,5	20%
Midterm (2) or Written exams	30	1	60%
Oral exam	15	0,5	20%
TOTAL	90	3	100%

Additional clarification:
The student must complete 70% of the class schedule and 100% of the class schedule in order to qualify for the signature in the index and for the exams, i.e. the final written exams. Assessment: A midterm exam is optional. Exit to II. The colloquium is not conditional on taking the I colloquium. Students have the right to go to one of the corrective tests, where they can take or improve their grades I or II. Exit to the corrective exam conditioned by passing the 1st or 2nd. Colloquium. If the student passed both tests (and is satisfied by the Total grade) the final exam released - the total grade in this case the arithmetic mean of the grades of both tests. The final exam (consisting of the written part) is compulsory for students who have not taken the course through a midterm exam. The final grade includes the results of the midterm or final written, engagement during the class, and evaluation of the seminar paper.

According to the Rulebook on studying, the final grade is obtained as follows:
A = 91-100% 5 (excellent)
B = 79 to 90% 4 (very good)
C = 67 to 78% 3 (good)
D = 55 to 66% 2 (sufficient)
F = 0 to 54% 1 (insufficient)

Compulsory literature:	1. Baltes W: Lebensmittelchemie. Springer Verlag, Berlin, Heidelberg, New York, 2000. 2. Fennema OR: Food Chemistry. Marcel Dekker, Inc., New York, Basel, Hong Kong, 1996. 3. AOAC: Food Additives (Collection of Analytical Methods for Food Additives), AOAC International, Arlington, USA, 1993. 4. Food Additives in the European Union (propisi). 5. Pravilnici 6. Branen AL, Davidson PM, Salminen S, Thorngate JH III. Food additives, 2nd Ed. Marcel-Dekker, New York, SAD, 2001. Dostupno na: ariefm.lecture.ub.ac.id/.../A._Larry_Branen_P._Michael_Davidson_Sepp... [10. 2. 2015.]
Additional literature:	1. Znanstveni i stručni časopisi

Course title	**NUTRITION AND HEALTH**				**Course code**	SAN026
Study program Cycle	Food technology course Food engineering, II				**Study year**	2
ECTS point value:	**3**	*Semester*	IV		Hours per semester (L+T+S)	15P/15S/
Course status:	elective	*Prerequisites:*	no	*Comparative conditions:*		no
Course access:	Year 2 students studying Sanitary Engineering at the Faculty of Health Studies			*Class schedule:*		schedule

Course teacher:	prof. dr. sc. Ivan Vasilj
Contact hours/consultations:	According the agreement
E-mail and phone number:	ivan.vasilj@sve-mo.ba
Assistant	
Contact hours/consultations:	
E-mail and phone number:	

Course objectives:	The objectives of this course are: Scientific research has shown that the importance of nutrition is important for growth and development in the early stages of life and in later stages of life in the prevention of disease. It is therefore important for students to become familiar with these issues in order to pass on this knowledge to future generations.
Learning outcomes (general and specific competences):	To clarify the role and importance of diet hygiene in relation to health and disease, Clarify the role and importance of nutrients and the principles of proper nutrition planning, Describe the characteristics of the facilities for the production and marketing of foodstuffs, and of the supervision and control of the employee.
Content of the syllabus/performance plan (in short):	Anatomy of the digestive system. Methods for determining nutritional status Vitamins, minerals, fats and proteins. Physiological needs for water and electrolytes. Hygiene of meat and fruits Food Contamination. Diseases of inadequate nutrition. Preparation of food.

