



## Faculty of Agriculture and Food Technology of the University of Mostar

# Undergraduate study programme: Food Technology

Mostar, 2018

## 1. Introduction

The idea of launching a food technology study programme came as a result of the need to create experts that will influence the development of food technology in a broader area of Bosnia and Herzegovina as well as the gravitational part of Mediterranean Croatia. Industrial production, processing and marketing of agricultural products require a greater degree of technological and technical knowledge. A future development brings along ecological problems and therefore, it has to meet environmental needs, including technological nutritional processes.

## **1.2.** Needs, opportunities and conditions for the introduction of a new study programme

There is a constant need for experts in the processing part of the agricultural economy. Only a small part is more developed (wine production, processing of some fruits and vegetables and some of milk and meat processing). Medicinal, honey, aromatic and spicy herbs should experience finalization of processing as well as fruits and vegetables, fish, meat, milk and various oilseeds to a greater extent — i.e. all of which is abound or may abound in our area.

It is also a compelling issue of education about methods of preservation, transport/storage, and marketing of food products, which is also provided by this study programme.

The complete teaching staff come from the Faculty of Agriculture and Food Technology of the University of Mostar, Faculty of Food Technology Osijek and Faculty of Food Technology and Biotechnology of the University of Zagreb.

## **1.3.** Defining the educational function of the new study programme

The study program was named: Undergraduate university full-time study programme of food technology. This three-year programme offer study of disciplines in the field of processing - food complex of agricultural products, ecology in this field.

## **1.2.** Student mobility

The concept of the proposed undergraduate study programme is such that it enables the student in the third year of study to select several elective modules. In agreement with the mentor, a student may choose it from the list of offered modules of the Faculty of Agriculture and Food Technology or other faculties in Bosnia and Herzegovina or abroad. Based on the choice of elective modules, the student creates his or her educational profile depending on his or her affinities and planned future occupation. Selecting modules from other European universities provides students with the opportunity to acquire highly specialized knowledge in a particular field and significantly enhances the quality of the study programme.

During undergraduate and graduate studies, students are provided with the opportunity to use Ceepus and Erasmus + KA1 mobility programmes. Programmes vary in both the length of mobility and the amount of financial support. Within the Erasmus + program, it is possible to realize a study visit and a professional internship, while CEEPUS's

mobility program allows only a study visit. Outgoing student mobility is achieved for 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, continues and completes his or her studies. The purpose of outgoing student mobility may also be a professional internship at a host foreign institution. In most cases, students pursue an Erasmus+ scholarship professional internships in foreign companies. International student exchange association IAESTE also offers students different opportunities to pursue professional internships that International Relations Office promotes and through which individuals can achieve their ambitions and improve knowledge and skills in their area of interest.

## **1.3. Curriculum changes**

By Decision of the Senate of the University of Mostar No. 01-710 / 07 of 17 May 2007, the Faculty of Agriculture and Food Technology has been approved for the introduction of a new undergraduate university full-time study programme in Food Technology. The initially adopted curriculum of the undergraduate study programme in Food Technology has had several amendments, which were implemented following the Rulebook on the Procedure for Adoption and Evaluation of Study Programmes and with the approval of the Senate of the University of Mostar (Decisions 01-1286/08 of 12/11/2008; 01-647/12 of 10/05/2012; 01-2045/14 of 6/11/2014 and 01-4209/18 of 21/11/2018).

Taking into account continuous conduct and monitoring of student surveys and the recommendations of accreditation bodies, study programmes have been adjusted to new research, labour market needs,

The development of study plans and programmes is a continuous process. Therefore, harmonisation of learning goals and outcomes is under continuous monitoring of the Quality Assurance Office both at university and faculty level and subject teachers.

As suggested by earlier evaluations, we included an expert practice leader to the original programme. This gives more importance to practical teaching, students take it more seriously and realize better contacts with experts from the public and private sectors. After APTF improved its staff capacities and acquired several new PhDs who were elected to the scientific-teaching rank of docents, the list of elective modules was enriched for which students showed exceptional interest.

### 2. General part

#### 2.1. Name of the study programme

Undergraduate university full-time study programme in food technology.

#### 2.2 Holder of the study programme

Holder of the undergraduate study programme is the Faculty of Agriculture and Food Technology of the University of Mostar. The course holders are primarily from the University of Mostar, and if necessary, other course holders are engaged from the Faculty of Food Technology Osijek and the Faculty of Food Technology and Biotechnology of the University of Zagreb as based on the Cooperation Agreement.

#### 2.2. Study duration

Undergraduate study programme lasts for three years. The first two years of this study programme include modules that represent the basis for studying Food Technology, food engineering. In the fifth semester, students have five compulsory modules and professional practice. In the sixth semester, in addition to the compulsory modules, students have the opportunity to choose elective modules from the offered list. They choose modules in consultation with the mentor. The one-semester-long compulsory and elective undergraduate modules are performed throughout the semester. The attached spreadsheet of the syllabus indicates the hourly rate of each module with the corresponding ECTS credits.

#### 2.3. Admission requirements for study programme

Applicants who have completed four years of high school have the right to enrol in the undergraduate study programme. Admission takes place based on the type of high school (appropriate and inappropriate) and success in high school. The appropriate high schools are Agricultural, Grammar, Technical, Forestry, Veterinary, Chemical and Medical school. In addition to the general result in secondary education, the success of the applicants in the following subjects is also taken into account: chemistry, biology, mathematics, and physics. Applicants are enrolled in full-time study programme paying tuition.

#### 2.4. Competencies of graduates

The aim of the undergraduate study programme is to provide basic knowledge about food, its quality, raw materials for food processing, processing and other activities related to this issue. Food technologies provide food, foods with satisfactory characteristics: qualitative, nutritional, organoleptic, etc. Therefore, offering the market satisfactory quality, ensuring quality production and control of food are the basic tasks of this study.

Through organized modules, the study also covers traditional productions, the creation of recognizable traditional products, i.e. the preservation and protection of these traditions and the maximum utilization of potential raw materials of the area. Students with a bachelor degree are qualified for professional work in various fields of food production, food lines, product quality monitoring, product analysis, etc. Upon completion of undergraduate studies, students with bachelor degree have the level of knowledge required to continue their graduate studies. They can continue their studies at the Faculty of Food Technology Osijek, the Faculty of Food Technology and Biotechnology of the University of Zagreb, or at graduate studies in other countries. Students with a bachelor degree can continue their education in interdisciplinary studies related to ecology, soil and water protection, chemistry, nutrition, legislation, economics, etc.

#### 2.5. Academic degree

After obtaining 180 ECTS credits, designing and defending their final work, students gain the title of Bachelor of Food Technology.

#### 2.6. Learning outcomes

Learning outcomes after completed undergraduate study programme of Food Technology:

- communicate and present work using modern information technologies,

- to choose analytical methods and procedures for solving practical problems within the field of agronomy and further research,

- search professional literature, databases and other sources of information and 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 food of plant and animal origin,

- apply the acquired knowledge to identify, design and solve engineering problems and practical problems in the field of agricultural production,

- apply the acquired knowledge in organizing quality food processing,

- clarify the scientific basis in the field of food processing, i.e. knowledge in the field of Food Technology,

- independently organize work activities and make decisions within a narrower area of expertise.

#### 2.7. Competencies

Bachelors of Food Technology are competent and qualified to handle complex and practical food technology issues. The level of knowledge they have acquired and mastered provides them with a foundation for the potential continuation of their training and education. Basic general competence includes the development of critical thinking, the ability to analyze and solve problems, with a clear idea of the good and bad sides of the decisions and actions made.

The outcome of the study process is the formation of experts with an academic background who have significantly expanded knowledge compared to the knowledge gained in high school, as well as the knowledge necessary to understand the scientific basis in the field of food technology. Other general competencies include:

- ability to communicate and present using modern information technologies
- the ability to select analytical methods and procedures to solve practical problems within the field of study and further research
- ability to search professional literature, databases and other sources of information
- the ability to collect and interpret relevant data

• the ability to effectively use various methods of communication with the engineering community and society at large

- recognizing the need and willingness to engage in lifelong learning
- · developed learning skills are necessary for further studies at

the graduate level at home or related colleges.

The study programme lasts for three years (six semesters). During the first five semesters, students acquire knowledge and skills, both general and professional ones, through the compulsory modules related to food technology. During the sixth semester, students also gain specific technical knowledge by listening to modules (compulsory and elective) that cover specific areas of food technology. Upon completion of their studies, students, as professionally competent persons, have the following professional skills at this level of education:

• understanding of the principles and processes of scientific disciplines related to the processing of plant and animal raw materials

• the ability to apply acquired knowledge to identify, design and solve engineering problems

• ability to apply the knowledge gained in the laboratories and facilities of the food and related industries

• the ability to apply the acquired knowledge to environmental protection

Depending on the group of selected modules, student may be able to work independently within a narrow field of expertise or acquire sufficient knowledge to pursue graduate studies within the biotechnical sciences.