Evaluation in detail within European Credit Transfer System

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and activity in classroom	30	1	0%
Seminar paper	30	1	0,5%

Midterm or written exam or Written exams	30	1	95%
TOTAL	90	3	100%

Additional clarification:
The lectures were obliged for the students because the attendance records are kept. In order to get a signature, students must attend at least 80% of lectures, seminars and 100% of exercises. In case of insufficient number of students, students not allowed to sign and are obliged to enroll again next year. Students who have accumulated a sufficient number of credits during the class are required to register for the exam via ISS.
The rules of study are given the final grade as follows:
A = 91-100% 5 (excellent)
B = 79 to 90% 4 (very good)
C = 67 to 78% 3 (good)
D = 55 to 66% 2 (sufficient)
F = 0 to 54% 1 (insufficient)

Compulsory literature:	Ćatović S i sur. Higijena ishrane sa dijetetikom, Svjetlost Fojnica, 2000
Additional literature:	Matasović D. Hrana, prehrana i zdravlje, FOVIS Zagreb, 1992
Additional information on course:	Class attendance and activity: Students are required to attend classes, 20% of absentee hours are tolerated

Course title	**GMO IN FOOD PRODUCTION**				**Course code**	
Study program Cycle	Food technology course Food engineering, II				**Study year**	2
ECTS point value:	**3**	*Semester*		III	Hours per semester (L+T+S)	22+5+3
Course status:	elective	*Prerequisites:*			*Comparative conditions:*	
Course access:					*Class schedule:*	
Course teacher:	Jurica Primorac/Ana Mandić					
Contact hours/consultations:	arrange according the need					
E-mail and phone number:	jurica.primorac@aptf.sum.ba/ana.mandic@aptf.sum.ba					
Assistant						
Contact hours/consultations:						
E-mail and phone number:						

Course objectives:	The objectives of course are: To acquaint students with the application of biotechnology in plant breeding, basic examples of genetically modified (GM) organisms, their detection in raw materials and products, and legal legislation related to GM products.
Learning outcomes (general and specific competences):	After completing this course, students will be able to: - Argumentally discuss the importance of GM organisms in biotechnology and food production and the impact on human society as a whole - Discuss the reasons for plant breeding and doubts about the impact of GM plants on the environment and human and animal health - Discuss the terms GM product and GM food and, in the same context, the status of GM plants, GM animals and GM micro-organisms - Explain the basic concepts and guidelines of the Law on GM Organisms of B&H - list and explain methods of plant transformation - Give and explain specific examples of genetic modifications of individual plants - Explain the application and principle and advantages and disadvantages of methods for the detection and quantification of GMOs in raw materials and products
Content of the syllabus/performance plan (in short):	The module covers the basic biology behind the production of GM organisms. Examples of how various GM foods, including pharmaceuticals produced. Environmental, ethical and political topics related to the production of genetically modified food and medicines discussed, thereby providing a critical overview of the controversies associated with GM organisms. The legal legislation of Bosnia and Herzegovina related to GM organisms presented, as well as the methods used in the detection and quantification of GM organisms.

Evaluation in detail within European Credit Transfer System			
STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and activity in classroom	30	1	10%
Seminar paper	15	0,5	25%
Midterm (2) or Written exams	45	1,5	65%
TOTAL	90	3	100%

Additional clarification:
The final exam written. It consists of open-ended questions.
The seminar involves 3 hours in the classroom presenting and discussing 10 hours of independent work and exchange with the teacher via e-mail.

Attending and participating in classes
0% student does not attend class regularly is absent and uninterested
8% of students attend classes but do not participate
7.8% of students are full-time, follow and respond when a teacher addresses him, does not initiate questions or discuss
9% of students are full-time students, participate actively, ask questions
10% of the student is full-time, active, encourages discussion about teaching units and participates in discussion

The seminar conducted in small groups of two to five students. On a given topic, students write work with chapters: introduction, problem solving, conclusions and discussion, literature. They send the paper by e-mail to the teacher. The teacher reviews the work suggests corrections. The corrected work presented with a presentation in front of the teacher, students and interested listeners. After the presentation, the teacher and the students ask a few questions or ask for additional explanations.

0 - 13% spelling and grammar errors, copied without citation, student disregards suggestions 13 - 16% share of grade, working with spelling and grammar errors, partly corrected after suggestion, literature not well-cited, missing citations, students read on presentation 17 - 19 percent of grammar and spelling corrected, one or two sources used, presentation contains too much text 20 - 22% share of grade satisfactory, more than two sources used, students use foreign and domestic literature, short presentation accompanied by photographs and drawings, no clear conclusions 23 - 25% share of grade written well written without misspellings, grammar, students use foreign and domestic literature, short presentation accompanied by photographs and drawings and graphs, clear conclusions, students respond with understanding
The written exam consists of 10 questions each carrying up to 10 points. A minimum of 55 points or 55% is required for passing.
55-66 points is up to 43% mark
67 - 78 points is up to 51% mark
79-90 points is up to 59% mark
90 - 100 points is up to 65% mark

According to the Rulebook on studying, the final grade is obtained as follows:
A = 91-100% 5 (excellent)

B = 79 to 90% 4 (very good) C = 67 to 78% 3 (good) D = 55 to 66% 2 (sufficient) F = 0 to 54% 1 (insufficient)	
Compulsory literature:	1. Predavanja i PowerPoint prezentacija 2. Bajrović, K., Jevrić–Čaušević, A., & Hadžiselimović, R. (2005). Uvod u genetičko inženjerstvo i biotehnologiju Institut za genetičko inženjerstvo i biotehnologiju, Sarajevo 3. Sabljo, A., Manaia, C., Jašić M. 2005. Genetically modified food: low, safety and practical implication for Bosnia and Herzegovina. Publisher: Faculty of Agriculture University of Mostar with Consortium TEMPUS JEP – 16140/01.
Additional literature:	1. Stewart , Neal C. ed. (2008). Plant biotechnology and genetics: principles, techniques and applications. Hobken: John Wiley & Sons.

Course title	AUTOCHOTONE DAIRY PRODUCTS				**Course code**	
Study program Cycle	Food technology course Food engineering, II				**Study year**	II
ECTS point value:	**5**	*Semester*	IV		Hours per semester (L+T+S)	30p+30v
Course status:	elective	*Prerequisites:*	Ne	*Comparative conditions:*		Ne
Course access:	Students who have enrolled in the course			*Class schedule:*		In accordance with the terms advertised on the bulletin board and web portal

Course teacher:	Doc.dr.sc. Marija Jukić Grbavac
Contact hours/consultations:	3
E-mail and phone number:	grbavacj@yahoo.com
Assistant	Leona Puljić, dipl. ing.
Contact hours/consultations:	3
E-mail and phone number:	Leona.puljic@aptf.sum.ba ; 036/ 337-129
Course objectives:	This course will be introducing the history of autochthonous dairy products, especially autochthonous cheese, about what cheese is and what the divisions of cheeses are. Cheese production technology starts by choosing and preparing milk for cheese making. These technological processes include basic milk analysis at the reception of the cheese industry, removal of mechanical impurity, standardization of milk for cheese making and addition of additives and dairy cultures in milk before cheese making. This subject described as the basic chemical-biochemical mechanism clotting different types of milk (cow, sheep, goat and buffalo). Further, the case explains the general legality of processing grain, cheese shaping and salting in terms of production of different types of cheese (fresh, soft, semi-hard, hard and extra hard). The subject gives basic information on ripening and packaging cheese. The case also acquires knowledge about hygiene and sanitation in cheese making and the application of HACCP. This subject offers environmental knowledge in the field of construction, decoration, designs and furnishing the cheese industry. In the course of the exercise, the students are acquainted with the organization production in the cheese factory - Calculation in cheese making, on side-by-side products produced in the production of cheese such as cream, butter and whey (albumin cheese-curd). Students in the course of laboratory exercises get acquainted with the basic analysis of Cheese necessary to make it a valid declaration. Field exercises include practical work in the cheese industry from milk reception to packaging of finished products and hygiene maintenance drive. Through the seminars, students introduced to the area of special cheese making, or being acquainted with the most important groups of world known cheeses.