The acquired knowledge provides the student with the completed undergraduate level with expertise and competencies that enables him/her to work in the following or similar institutions and areas:

• in various branches of the food industry to perform medium-sized tasks and are ready to respond to the challenge of technological change and innovation;

• successful performance of food and beverage quality control laboratories;

• in companies involved in the sale of raw materials and equipment for the food industry;

• in food production and marketing of feed additives;

• commitment to the responsibility and scope of limited business in the wholesale and distribution of food, catering and tourism;

• engaging in the responsibility and scope of limited work in relevant state institutions and non-governmental organizations.

The student who completes this programme of basic academic studies, which lasts 3 years (6 semesters) and achieve 180 ECTS (credits), gains the right to the academic title: Bachelor of Food Technology.

#### 3. Curriculum

#### I. SEMESTER

Ordinal	Status	Module name	Number of hours			ECTS
no.			L	Т	S	
1.	CM*	CHEMISTRY I	60	30	30	10
2.	СМ	MATHEMATICS I	45	30	-	6
3.	СМ	TECHNICAL PHYSICS	45	15	15	6
4.	СМ	BIOLOGY	45	30	-	6
5.	СМ	FOREIGN LANGUAGE I	15	15	-	2
6.	СМ	PHYSICAL EDUCATION	-	30	-	-
		TOTAL	210	150	45	30
		TOTAL		405		

## \*CM – core module

## II. SEMESTER

Ordinal	Status	Module name	Number of hours		ECTS	
no.			L	Т	S	
1.	СМ	CHEMISTRY II	45	45	15	8
2.	СМ	MATHEMATICS II	30	30	-	5
3.	СМ	ENGINEERING	45	30	-	6
		THERMODYNAMICS				
4.	СМ	MACHINE ELEMENTS	45	30	-	6
5.	СМ	INTRODUCTION TO	30	15	-	3
		INFORMATICS				
6.	СМ	FOREIGN LANGUAGE II	15	15	-	2
7.	СМ	PHYSICAL EDUCATION	-	30	-	-
		TOTAL	210	195	15	30
		TOTAL		390		

#### **III. SEMESTER**

Ordinal	Status	Module name	Number of hours		ECTS	
no.			L	Т	S	
1.	СМ	PHYSICAL CHEMISTRY	45	30	-	6
2.	СМ	MICROBIOLOGY	45	30	-	6
3.	СМ	ENGINEERING	60	30	-	7,5
4.	СМ	BIOCHEMISTRY	60	30	-	7,5
5.	СМ	BIOSTATISTICS	15	15	-	3
		TOTAL	225	135	-	30
		TOTAL		360		

## **IV. SEMESTER**

Ordinal	Status	Module name	Number of hours		ECTS	
no.			L	Т	S	
1.	СМ	FOOD SCIENCE	45	-	-	5
2.	СМ	FOOD MICROBIOLOGY	45	30	-	6
3.	СМ	FOOD QUALITY CONTROL	45	45	-	6
4.	СМ	FOOD PACKAGING	30	15	-	4
5.	СМ	RAW MATERIALS OF ANIMAL	30	15	-	4
		ORIGIN				

6.	CM	RAW MATERIALS OF PLANT	45	15	-	5
		ORIGIN				
TOTAL			270	120	-	30
		TOTAL		390		

#### V. SEMESTER

Ordinal	Status	Module name	Nun	Number of hours		ECTS
no.			L	Т	S	
1.	СМ	PROCESSES IN FOOD INDUSTRY	45	30	15	7
2.	СМ	WATER TECHNOLOGY AND WASTEWATER TREATMENT	45	15	-	5
3.	СМ	FOOD CHEMISTRY	45	15	-	5
4.	СМ	PROCESS MEASUREMENT AND MANAGEMENT	45	15	-	5
5.	СМ	HYGIENE AND SANITATION	30	30	-	4
6.	СМ	PROFESSIONAL PRACTICE	-	120	-	4
		TOTAL	210	225 <b>450</b>	15	30
		IUIAL		430		

## VI. SEMESTER

Ordinal	Status	Module name Number of hours		ours	ECTS	
no.			L	Т	S	
1.	СМ	TECHNOLOGICAL DESIGN I	30	30	-	4
2.	CM	THE PROCESSING	75	30	-	8
		TECHNOLOGY OF RAW				
		MATERIALS OF PLANT				
		ORIGIN				
3.	СМ	THE PROCESSING	45	30	-	4
		TECHNOLOGY OF RAW				
		MATERIALS OF ANIMAL				
		ORIGIN				
4.	EM*	ELECTIVE MODULE I				min.10
5.	EM	ELECTIVE MODULE II				
6.	EM	ELECTIVE MODULE III				
7.	EM	ELECTIVE MODULE IV				
		FINAL THESIS				4
						30

## \*EM - elective module

Ordinal	Status	Module name	N	Number of hours		ECTS
no.			L	Т	S	
1.	EM*	WINE TECHNOLOGY	45	15	-	6
2.	EM	PRODUCTION OF	30	15	-	4
		ALCOHOLIC DRINKS				
3.	EM	ECOLOGY	20	10		4
4.	EM	FOOD PRODUCTS MARKET	20	10		4
5.	EM	WATER MICROBIOLOGY	25		5	4
6.	EM	ENVIRONMENTAL	18	7	5	4
		PROTECTION IN THE FOOD				
		INDUSTRY				

## 3. Module overview

Course title	Chemistr	y 1			Course	FT111
Study programma					coue Study year	1
Cycle	Food Tec	hnology I		•	Study year	1
ECTS point value:	10	Semester	Ι	]	Hours per	60+30+30
<i>I</i>	-			5	semester	
				(	(l+t+s)	
Course status:	Core	Prerequisites: -		Com	ıparative	-
				cona	ditions:	
Course access:	-			Clas	SS .	-
<u>C</u> 1		Duef Auite Leevile	::( Dl-D	sche	edule:	
Course teacher:		Prof Anita Ivanko	$\frac{\text{Vic, PhD}}{160}$	) 	1 1	a ala
<i>Contact nours/consulta</i>	hons:	90 contact nours,	consultat	$\frac{1000}{1000}$	$\frac{1}{26} \frac{1}{27} \frac{1}{17}$	еек
<i>E-mail and phone num</i>	ber:	<u>anita.ivankovic@a</u>	ić MA ir	$\frac{0a}{0}$	$\frac{30}{20}$ $\frac{35}{11}$	nietry
Contact hours/consulta	utions.	30 contact hours	consultat	ions	1 hour per w	reek
<i>E-mail and phone num</i>	her	markovic marijar	a@hotm		m	CCK
Course objectives:	Course of	piectives are:	u e notin	<u>un.co</u>		
j	Acquisiti	on of fundamental	knowled	lge ir	n general an	d analytical
	chemistry	,		C	C	2
	- enable	the student to follo	ow lectur	res in	other mod	ules of food
	technolog	y with understanding	ng.			
	- through	computational and	laborator	ry exe	ercises in che	emistry to
	enable the	e student to, among	other thi	ngs, a	actively, pro	fessionally
	and respo	nsibly engage in all	areas of	indiv	vidual work,	experiments
	and proce	dures envisaged by	most co	urses	in the field (	DI er other
	practical	exercises.	er it be a	labor	atory, field (	or other
Learning outcomes	After con	pleting this course,	, students	s will	be able to:	
(general and specific	- clarify t	he basic concepts a	nd princi	ples i	n the field of	f chemistry
competences):	that are no	ecessary for underst	tanding t	he pro	ofession and	further
	study.					
	- integrate	e basic chemical kn	owledge	with	specific requ	irements in
	1000 tech	nology he colculation in ch	omistry			
	- master t	experimental work	indepen	dently	v in the labo	ratory
	- to obser	ve the chemical cha	inges and	l desc	ribe them au	alitatively
	and quant	itatively (using a st	oichiome	etric a	approach) an	d to
	describe t	he composition of t	he substa	ance c	qualitatively	and
	quantitati	atively,				
	- perform	simple chemical ex	perimen	ts ind	lependently.	
	- collect a	and interpret the results of the laboratory experiment			riment	
	- participa	ate in the work of a	professio	onal te	eam in the fi	eld of food
	technolog	y				
Content of the	Lectures:	ant in abamist.	and unit	a of	maaau	t Minteres
synabus/perjormance	chemical	compounds and ala	allu Ullill ments	S OI 1	measuremen	u. mixtures,
pun (in short):	Electroni	compounds and ele	nucints.	tome		
				noms.	•	