	Students get to know the meaning of the term autochthony. The basic properties of the more famous autochthonous BH dairy products, specifics of their production and health care. Possibilities of modernizing production of autochthonous dairy products. Protecting the origin of autochthonous dairy products.
Learning outcomes (general and specific competences):	After attending and passing this course, students will know / be able to: List and state the technological processes in production of autochthonous dairy products. Calculate and plan the production of autochthonous dairy products. Identify control points and critical control points in the production of autochthonous dairy products from raw material to final products. Establish indicators of impacts of construction, decoration and equipping the dairy farm to the environment and to conclude an environmental program. Demonstrate processes in the production of autochthonous dairy products. Access the standard
Content of the syllabus/performance plan (in short):	Indigenous dairy products are a significant market item but for years have also represented a significant segment in the nutrition of the population of Bosnia and Herzegovina. Faced with the danger of disappearing and being lost in massive industrial production, traditional cheeses become protected in many countries, where some countries, like France and Italy have a long tradition. In an effort to keep the richness of these products in Bosnia and Herzegovina, this module will contribute to the study and popularization of indigenous technology dairy products. It characterized that the production and consumption of these products still taking place, largely, in countrified households. The exception Kajmak and Vlašić cheese produced in small farms but more importantly marketed. Livanjski cheese and Trapist represent industrial production while all other indigenous cheeses threaten the destiny of oblivion that is why courses like this have the purpose of informing students about the importance of this topic.

Evaluation in detail within European Credit Transfer System
(Example)

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and activity in classroom	60	2	
Seminar paper	15	0,5	20%
Midterm (2) or Written exams	60	2	60%
Oral exam	15	0,5	20%
TOTAL	150	5	100%

Additional clarification:

According to the Rulebook on studying, the final grade is obtained as follows:
A = 91-100% 5 (excellent)
B = 79 to 90% 4 (very good)
C = 67 to 78% 3 (good)
D = 55 to 66% 2 (sufficient)
F = 0 to 54% 1 (insufficient)

Compulsory	Bijeljac, S., Sarić, Z.: Autohtoni mliječni proizvodi sa

literature:	osnovama sirarstva, Univerzitet u Sarajevu, Poljoprivredni fakultet (2005).
Additional literature:	Dozet, N., Adžić, N., Stanišić, M., Živić, N.: Autohtoni mliječni proizvodi, Beograd (1996).

Course title	**AUTOCHONTIC MEAT PRODUCTS**				**Course code**	
Study program Cycle	Food technology course Food engineering, II				**Study year**	II
ECTS point value:	**5**	*Semester*	IV		Hours per semester (L+T+S)	30p+30v
Course status:		*Prereq uisites:*	Ne	*Comparative conditions:*		Ne
Course access:	Students who have enrolled in the course			*Class schedule:*		In accordance with the terms advertised on the bulletin board and web portal

Course teacher:	Doc.dr.sc. Jozo Grbavac
Contact hours/consultations:	3
E-mail and phone number:	grbavacj@yahoo.com
Assistant	Leona Puljić, dipl. ing.
Contact hours/consultations:	3
E-mail and phone number:	leonapuljic224@gmail.com ; 036/ 337-129
Course objectives:	The objectives of this course are: Updating knowledge in the field of quality and technology, veterinary-health surveillance, standardization and protection of indigenous meat products.
Learning outcomes (general and specific competences):	After completing this course, students will be able to: Clarify trends in the production and protection of indigenous meat products in B&H and the EU. Indicate and describe problems in the production of indigenous meat products: technological, marketing and veterinary-health standards in their production. Define regulations and ways of protecting indigenous meat products with designations of origin, geographical origin and traditional reputation, and with different marketing labels. To define microbiological, physicochemical and sensory properties of indigenous meat products.
Content of the syllabus/performance plan (in short):	lectures: Indigenous meat products in Bosnia and Herzegovina. Economic, historical-cultural, gastronomic and market importance of production of indigenous meat products. Some specific features of the chemical composition and nutritional and organoleptic properties of indigenous meat

	products. Basic raw materials, additives, and spices for the production of indigenous meat products. Traditional technologies and application of the latest technological advances in the production of indigenous meat products (Herzegovinian prosciutto, Bosnian sadhu, dry trout, homemade sausage). Problems in the field of legalization of production and marketing, veterinary-health control, standardization and protection of indigenous meat products. Indications of geographical origin, tradition and originality. exercises: Sensory evaluation of some indigenous meat products. Visit to the family farm-producer of indigenous meat products

Evaluation in detail within European Credit Transfer System
(Example)

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and activity in classroom	60	2	0%
Written exams	60	2	70%
Oral exam	30	1	30%
TOTAL	150	5	100%

Additional clarification:
In order to take the final exam, students are required to attend 80% of class hours and 100% of class hours. Students can choose whether to take the final exam in writing or orally.
The final exam is assessed in the following ways:
less than 50% correct answers = 0% marks
from 51% to 60% = up to 10% of grade
from 61% to 70% = up to 20% of grade
from 71% to 80% = up to 30% of grade
from 81% to 90% = up to 40% of grade
from 91% to 100% = up to 50% of grade

According to the Rulebook on studying, the final grade is obtained as follows:
A = 91-100% 5 (excellent)
B = 79 to 90% 4 (very good)
C = 67 to 78% 3 (good)
D = 55 to 66% 2 (sufficient)
F = 0 to 54% 1 (insufficient)

Compulsory literature:	1. Benčević, K., Petričević, A. (1999): Slavonski domaći kulen i kobasice. Mala škola povijesti i proizvodnje., Hrvatski farmer d.d., Zagreb. 2. Kovačević, D. (2001): Kemija i tehnologija mesa i ribe, PTF - Osijek, Osijek (sveučilišni udžbenik)
Additional literature:	1. Varnam, A. H., Sutherland, J. P. (1995): Meat and Meat Products. Technology, chemistry and microbiology, Chapman & Hall, London - Glasgow - Weinheim - New York-Tokyo - Melbourne - Madras.

Course title	**FUNCTIONAL FOOD AND FOOD SUPPLEMENTS**				**Course code**	
Study program Cycle	Food technology course Food engineering, II				**Study year**	II
ECTS point value:	5	*Semester*		IV	Hours per semester (L+T+S)	30+0+15
Course status:	elective	*Prerequisites:*	-	*Comparative conditions:*		-
Course access:	-			*Class schedule:*		-
Course teacher:	prof. dr. sc. Daniela Čačić Kenjerić					
Course associate / teacher	-					
Contact hours / consultations:	e-mail					
E-mail and phone number:	daniela.kenjeric@ptfos.hr +385 (0)31 224 340					
Assistant	-					
Contact hours/consultations:	-					
E-mail and phone number:	-					
Course objectives:	The aim of the course is to gain knowledge about the impact of bioactive components present in food on human health. The course also provides guidelines for the development of functional products in accordance with the latest insights in the field of human nutrition, and describes the activity and role of dietary supplements in meeting nutritional needs and preventing the development of disease.					
Learning outcomes (general and specific competences):	Define a functional product and its role in nutrition. List the bioactive components in a particular foodstuff and describe their role in the body with particular emphasis on preventing the development of the disease. Enumerate and clarify the nature of the action of foods used in promoting the health of the digestive system and cardiovascular system, and the prevention of chronic non-communicable diseases associated with malnutrition. Define functional product development principles. Indicate each group and describe the role and use of dietary supplements. Define legal provisions regarding the advertising of functional foods and clarify their application in marketing them.					
Content of the syllabus/performance plan (in short):	lectures: • Definition of functional foods and areas of human physiology that are most relevant to the development of functional products. • Biologically active components in food of plant and animal origin. • Functional Food & Health: Functional Food & Digestive System, Functional Food & Cardiovascular System,					

	Functional Food & Cancer, Functional Food & Osteoporosis, Functional Food & Diabetes. • Development of functional foods - components, goals, compliance with the eating habits of the modern consumer. • The definition, division and role of dietary supplements in meeting nutritional needs and preventing the development of disease. • Functional food legislation: nutrition and health claims. Seminar: • Analyze and present to the other students the selected product available on the market from the range of functional products, and the proposal of their own product that would be more adequate to introduce the same observed bioactive component and, according to the student's knowledge, would have a significant positive impact on health.