	Chemical bonding and struc	ture of molecules.	
	Aggregate states of sub-	stances (gases, liquid	ls and solids).
	Homogeneous and heteroge	neous chemical equilib	rium.
	Chemical kinetics.	_	
	Solution.		
	Buffers, hydrolysis and ioni	c product of water.	
	Ionic equilibrium in aqueou	s solutions of complex	ions.
	Solubility product.		
	Protolytic reactions and titri	metric methods.	
	The theory of oxidation/red	uction reactions	
	Instrumental analytical meth	nods.	
	Seminars:		
	The seminars illustrate speci	fic topics covered by le	ctures by solving
	specific problematic tasks, a	and special attention is	given to solving
	computing tasks in chemist	ry. After familiarizing	the student with
	measurements and related	units, relative atomic	and molecular
	masses, the stoichiometry of	f chemical reactions and	l concentrations,
	they perform computationa	l exercises in the field	of reactions in
	solutions (ionic, redox,	protolytic and espec	cially acid-base
	reactions). Then, the collig	gative properties of th	e solutions, the
	equilibrium of the chemica	l reactions, and the eq	uilibrium in the
	electrolyte solutions.		
	Tutorials:	<b>C . .</b>	
	Basic laboratory operations	of protection measures	and equipment.
	Measurement of mass, volu	me and density. Prepara	ation of standard
	solutions. Separation of het	erogeneous and homog	eneous mixtures
	(extraction, distillation, si	ublimation). Determin	ation of molar
	volume and molar mass of g	ases. The solubility of g	ases, liquids and
	solids in liquids. Preparati	on of standard solution	ons. Gravimetric
	determination. Determination	on of chloride by M	onr. volumetric
	(complexemetry) Methods	has based on complex for	nation reactions
	titrations: Argentometry	Uased OII TEUOX TEACHO	ns. riccipitation
<b>Evaluation in detail</b> wi	ithin Furonean Credit Trans	for System	
(Example)	ium European Crean Transj	cr system	
STUDENT	LESSON HOURS	ECTS	GRADE
OBLIGATIONS	(ASSESSMENT)	2010	

OBLIGATIONS	(ASSESSMENT)		
Class attendance and	120	4	
activity			
Midterm (2) or	90	3	50%
Written exam			
Oral exam	90	3	50%
TOTAL	300	10	100%

Additional clarification:

To take the final exam, students are required to attend 80% of the class, pass a practicum exam and submit a lab journal, pass a written exam, or pass the written exam I and II while listening to the module. During semester two midterms are written. The final grade includes the results of the midterm, the final exam. Students can choose whether to take the final exam in writing or orally.

According to the Rulebook on studying, the final grade is obtained as follows:				
A = 91-100% 5 (excell)	ent)			
B = 79 to 90% 4 (very	good)			
C = 67 to 78% 3 (good	)			
D = 55 to 66% 2 (sufficient	cient)			
F = 0 to 54% 1 (insuffi	cient)			
Compulsory	A. Ivanković i A. Martinović Bevanda: Chemistry for Biotechnical			
literature:	Faculties, University of Mostar, 2018.			
	M. Sikirica: Stoichiometry, Školska knjiga, Zagreb 1988 (i sva			
	kasnija izdanja) – selected chapters			
	Internal script for practicum, M. Marković			
Additional literature:	Filipović, S. Lipanović: General and Inorganic Chemistry, Školska			
	knjiga, Zagreb 1988 (i sva kasnija izdanja) – odabrana poglavlja			
	D. A. Skoog, D.M. West, F.J. Holler, Fundamentals of Analytical			
	Chemistry, Školska knjiga, Zagreb, 1999.			
	F. A. Cotton, G. Wilkinson, Basic Inorganic Chemistry, A Wiley			
	Interscience Publ. New York, 2000.			
	R. Kellner, J.M. Mermet, M. Otto, M. Valcarcel, Analytical			
	Chemistry, John			
	Wiley&Sons. Inc. ,New York, 2004.			
	G. Pavlović: Zbirka zadataka iz kemije, Alfa, Zagreb, 2011.			
Additional	Internal script for practicum:			
information on	1. 1. All tutorials and experiments planned in the Practicum of			
course:	Chemistry I are selected from: <i>Tutorials in Chemistry I, I</i>			
	<i>part</i> , (internal script), PBF, University of Zagreb, 2006.			
	dr.sc. D. Iveković			
	2. Z. Šoljić, Basics of Quantitative Chemical Analysis			
	(tutorials), Sveučilišna naklada d.o.o. Zageb, 1991.			
	3. B. Korpar-Čolig, M. Sikirica, V. Marić, <i>Practicum in</i>			
	General Chemistry, Sveučilišna naklada d.o.o. Zageb,			
	1991.			
	4. B. Bach-Dragutinović, B. Mayer, Practicum in General			
	and Inorganic Chemistry, Školska knjiga, Zagreb, 1991.			
	<b>5.</b> D.A. Skoog, D.M. West, F.J.Holler, <i>Fundamentals of</i>			
	Analytical Chemistry, Školska knjiga, Zagreb, 1999.			

Course title	MATHEMATICS 1					Course code		
Study programme			1100			Study year		
Cycle	1. cv	vcle				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1	
ECTS point value:	6	Semester		1.		Hours per semester (l+t+s)	45+30+0	
Course status:	Core	Prerequisites:		-	Compar conditio	rative ons:		
Course access:					Class so	chedule:		
Course teacher:		Prof Ljiljanka I	Kvesi	ć, PhE	)			
Contact hours/consulta	tions:							
E-mail and phone num	ber:	ljiljanka.kvesic@fpmoz.sum.ba						
Asisstant								
Contact hours/consulta	tions:	s:						
E-mail and phone numb	ber							
Course objectives:	Introduce students to the basic ideas and methods of differential calculus that is the basis for other courses. The lectures will informally cover basic mathematical concepts, illustrating their usefulness and application. During tutorials, students should master the appropriate technique and he able to solve specific problems.							
Learning outcomes (general and specific competences):	$\begin{array}{cccc} - & \mathrm{id} \\ & \mathrm{th} \\ & \mathrm{gi} \\ & \mathrm{gi} \\ - & \mathrm{ca} \\ & \mathrm{th} \\ - & \mathrm{ca} \\ & \mathrm{de} \\ - & \mathrm{ap} \\ & \mathrm{th} \\ - & \mathrm{no} \\ & \mathrm{va} \\ & \mathrm{ca} \\ & \mathrm{de} \\ - & \mathrm{ap} \\ - & \mathrm{ca} \\ & \mathrm{de} \\ - & \mathrm{ap} \\ - & \mathrm{ca} \\ & \mathrm{th} \\ - & \mathrm{us} \\ & \mathrm{ap} \\ - & \mathrm{re} \\ & \mathrm{th} \end{array}$	<ul> <li>application. During tutorials, students should master the appropriate technique and be able to solve specific problems.</li> <li>identify and sketch graphs of elementary functions, determine the domain of more complex functions, and identify curves given by implicit or parametric equations</li> <li>calculate the limit values of arrays and functions, and identify the arrays and functions associated with the number e</li> <li>calculate derivations of functions, and approximately determine the values of functions</li> <li>apply differential calculus to various problems associated with the study of functions and their graphs</li> <li>note the similarities and differences of the function of several variables with the function of one variable</li> <li>calculate partial derivatives of functions, and approximately determine the values of functions using differentials</li> <li>apply differential calculus to various problems associated with the study of functions and their graphs</li> <li>note the similarities and differences of the function of several variables with the function of one variable</li> <li>calculate partial derivatives of functions, and approximately determine the values of functions using differentials</li> <li>apply differential calculus to various optimization problems</li> <li>define the concept of vectors in plane and space and explain the concepts of linear dependence and independence of vectors</li> <li>use basic operations with vectors in the plane and space with appropriate applications</li> </ul>						