Evaluation in detail within European Credit Transfer System

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and activity in classroom	**45**	**1,5**	**10%**
Midterm exam or written exams	**60**	**2**	**50%**
Seminar paper	**45**	**1,5**	**40%**
TOTAL	**150**	**5**	**100%**

According to the Rules of Evaluation, the final grade is obtained as follows:

A = 90 − 100% 5 (excellent)
B = 80 − 89,9% 4 (very good)
C = 70 − 79,9% 3 (good)
D = 60 − 69,9% 2 (sufficient)
E = 50 − 59,9% 1 (insufficient)

Compulsory literature:	***G.R. Gibson, M.W. Wiliams: Functional foods, CRC Press, Woodhead Publishing Limited, Boca Raton, Boston, New York, Washington, 2000.***
Additional literature:	- R. Chadwick et al.: Functional Foods, Springer, Berlin, 2003. - scientific paper

Course title	**TECHNOLOGY OF CARBON AND CONDITIONERS PRODUCTS**				**Course code**	MB
Study program Cycle	Food technology course Food engineering, II				**Study year**	2
ECTS point value:	**5**	*Semester*		IV	Hours per semester (L+T+S)	2+2+0 (30+30+0)
Course status:	elective	*Prerequisites:*	-	*Comparative conditions:*		-
Course access:	Students who have enrolled in the course			Class schedule:		According to advertised bulletin board and website terms

Course teacher:	prof. dr. sc. Drago Šubarić
Course associate / teacher	doc. dr. sc. Antun Jozinović
Contact hours / consultations:	Students will be informed about the dates of the consultation at lectures, exercises and e-mail.
E-mail and phone number:	drago.subaric@ptfos.hr +385 31 224 312
Assistant	doc. dr. sc. Antun Jozinović
Contact hours / consultations:	Students will be informed about the dates of the consultation at Lectures, exercises and e-mail.
E-mail and phone number:	ajozinovic@ptfos.hr +385 31 224 336
Course objectives:	The objectives of this course are: The aim of the course is to provide students with the knowledge necessary to lead the process of production of sugar, starch and starch derivatives as well as confectionery products and to research in the field. The lectures cover all aspects of the production of the aforementioned products, starting with the quality of the raw material, production conditions, quality control, hygiene conditions and other elements necessary for the production of a quality and safe consumer product. During the exercises, students will work in groups and will process individual productions in the form of seminar papers.
Learning outcomes (general and specific competences):	After completing this course, students will be able to: • manage the sugar beet production process; • manage the chocolate production process; • manage the production of candy products; • guide the production of modified starches and starch derivatives; • define the quality parameters of raw materials and finished products for these processes;

	• define the extrusion process; • lead the process of manufacturing extruded products
Content of the syllabus/performance plan (in short):	Carbohydrates, division and properties. Production of sucrose from sugar beet. Preparation for extraction. Juice extraction and cleaning. Concentrating juice. Crystallization and centrifugation. Post-centrifuge crystal processing and storage. By-products of beet processing. Wastewater and treatment. Production of cane sugar. Physical and chemical properties of starch. Raw materials for starch production. Manufacture of starch from maize. By-products. Enzymes in starch technology. Production of starch hydrolytes. Crystalline glucose production. Production of fructose syrup and fructose. Manufacture of modified starches. Production of starch from potatoes and wheat. Confectionery products, production and consumption. Raw materials for the manufacture of confectionery. Cocoa beans, cultivation and processing. Cocoa mass, cocoa powder and cocoa butter. Properties of cocoa butter and fat substitutes. Chocolate production. The rheological properties of chocolate. Production of candy products. Production technology of other confectionery products. Coffee chemistry and technology. Tea. Snack Product Technology. Analytical methods in carbohydrate and confectionery technology. Sugar quality. Thermo physical properties of starch. Rheological properties of starch suspensions. Water binding capacity. Preparation of modified starches. Industrial exercises.

Evaluation in detail within European Credit Transfer System

STUDENT OBLIGATIONS	**LESSON HOURS (ASSESSMENT)**	**ECTS**	**GRADE**
Class attendance and activity in classroom	60	2	
Seminar paper	15	0,5	20%
Midterm (2) or Written exams	60	2	60%
Oral exam	15	0,5	20%
TOTAL	150	5	100%

Additional clarification:
The student must complete 70% of the lecture hour and 100% of the seminar hour in order to be eligible for signature in the index and exit to the colloquiums, i.e. final written exams.
Assessment: A midterm exam is optional. Exit to II. The colloquium is not conditional on taking the I colloquium. Students have the right to go to one of the corrective tests, where they can take or improve their grades I or II. Exit to the corrective exam conditioned by passing the 1st or 2nd. Colloquium. If the student has passed both tests (and satisfied by the Total grade) the final exam released - the total grade in this case the arithmetic mean of the grades of both tests. The final exam (consisting of the written part) is compulsory for students who have not taken the course through a midterm exam. The final grade includes the results of the midterm or final written, engagement during the class, and evaluation of the seminar paper.

According to the Rulebook on studying, the final grade is obtained as follows:

A = 91-100% 5 (excellent) B = 79 to 90% 4 (very good) C = 67 to 78% 3 (good) D = 55 to 66% 2 (sufficient) F = 0 to 54% 1 (insufficient)	
Compulsory literature:	1. P. W. Van der Poel, H. Schiweck, T. Schwartz: Sugar Technology. Verlag Dr. Albert Bartens KG-Berlin, 1998. 2. R. L. Whistler, J. N. BeMiller, E. F. Paschall (1984): Starch, Chemistry and technology. 3. S. T. Beckett: Industrial chocolate manufacture and use. Blackwell Science, 1999. 4. S.T. Beckett: The science of chocolate, Royal Society of chemistry, York, 2000.
Additional literature:	1. S. Šušić: Priručnik industrije šećera. Knjiga I, Beograd, 1980. 2. S. Šušić: Priručnik industrije šećera. Knjiga II, Beograd, 1980. 3. R.J. Clarke, R. Macrae: Coffee-Technology. Elsevier Applied Science, London, New York, 1987. 4. F. W. Schenck, R. E. Hebeda: Starch hydrolysis products.VCH, New York,Weinheim, 1992.

5. List of the teacher

Full professor:
dr.sc. Mate Bilić
dr.sc. Drago Šubarić
dr.sc. Srećko Tomas
dr.sc. Daniela Čačić- Kenjerić
dr.sc. Tihomir Moslavac
dr.sc. Jurislav Babić
dr.sc. Mirela Kopjar
dr.sc. Stjepan Pliestić

Associate professors:
dr.sc. Zrinka Knezović
dr.sc. Ljiljanka Kvesić
dr.sc. Stela Jokić
dr.sc. Anita Ivanković
dr.sc. Danijela Petrović
dr.sc. Jozo Grbavac
dr.sc. Anita Martinović Bevanda

assistant professor:
dr.sc. Tihomir Prusina
dr.sc. Ivan Spužević
dr.sc. Miroslav Grubišić
dr.sc. Anita Jurić
dr.sc. Ana Mandić
dr.sc. Antun Jozinović
dr.sc. Jurica Primorac
dr.sc. Paulina Šaravanja
dr.sc. Marija Jukić Grbavac

Higher asisstant:
Kristina Batinić, dipl.ing.
Nikolina Kajić, dipl.ing.agr
Leona Puljić,dipl.ing.agr.
Marija Lasić, dipl.occ.

asisstant:
Josipa Krezić, mag.preh.teh.
Andrea Odak, mag.preh.teh.
Ivana Bošnjak, mag.preh.teh.
Mario Kovač, mag.preh.teh.