	• Sets. Natural and integers	. The principle of math	ematical induction.					
Content of the	Rational and real numbers. Complex numbers.							
syllabus/performance	• Functions. Definition, method of assignment and some properties of							
plan (in short):	functions. Composition of functions. Inverse function, Elementary							
	functions. Function definition area. The definition and convergence of							
	a sequence. Function limit value. Continuity of a function.							
	• Differential calculus. The physical and geometric meaning of							
	derivation. Derivation rules. Derivation of elementary functions.							
	Derivation of an implicit de	efault function. Derivat	ion of a parameter-					
	defined function. Logarit	hmic derivation. Fur	nction differential.					
	Higher-order derivation. H	Basic theorems of di	fferential calculus.					
	L'Hospital's rule. Application of differential calculus (tangent and							
	normal, monotonicity, local extremes, convexity, inflexion points.							
	• Functions of multiple variables. The value range of a function of two							
	variables. Partial derivatives of the function of two variables. The local							
	extremes of the function of two variables. The total differential of the							
	function of two variables.							
	• Vectors, Scalar product, vector product and mixed product.							
	• Analytical geometry of space. The direction in space. Plane in space							
	Relationship between direction and plane in space.							
<b>Evaluation in detail</b> within European Credit Transfer System								
(Example)								
STUDENT	LESSON HOURS	ECTS	GRADE					

STUDENT	LESSON HOURS	ECTS	GRADE
<b>OBLIGATIONS</b>	(ASSESSMENT)		
Class attendance and	60	2	10%
activity			
Midterm (2) or	60	2	40%
Written exam			
Oral exam	60	2	50%
TOTAL	180	6	100%

Additional clarification:

To take the final exam, students are required to complete 80% of the lectures and 80% of the tutorials. Two midterms are written during the semester. The final grade includes the results of the midterm exam, final exam, activity in the class. Midterms are graded as follows:

less than 50% correct answers = 0% ocjene from 51% to 60% = up to 4% of grade from 61% to 70% = up to 8% of grade from 71% do 80% = up to 12% of grade from 81% do 90% = up to 16% of grade from 91% do 100% = up to 20% of grade Final written exam is graded as follows: less than 50% correct answers = 0% ocjene from 51% to 60% = up to 6% of grade from 61% to 70% = up to 12% of grade from 71% do 80% = up to 12% of grade from 71% do 80% = up to 18% of grade from 81% do 90% = up to 24% of grade from 91% do 100% = up to 30% of grade According to the Rulebook on studying, the final grade is obtained as follows:

A = 91-100% 5 (excelle	ent)			
B = 79 to 90% 4 (very	good)			
C = 67  to  78% 3  (good)				
D = 55  to  66% 2  (suffice)	cient)			
F = 0 to 54% 1 (insufficient of the second secon	cient)			
Compulsory	1. 1. Lj. Kvesić, Mathematics 1 - textbook with solved examples,			
literature:	University of Mostar, Mostar, 2017.			
	2. 2. S. Kvesić, Mathematics - textbook for faculties of science and			
	technology, University of Mostar, Mostar, 2015.			
3. 3rd Lj. Kvesić, Collection of Problems in Multiple Mathemat				
	with Solved Examples Part I, University of Mostar, Mostar,			
	2019.			
	4. 4. B P. Demidovic, Tasks and Solved Examples in Higher			
	Mathematics with Application to Engineering, Technical Book,			
	Zagreb, 1986.			
Additional literature:	1. 1. J. Pečarić et al., Mathematics for Faculties of Technology,			
	Zagreb, 1994.			
	2. 2. S. Kurepa, Mathematical Analysis 1 and 2, Technical Book,			
	Zagreb, 1972.			
	3. 3. V. Devide et al., Problems in Higher Mathematics, School Book			
	Zagreb, 1979			

Course title	TECHNICAL PHYSICS				Course code		
Study programme					Study year		
Cycle	Food Tec	hnology, I					
ECTS point value:	6	Semester	first		Hours per semester (l+t+s)	45+15+15	
Course status:	core	Prerequisites:	no	Con con	nparative ditions:		
Course access:				Cla sch	edule:		
Course teacher:		Slavica Brkić, PhD					
Contact hours/consulta	tions:	Tuesday 13:00	cabinet 20	06 FPI	MOZ		
E-mail and phone num	nber: slavica.brkic@fpmoz.sum.ba 00387 36 355 478					5 478	
Asisstant	Blanka Tuka						
Contact hours/consulta	ations: Tuesday 14:00 cabinet 205 FPMOZ						
E-mail and phone num	ber blanka.tuka@fpmoz.sum.ba 00387 36 355 475					475	
Course objectives:	The object	The objectives of this course are:					
	Know and explain the basic physical laws of classical physics.						
	Recogniz	Recognize and put into practice.					
Learning outcomes	After passing the exam from the course TECHNICAL PHYSICS						
(general and specific	the stude	nt will know:					
competences):	- explain	basic physical co	oncepts, ba	asic pl	nysical laws	of classical	
	physics,						
	- clarify p	ohenomena in na	ture based	on th	ese laws,	.1	
	- recogniz	ze the physical la	iws of the	dev1c	es and apply	them	
	practicall	<u>y.</u>					
Content of the	Basic	physical terms					
syllabus/performance	• Mech	anics					
plan (in snort):	• Heat						
	• Acou	stics					
	• Electr	romagnetism					
	Optic	S					
	Atom	ic and Nuclear P	hysics				
<b>Evaluation in detail</b> w ( <i>Example</i> )	ithin <i>Euro</i>	pean Credit Trai	isfer Syste	em			
STUDENT	LESSON HOURS ECTS GRADE					RADE	
OBLIGATIONS	(ASSES	SSMENT)					
Class attendance and	75		2,5				
activity							
Seminar paper	30		1	10	)%		

Midterm (2) or	45	1,5	60%				
Written exam							
Oral exam	30	1	30%				
TOTAL	180	6	100%				
Additional clarification:							
According to the Ruleb	ook on studying, the final gra	ade is obtained as follo	ws:				
A = 91-100% 5 (excelle	ent)						
B = 79 to 90% 4 (very §	good)						
C = 67  to  78% 3  (good)							
D = 55 to 66% 2 (suffic	ient)						
F = 0 to 54% 1 (insuffic	cient)						
Compulsory	Nikola Cindro: PHYSICS I,	PHYSICS II					
literature:	Petar Kulisic, Vjera Lopac: Electromagnetic phenomena and						
	structure of matter						
	Primorac Z, Batista J: Mec	hanics, task collection					
	Tomislav Petković: Task	s in Physics, Univer	rsity of Zagreb				
	Textbooks, Element, Zagrel	<i>b</i> , <i>2011</i> .					
Additional literature:	Petar Kulisic: Mechanics a	nd Heat of the Zagreb	School				
	Petar Kulisic: Waves and C	Optics, ŠK Zagreb					
	Petar Kulišić: Electromagn	etic phenomena and str	ructure of matter,				
	ŠK Zagreb						
	Halliday, Resnick, Walker:	Physics, John Wiley &	Sons, Inc.				

Course title						Course	FT114
	BIOLOG	Y				code	
Study programme						Study	I.
Cycle	Food Tec	hnology, I				year	
ECTS point value:	6	Semester		Ι		Hours per	45+30
						semester	
Course status	Corro	Duono quigitog			Ca	(I+t+s)	
Course status:	Core	Prerequisites				mparative	
Course access:							
Course access.					sch	iss nedule:	
Course teacher:		Danijela Petro	vić.	PhD	501		
Contact hours/consulta	itions:	Consultations	by a	ppointr	nent		
E-mail and phone num	ber:	danijela.petrov	vic@	aptf.su	m.ba	a	
1							
		036 337 117					
Asisstant	Leona Puljić, senior assistant						
	Nikolina Kajić, senior assistant						
Contact hours/consulta	itions:						
E-mail and phone num	ber Leona.puljic@aptf.sum.ba, nikolina.kajic@aptf.sum.ba						
Course objectives:	The object	The objectives of this course are: Students should understand					
	natural pr	ocesses, especia	lly t	those th	at ca	an be monitor	ed or altered,
	affecting	plant and anima	l pei	rformar	ice.	Find a new an	d better
	approach,	1.e. methods the	at ca	in be su	cces	stully used in	food
	productio	n or in predictin	g th	e effect	OIT	ne environme	ent on
I aguning outcomes	A ftor cor	n change.	***	atudant		Il be able to:	
Learning outcomes	to clarify	the structural (	ise,	function	is wi	III de adle to.	f the
(general and specific	organism	the chemical h	niu i acic	of life f		atoms to	i the
competences).	macromo	ecules.	4515	or me i	10111	atoms to	
	- to clarif	y and describe th	neir	structu	re, fi	unctions, relat	ionship with
	the enviro	nment and the l	awf	ulness o	of th	eir action on i	ndividual
	physiolog	ical processes a	nd t	hrough	then	n on individua	al organs or
	entire sys	tems.		-			-
Content of the	The chem	ical basis of life	e, fro	om aton	ns to	macromolec	ules.
syllabus/performance	Common	properties of pla	ants	and and	imal	s. Classificati	on, mutual
plan (in short):	relations	of organisms, th	e ch	emical	com	position of liv	ving matter.
	Physical p	Physical properties of living matter: diffusion, osmosis, turgor,					
	plasmolys	sis, pinocytosis.	Prol	karyote	s and	d their metabo	olic diversity.
	Structure	and function of	the	station.	Cel	l reproduction	and
	ontogeny	Reproduction a	and e	evolutio	on of	f organisms. I	nheritance
	and diversity. Gene interactions, mutations, genetics of plant and						

	animal organisms. Anatomy of plant tissues: division, major and						
	basic. Vegetative and generative organs of plants. Animal tissues:						
	epithelial, supporting, mus	cular, nerve. Animal in	formation and				
	regulation systems: hormo	nal, nervous, immune. I	Metabolic and				
	transport systems of anima	als: digestive, respirator	y, circulatory,				
	reproductive, excretory, be	ones, muscles, skin.					
	Population/ecosystem rela	tionship from a biologic	al point of view.				
Evaluation in detail w	ithin European Credit Tran	sfer System					
(Example)							
STUDENT	LESSON HOURS	ECTS	GRADE				
OBLIGATIONS	(ASSESSMENT)						
Class attendance and	75	2,5					
activity							
Midterm (2) or	60	2	60%				
Written exam							
Oral exam	45	1,5	40%				

6

100%

Additional clarification:

TOTAL

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

180

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	T. Bačić: Morphology and anatomy of plants. Faculty of						
literature:	Education, Osijek 2003. T. Bašić-Zaninović and N. Perić: Biology						
	- a journey through life. Zagreb Kugler, 2004. Textbooks of the						
	University of Zagreb. MW. Burns: Station. School Book, Zagreb						
	1991 L.C. Yunqueira, J. Carneiro, R.O. Kelley. Basics of						
	histology. School Book, Zagreb, 1999. M. Sabo Biology. (internal						
	script) Faculty of Food Technology Osijek 2002. B. Durst-						
	Živković. Practicum of histology. School Book, Zagreb, 1998.						
Additional literature:	Nikolic, T.: Systematic Botany: Diversity and Evolution of the						
	Plant World, Alpha, Zagreb, 2013.						
	D. Denffer, H. Ziegler: Botany morphology and physiology.						
	School Book Zagreb 1991. K. Dubravec: Botany. Faculty of						
	Agriculture Zagreb 1996. S. Jelaska: Culture of plant cells and						
	tissues. Školska knjiga, Zagreb 1995. T. Švob et al: Fundamentals						
	of General and Human Genetics. School Book, Zagreb 1991. O.						
	Springer: Man and Health. PMF Zagreb 1995.						

Course title	GERMA	N LANGUAGI	E ( <b>I</b> ,	II)		Course code	OS121-2
Study programme Cycle	Food Tec	chnology, I				Study year	I. (prva)
ECTS point value:	2 +2	Semester		I. (prvi) II. (drugi)		Hours per semester (l+t+s)	30+0+0 30+0+0
Course status:	core	Prerequisites:			Compar conditio	rative ons:	-
Course access:	-		Class s			chedule:	according to the given schedule
Course teacher:	ANKA PEHAR, lecturer						
Contact hours/consultations:							
E-mail and phone num	- By ap	poir	tment -	2 hours	per week		
Asisstant		063-324-631- anka.pehar@gf.sum.ba					
Contact hours/consult	ations:				-		
E-mail and phone num	ıber				-		
Study programme Cycle		-					
Course objectives:	Developing communicative and social skills, gaining knowledge of language structures within the profession, fostering autonomous learning and intercultural aspects						
Learning outcomes (general and specific competences):	<ul> <li>know professional terminology,</li> <li>read and write fluently in German,</li> <li>present a specific topic in German.</li> </ul>						
Content of the syllabus/performance plan (in short):	<ul> <li>Process</li> <li>profest</li> <li>and spin</li> <li>them.</li> </ul>	ssing professiona ssional vocabula peaking skills, w	ıl te ıry, ritir	xts in tl develop 1g texts	ne field o bing read on a give	of agronom ing, writing n topic and	y, learning , listening presenting

**Evaluation in detail** within *European Credit Transfer System* (*Example*) **STUDENT** GRADE **LESSON HOURS ECTS OBLIGATIONS** (ASSESSMENT) Class attendance 30 1 Midterm (2) or 15 0.5 50% Written exam Oral exam 15 0,5 50% TOTAL 60 100% 2

Additional clarification: example

E.g. To pass the final exam, students are required to achieve a minimum score during class, which is 20% in total. During semester, two midterms are written. The final grade includes the results of the midterm exam, the final exam, the activity during the class and the evaluation of the seminar paper.

Seminar paper is graded as follows:

0% = Paper is not written.

2% = The paper does not meet the formal criteria.

4% = The paper meets the formal criteria, but there are major deficiencies in the content.

6% = The paper meets formal and content criteria, but there are notable grammatical and spelling errors.

8% = The paper meets formal and content criteria, but there are minor grammatical and spelling errors.

10% = The paper is comprehensive, with correct grammar and spelling.

Presentation of the seminar paper is graded as follows:

0% = Paper is not presented.

2% = Paper is read.

4% = Paper is partially read and unprepared.

6% = Paper is not read, but there are major deficiencies in the oral presentation.

8% = Presentation is well prepared, but minor errors in the speech are noticed.

10% = Oral presentation is well prepared.

Midterms are graded as follows:

less than 50% correct answers = 0% ocjene

- from 51% to 60% = up to 4% of grade
- from 61% to 70% = up to 8% of grade
- from 71% do 80% = up to 12% of grade

from 81% do 90% = up to 16% of grade

from 91% do 100% = up to 20% of grade

Written exam is graded as follows:

less than 50% correct answers = 0% of grade

from 51% to 60% = up to 6% of grade

from 61% to 70% = up to 12% of grade

from 71% do 80% = up to 18% of grade

from 81% do 90% = up to 24% of grade

from 91% do 100% = up to 30% of grade

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 (insuffi	icient)		
Compulsory	-	textbook "Kommunikation in der Landwirtschaft" Goethe-	
literature:		Institut, Fraus	
	-	dictionary ''Njemačko-Hrvatski'' Antun Hurm	
Additional literature:	-	Grammar of German language	

Course title	ENGLISH LANGUAGE 1				Course		
Study programma						Study year	first
Cycle	Food Tecl	nology I				Study year	1115t
FCTS point value:		Somester				Hours per	
LCIS point value.	2 +2	Semesier		тап		semester	15 + 15 + 0
				1. 1 11.		(l+t+s)	15+15+0
Course status:		Prerequisites:			Co	mparative	
	core	1	-		con	ditions:	-
Course access:					Cla	iss	Tuesday,
					sch	edule:	$13^{00} - 15^{00}$
Course teacher:	Željka Žulj, lecturer						
Contact hours/consulta	tact hours/consultations:						
E-mail and phone num	<i>mber:</i> <u>zulj.zeljka@gmail.com</u> / 063			063 (	313 266		
Asisstant		-					
Contact hours/consulta	nsultations: -						
<i>E-mail and phone num</i>	ber -						
Course objectives:	The objec	tives of this cour	se a	are:			
	The cours	e aims to introdu	ce s	students	s to t	he profession	al
	vocabular	y through the pre	epar	ation of	f app	propriate texts	
	Practice v	ocabulary and th	e at	oility to	diff	erentiate betw	veen
	profession	al and general la	ingi mal	lage thr	ougi	n the activitie	S OI
	Doposting	g from and find e	arta	isii,	mot	ical structure	9
	Listening	(watching) profe		un gran anal evo	nnai	s and practici	s. ng verbal
	expression	(watering) profe	sion	/retellir	ισ ισ	s and practisi	ing verbai
Learning outcomes	After com	nleting this cour	se	students	<u>15</u> . s wil	l be able to:	
(general and specific	- recogniz	e and use profes	sior	al term	inol	ogy in Englis	h.
competences):	- read and	translate texts					,
I I I I I I I I I I I I I I I I I I I	- express	themselves both	wri	tten and	lora	lly in English	
	- discuss professional topics in English.						
Content of the	Profession	nal language/gen	eral	langua	ge -	differences -	lecture
syllabus/performance	Common	grammatical erro	ors i	in the pr	rofes	sional text - l	ectures and
plan (in short):	tutorials	tutorials					

	Foreign forms of plural nouns in professional languages - lectures						
	and exercises						
	Keywords and sentences in the professional text - lecture and						
	tutorials						
	Translation of professiona	l texts from and	into English				
	Understanding audio mate	rials from the pr	ofession				
	Writing hints about the ma	terial being hea	rd				
	Asking questions related to	o a specific matt	er				
	Paraphrasing certain conte	nt					
Evaluation in detail with	ithin European Credit Tran	sfer System					
(Example)							
STUDENT	LESSON HOURS	ECTS	GRADE				
OBLIGATIONS	(ASSESSMENT)						
Class attendance and	30 1						
activity							
Midterm (2) or	15 0,5 60%						
Written exam							
Oral exam	15	0,5	40%				
TOTAL	60	2	100%				
Additional clarification	:						
Prema Pravilniku o stuč	liranju konačna se ocjena d	obiva na sljedeć	i način:				
A = 91-100% 5 (excelle	ent)						
B = 79 to 90% 4 (very g	good)						
C = 67  to  78% 3  (good)							
D = 55 to 66% 2 (suffic	ient)						
F = 0 to 54% 1 (insuffic	eient)						
Compulsory	"An English Reader for Food Technology and Biotechnology" -						
literature:	Book One sa englesko-hrv	atskim rječnkon	n, Manualia Universitatis				
	Studiorum Zagrabiensis, Durieux, 2005.						
Additional literature:	"Food Dictionary" – dr Ig	njac Kulier					
	Professional texts and artic	eles					

Course title	PHYSICAL EDUCATION				Course	FT116		
~ .						code		
Study programme				Study year	Ι			
Cycle	Food Tech	chnology, I						
ECTS point value:	0	Semester		I+II		Hours per	30+30	
						semester		
Course status:	obligatory	Proroquisitos			Co	(I+I+S)		
Course status.	obligatory	Trerequisites.				nparanve		
Course access:					$Cl_{C}$	141110115. 755		
Course access.					sch	nedule:		
Course teacher:	1	Prof Marin Ćor	luka	ı, PhD	5011			
Contact hours/consulta	itions:			,				
E-mail and phone num	ber:	Marin.corluka@	@fpn	noz.su	m.ba	<u>a</u>		
Asisstant								
Contact hours/consulta	sultations:							
E-mail and phone num	umber							
Course objectives:	The objecti	ves of this cours	e are	e:				
	By masterin	ng the content of	the	course	, the	e student will	acquire	
	knowledge	about ways to ac	chiev	ve tran	sfori	mation proce	esses on her	
	or his orga	nism through var	ious	forms	of p	physical activ	vity.	
Learning outcomes	By masterin	ng the content of	the	course	e the	student will	be able to:	
(general and specific	- to clarify	the theory of trai	ning	5,				
competences):	- to argue the	he need to test m	otor	skills,		· ·		
	- demonstra	ate the componer	its o	f the tr	anst	formation pro	ocess,	
	critically an	halyze the change	e 1n 1	the trai	nsto	rmation proc	ess.	
Content of the	Student	s are divided in	nto	groups	5 01	30 to 40 s	tudents. We	
syllabus/performance	regularly d	lvide them into t	WO I	emale	and	one male gr	oup. In each	
plan (in snort):	semester, s	tudents listen to .	30  sc		nour oro t	s each, which	n 18 60 nours	
	the Medice	line academic yea	$\mathbf{r} \cdot \mathbf{C}$	olio T	ho o	lagger are he	sports hall of	
	the Medical School in Zeleno Polje. The classes are held in the hall							
	competing	in sports in the Fi	iret I		ann. A are	exempted from	ay. Students	
	classes if th	n sports in the P	ifica	ste In	the c	tym classes	are based on	
	sports game	es of vollevhall	hask	ethall	and a	soccer We g	to the pool	
	three or for	e or four times a semester if there are interested students. The						

	goal is to teach non-swimmers if there are any, and then work on certain swimming technique.
Additional information on course:	Students do not receive a grade from Physical Education, only the signature of the teacher as evidence of duly completed obligations.

Course title						Course code			
	CHEMISTRY II								
Study programme			Study year	1					
Cycle	Food Tech	Food Technology, I							
ECTS point value:	8	Semester		II.		Hours per	45+45+15		
						semester			
-			1		-	(l+t+s)			
Course status:	core	Prerequisit	-		Con	nparative	completed		
		es:			con	ditions:	course		
							Chemistry I		
Course access:					Cla	ss schedule:			
Course teacher:		Ilijana Odak	, PhI	)					
Contact hours/consulte	ations:	Tuesday, fro	m 9:	00 to 10	:00				
<i>E-mail and phone num</i>	ber:	ilijana.odak@	@fpr	noz.sum	<u>.ba</u> , -	+387 36 445 47	'8		
Asisstant		Marijana Ma	arkov	vić, mag	biol	. et chem.			
Contact hours/consulte	ations:	By appointm	nent						
E-mail and phone num	ber	<u>markovic_m</u>	arija	na@hot	mail.	<u>com</u> , +387 63 4	465 862		
Course objectives:	The object	objectives of this course are:							
	1. Acquire	knowledge of	f the	structure	e and	reactions of or	ganic		
	compounds	s so that stude	ents c	an conti	nue t	o pursue classe	es that		
	complement	nt organic che	mist	ry.					
	2. Master t	he basic labor	atory	y technic	ues i	used in the synt	thesis and		
	isolation of	f organic com	poun	ıds.					
Learning outcomes	After comp	oleting this co	urse,	student	s will	be able to:			
(general and specific	1. Explain	the structure a	and d	lynamics	s of o	rganic molecul	les and will		
competences):	be able to a	classify and na	ame	organic	comp	ounds.			
	2. Describe	e typical react	ions	of majoi	clas	ses of organic of	compounds		
	and predict	reaction proc	lucts	or use a	ppro	priate reactants	to carry		
	them out.								
	3. To clarif	Ty the basics a	bout	natural	orgai	nic compounds	that will		
	allow them	to relate basi	c che	emical p	rincij	ples to the struc	cture and		
	functions of	f biological n	nolec	cules.					
	4. Use basic laboratory techniques used in organic chemistry.								

Content of the	Introduction. Chemical bonds. Electronic structure of organic
syllabus/performanc	molecules. Alkanes, composition, constitution, configuration.
e plan (in short):	Stereochemistry. Alkenes, alkanes; structure and reactivity. Addition
	reactions to alkenes. Electrophilic substitutions, reactions of aromatic
	compounds. Alkyl halides; substitutions on saturated carbon.
	Elimination reactions. Alcohols, thiols, ethers. Nucleophilic
	Additions, Aldehydes and Ketones. Carboxylic acids and derivatives.
	Nucleophilic acyl substitutions. Amines. Heterocyclic compounds.
	Amino acids and peptides. Carbohydrates, glycosides and nucleotides.
	Lipids. Alkaloids. Synthetic polymers.
	Laboratory tutorials: Introductory tutorials (melting point
	determination, steam distillation, extraction with indifferent and
	reactive solvent, recrystallization). Syntheses (nucleophilic
	substitution, esterification, reduction, oxidation, electrophilic aromatic
	substitution). Isolation of natural compounds (pigment isolation and
	chromatography, lactose, oleic acid, piperine, DNA).
Evaluation in detail w	vithin European Credit Transfer System

ion in detail within European Credit Transfer System (Example)

(Example)			
STUDENT	LESSON HOURS	ECTS	GRADE
OBLIGATIONS	(ASSESSMENT)		
Class attendance and	105	3,5	
activity			
Midterm (2) or	90	3	80%
Written exam			
Oral exam	45	1,5	20%
TOTAL	240	8	100%
Additional clarification:	·		
According to the Rulebo	ook on studying, the fina	l grade is obtained as follo	ws:
	_		

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	1. Stanley H. Pine: Organic Chemistry, Školska knjiga Zagreb 1994.
literature:	
	2. J. McMurry. Basics of Organic Chemistry, Medicinski fakultet
	Sveučilišta u Rijeci, Zrinski d.d., 2014.
Additional literature:	1. H. Hart, L. E. Craine, D. J. Hart, Ch. M. Hadad, Organic
	Chemistry-a Short Course, Twelfth Edition, Houghton Mifflin
	Company, Boston, USA, 2007.
	2. V. Rapić, Nomenclature of Organic Compounds, III. revised and
	renewed edition Školska knjiga Zagreb 2004

Course title	MATHEMATICS 2					Course Course code	
Study programme	1. cycle			Study year	1		
ECTS point value:	5	Semester 2.			Hours per semester (l+t+s)	30+30+0	
Course status:	Core	Prerequisites:			Compa conditio	rative ons:	
Course access:					Class s	chedule:	
Course teacher:		Prof Ljiljanka K	vesić,	PhD			
Contact hours/consulta	tions:						
E-mail and phone num	ber:	1	jiljank	ka.kves	sic@fpmo	oz.sum.ba	
Asisstant							
Contact hours/consulta	tions:						
<i>E-mail and phone num</i>	ber						
Learning outcomes (general and specific competences):	Introduce students to the basic ideas and methods of differential calculus that are the basis for other courses. The lectures will informally cover basic mathematical concepts, illustrating their usefulness and application. At the tutorials, students should master the appropriate technique and be able to solve specific problems. After successfully mastering the course content, the students are expected to communicate mathematical knowledge and ideas in an argumentative and effective way such as: - understand the basic methods of integration, and relate the concept of a definite and indefinite integral - identify how a particular integral is formed - apply integral calculus in calculating the surface area, length of the arch, volume and area of rotating bodies - solve first and second-order differential equations, and identify basic models of differential equations - use a matrix account - distinguish and apply different ways of solving systems of linear equations					tures will tures will ting their master the is. as are as in an e concept gth of the entify f linear hing, the	
Content of the syllabus/performance plan (in short):	<ul> <li>student is expected to build a foundation for lifelong learning and continuing education.</li> <li>The concept and properties of an indefinite integral. Integration methods: substitution method, partial integration method, integral of a rational function. Definite integral. Newton - Leibniz formula. Integration technique. The Mean Value Theorem for integrals of continuous function. Applications of definite integral (curve arch length, pseudotrapezoid surface, rotary body volume, applications in the technique). Improper integrals.</li> </ul>						ntegration d, integral z formula. tegrals of purve arch plications

	<ul> <li>Ordinary Differential Equations: A general and particular solution of a differential equation. Ordinary first-order differential equations (separation of variables, homogeneous, linear, Bernoulli, exact differential equation). Second-order linear differential equation. Second-order linear differential equation. Second-order linear differential equation with constant coefficients.</li> <li>Matrices. Matrix operations. Ranks. Regular matrices. Determinants. Matrix equations. Systems of linear algebraic equations. Gaussian method of elimination. Gauss - Jordan method. Discussion of the solution of a system of linear equations. Cramer's</li> </ul>						
	method						
<b>Evaluation in detail</b> wit	hin European Credit Transf	er System					
(Example)	1 0	·					
STUDENT	LESSON HOURS	ECTS	GRADE				
OBLIGATIONS	(ASSESSMENT)						
Class attendance and	60	2	10%				
activity							
Midterm (2) or	45	1.5	40%				
Written exam							

1.5

5

50%

100%

Additional clarification:

Oral exam

TOTAL

45

150

E.g. Activity is graded as follows:: less than 80% of attendance = 0% of grade from 81% to 84% = up to 2% of grade from 85% to 88% = up to 4% of grade from 89% to 92% = up to 6% of grade from 93% to 96% = up to 8% of grade from 97% to 100% = up to 10% of grade E.g. Midterms are graded as follows: less than 50% correct answers = 0% ocjene from 51% to 60% = up to 6% of grade from 61% to 70% = up to 12% of grade from 71% do 80% = up to 18% of grade from 81% do 90% = up to 24% of grade from 91% do 100% = up to 30% 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. Lj. Kvesić, Mathematics for the faculties of science and technology, University of Mostar, Mostar, 2015. 2. P. Demidović, Tasks and Solved Examples in Higher Mathematics with Application to Technical Sciences, Tehnička knjiga, Zagreb, 1986.

Additional literature:	<ol> <li>J. Pečarić i dr., Mathematics for the Faculties of Technology, Zagreb, 1994.</li> <li>S. Kurepa, Mathematical analysis 1 and 2, Tehnička knjiga, Zagreb, 1972.</li> <li>V. Devide i dr., Solved Tasks from Higher Mathematics, Školska knjiga, Zagreb, 1979.</li> </ol>
Additional information on course:	Lectures and tutorials are compulsory. The exam consists of a written and oral part, and it is taken after the lectures and tutorials have been completed. The results of the tests, which students write during the semester, replace the written part of the exam.

Course title	ENGINEERING				Course	FT 123
	THERMO	DDYNAMICS			code	
Study programme				Study year	1.	
Cycle	Food Tec	hnology, I				
ECTS point value:	6	Semester	II		Hours per	45+30
					semester	
					(l+t+s)	
Course status:		Prerequisites:		Co	mparative	
				СО	nditions:	
Course access:				Cle	ass	16-18sati
		1		sch	hedule:	
Course teacher:		Josip Đogić, Ph	D			
Contact hours/consulta	itions:	18 p.m. (Tuesda	y,Thursd	ay)		
E-mail and phone num	ber:	djogic.josip@gi	nail.com			
Asisstant	-					
Contact hours/consulta	itions:					
E-mail and phone num	ber					
Course objectives:	The object	tives of this cour	se are:			
	Explain g	eneral thermodyr	amic prin	nciple	es and change	s, and their
	possible application in further study and work					
Learning outcomes	After con	pleting this cour	se, studen	ts wi	ll be able to:	
(general and specific	- Clarify	basic concepts an	d principl	es in	thermodynan	nic
competences):	processes	,				
	- Apply tl	ne principles of th	lermodyn	amic	processes in j	practical
	work.					
	- Explain the thermodynamic changes of state					
	- Clarify and apply the second law of thermodynamics and circular					
	processes					
Content of the	Basic the	rmodynamic quar	ntities and	lequ	ation of state	
syllabus/performance	Thermody	ynamic state char	iges			
plan (in short):	The second law of thermodynamics, conversion of work and heat					

	Circular processes, refrigeration plants, steam processes							
Evaluation in detail w	Evaluation in detail within European Credit Transfer System							
(Example)		-	-					
STUDENT	LESSON HOURS	ECTS	GRADE					
OBLIGATIONS	(ASSESSMENT)							
Class attendance and	75 2,5							
activity								
Midterm (2) or	60	2	80%					
Written exam								
Oral exam	45	1,5	20%					
TOTAL	180	6	100%					
Additional clarification	s:							
Students can pass the w	ritten exam is possible throu	igh the midterm or inte	grally. Each task					
has a total score that is	evaluated over the accuracy	of the results and the a	ccuracy of the					
schematic diagrams. E.	g. One task has a total of 5 p	oints. For exactly calcu	ulated values of					
the required quantities,	one point is obtained, and for	or the diagram of therm	al changes and					
the scheme of operation	n one point, which ultimately	amounts to five point	s. The sum of					
points for other tasks gi	ives the total points that are o	converted into grades a	ccording to the					
percentage success rate	, as defined by the Rulebook	- 						
According to the Ruleb	ook on studying, the final gr	ade is obtained as follo	ows:					
A = 91-100% 5 (excelle	ent)							
B = 79  to  90% 4  (very)	good)							
C = 67  to  78% 3  (good)	)							
D = 55  to  66% 2  (suffice)	cient)							
F = 0 to 54% 1 (insuffic	cient)							
Compulsory	R. Budin; A. Mihalić-Bogo	lanić						
literature:	Fundamentals of Technical	Thermodynamics						
	Školska knjiga, Zagreb 1990.							
Additional literature:	I. Galović, Thermodynami	cs I & II						
	Školska knjiga, Zagreb 200	03.						
Additional								
information on								
course:								

Course title	MACHI	NE ELEMENTS	Course	FT124		
			code			
Study programme					Study	1. year
Cycle	Food Te	chnology, I			year	
ECTS point value:	6	Semester		II.	Hours per	45+30
					semester	
					(1+t+s)	
Course status:	core	Prerequisites:		Co	mparative	
		con			ditions:	
Course access:	C			Cla	iss	According to
			edule:	schedule		
Course teacher:		Prof Davorka Š	, PhI	)		

Contact hours/consultations:									
E-mail and phone num	ber:	davorka.saravanja@fsre.sum.ba							
Asisstant									
Contact hours/consulta	tions:								
E-mail and phone num	ber								
Course objectives:	The obje	ectives of this course are:							
	- introdu	ce students to the basic structural and functional							
	characte	ristics of machine elements.							
	- acquisi	tion of general knowledge through course education, and							
	among s	pecial knowledge acquisition of norms and standards used							
	in design	ning technological operations in the food industry.							
	- acquiri	quiring the skill to use knowledge, integrating previously							
	acquired	knowledge so that in practice, a student can identify the							
	elements	s of machines and circuits, identify the problems							
	encounte	ered in operation, make recommendations for their							
<b>.</b> .	eliminat	ion and make the necessary decisions independently.							
Learning outcomes	After co	mpleting this course, students will be able to:							
(general and specific	Apply K	nowledge of designing and constructing machine elements,							
competences):	Apply la	I utawilig.							
	and dyn	amics) and strength							
	Recogni	ze the various joints of machine elements elements for							
	transmis	sion of motion, transmitters of power and motion, pipe							
	structure	28.							
	Interpret	different materials and their properties with particular							
	emphasi	s on materials used in the food industry.							
	Recogni	ze the characteristics, advantages and disadvantages of							
	machine	e elements (function and application).							
	Apply th	he necessary knowledge of the norms and standards used in							
	the food	industry.							
Content of the	Introduc	tory concepts about machine elements in the food industry.							
syllabus/performance	Example	es of machines used in the food industry. Design and							
plan (in short):	construc	tion of machinery and machine parts. Determination of							
	shape an	d dimensions of machine parts. Basics of technical drawing.							
	Basics o	f statics, kinematics, dynamics. Basic Concepts of Strength							
	Science.	Material strength testing. Material fatigue testing. Basic							
	instrum	s of fine mechanics of food technology devices and							
	(couplin	g elements circular motion and power transfer elements							
	flow ele	ments, step mechanism elements, power control elements)							
	Technic	al materials division of technical materials Material							
	structure	choice and types of materials materials for the food							
	industry	physical properties: gloss colour density melting point							
	crystalli	ne structure. thermal and electrical conductivity.							
	magneti	sm; chemical properties: ability to chemically bond with							
	other ele	ements). Metals and division of metals, alloys, non-metals.							
	Testing	of material properties in food technology. The legality of							
	their me	chanical behaviour, proper application in the food industry.							
	General	y about standardization and standards. Standards and							
	quality r	nanagement systems in the food industry.							

Evaluation in detail within European Credit Transfer System								
(Example)			22.1.2.2					
STUDENT	LESSON HOURS	ECTS	GRADE					
OBLIGATIONS	(ASSESSMENT)							
Class attendance and	75	2,5	0%					
activity			<b>5</b> 00/					
Midterm (2) or	60	2	70%					
Written exam		1.5	2004					
Oral exam	45	1,5	30%					
TOTAL	180	6	100%					
Additional clarification:								
Additional clarification:								
According to the Rulebo	bok on studying, the final	grade is obtained as f	follows:					
A = 91-100% 5 (excelle	nt)							
B = 79 to 90% 4 (very g	good)							
C = 6 /  to  /8% 3  (good)	•							
D = 55  to  66% 2  (suffice)	ient)							
F = 0 to 54% 1 (insuffic	$\frac{1}{1} \frac{1}{1} \frac{1}$							
Compulsory	1. Karl-Heinz Deck	er: MACHINE ELEN	IENIS, GOLDEN					
literature:	MAKKEIING - 2 D D D D D D D D D D D D D D D D D D	TEHNICKA KNJIGA	A, ZAGKEB, 2006.					
	2. Davorka Saravan	a: Selected Chapters	of Machine					
	Elements, script,	Sveuciliste u Mostari	1, 2014.					
	5. Damir Jelaska: M	ACHINE ELEMEN.	IS, FESB,					
	UNIVERSIII U	F SPLIT, SPLIT, 200						
	4. Antun Babici dr.	E BASICS OF TECH	NICAL					
Additional literatures	MATEKIALS, SKULSKA KNJIGA, ZAGKEB, 2005.							
Additional illerature:	Industry XXI hrvatski skup kamičara i kamijskih inženiora							
	- knjiga sažetaka Zagreb 2009							
	2 D I Fellows: For	Lagicu, 2009.	ogy: Principles and					
	2. 1. J. Fellows. For	Edition Woodhead P	ublishing Limited					
	2000	Luition, woodhead I	uonsinng Linnea,					
	3 R P Singh D R	Heldman: Introducti	ion to Food					
	Engineering 3 e	1 Marcel Dekker 20	001					
	4 Filipovic I B N	iari I. Kozacinski Ž	Cvrtila Fleck B					
	Miokovic, N. Zdo	olec, V. Dobranic: OI	JALITY					
	MANAGEMENT	SYSTEMS IN FOO	D INDUSTRY.					
	Kongresno priopó	tenie	,					
Additional	The student is not oblige	d to take the written r	part of the exam if					
information on	he/she has passed two tes	sts that are organized	during the course.					
course:	Each test carries a total o	f 100 points. A minir	num score of 50% is					
	required for a passing gra	de on each test.						
	The passing grade on the	proficiency tests is v	alid only until the					
	beginning of classes in th	e next academic year	, i.e. by the end of					
	the second term of the cu	rrent academic year of	or the extraordinary					
	examination period if organized.							

Course title	INTRODUCTION TO INFORMATICS					Course code		
Study programme			Study yea	ar				
Cycle	Food Tech	echnology, I						
ECTS point value:	3	Semester		II.		Hours per semester (l+t+s)		30+15
Course access:		Semester			Con cond	nparative ditions:		
Course approach:					Clas	ss schedul	le:	
Course teacher:		Prof Milenk	o Ol	bad, pHo	d			
Contact hours/consultat	ions:							
E-mail and phone numb	er:	Milenko.oba	ıd@	fsre.sun	1.ba			
Asisstant								
Contact hours/consultat	ions:							
E-mail and phone numb	er							
Course objectives:	The objectives of this course are: Provide students with basic information technology knowledge and learn how to master basic computer skills to create a foundation for acquiring the specialized knowledge required to manage information in business. Specific competencies would be developed within the framework of seminar papers and exercises by designing project assignments according to students' preferences							
(general and specific competences):	<ul> <li>After completing this course, students will be able to:</li> <li>- clarify the basic concepts and principles of network and Internet communication protocols,</li> <li>- use presentation tools;</li> <li>- use computers and information and communication (ICT) technologies in research.</li> </ul>							
Content of the syllabus/performance	Information and inform	on technology nation. Hardw	and are.	l digital Softwa	socie re. Pe	ty. Comp cople. Org	uter ganiz	system. Data zation.
<i>plan (in short):</i> <b>Evaluation in detail</b> wi	Communication. Computer algorithms and programming. Computer system model. The central unit of the computer. Processor. Working memory. Program execution and instruction sets. Input-Output Subsystem, Input Devices. Output devices. Storage devices. Data structure. Physical and logical organization of data. System software. Operating systems. Utilities. Computer communications and networks. Information systems. Role and tasks of IS. Designing IS. Construction of IS. IS management. Organization and management of data. Files. Database. Data Warehouses. Data Warehousing. Data mining. Internet and e- commerce. Internet. Functions of the Internet. Search the Internet.							
(Example)								
STUDENT OBLIGATIONS	LESSON (ASSES	N HOURS SMENT)	F	ECTS			GR	ADE
Class attendance and activity	45	· · · ·	1	,5				

Midterm (2) or	30	1	60%					
Written exam								
Oral exam	15	0,5	40%					
TOTAL	90	3	100%					
Additional clarification								
According to the Ruleb	ook on studying, the final	grade is obtained as follo	ows:					
A = 91-100% 5 (excelle	ent)							
B = 79 to 90% 4 (very §	good)							
C = 67  to  78% 3  (good)								
D = 55 to 66% 2 (suffic	ient)							
F = 0 to 54% 1 (insuffic	cient)							
Compulsory	Čerić, V., Varga, M., Information Technology in Business,							
literature:	Element, Zagreb, 2004. Novak, N.: Poseban studentski priručnik o							
	ICT; Zagreb, Osijek, 2001.							
Additional literature:	Gupta, U., Information Systems, Success in the 21st century,							
	Prentice Hall, Upper Sad	dle River, NJ, 2000. Hin	kle, D., Marple,					
	M., Stewart, K., MS Office XP Suite: A Comprehensive Approach,							
	Student Edition, Glencoe	McGraw-Hill, 2002.						

Course title	PHYSICAL CHEMISTRY					Course		
						code		
Study programme						Study	second	
Cycle	Food Te	chnology, I				year		
ECTS point value:						Hours		
	6	Semester		III		per	45+30+0	
						semester		
-					-	(l+t+s)		
Course status:	core	Prerequisites	Ph	ysics	Compo	arative		
			Che	mistry	condit	ions:		
Course access:		1			Class S	schedule:		
Course teacher:		Ivana Martino	vić, I	PhD				
Contact hours/consulta	tions:	By appointment	nt, e-	mail: <u>iv</u>	ana.mar	<u>tinovic@fp</u>	tinovic@fpmoz.sum.ba	
E-mail and phone num	umber:							
Asisstant		Mag. kem. i bi	ol. G	loria Zl	atić, ass	istant		
Contact hours/consulta	tions:	By appointment	nt, e-	mail: <u>z</u> l	laticglor	ia@gmail.	<u>com</u>	
E-mail and phone num	ber	Gloria.zlatic@	fpmo	oz.sum.ł	<u>5a</u>			
Course objectives:	The objectives of this course are: to gain knowledge of the basic							
	principl	principles of physical and chemical change.						
Learning outcomes	After co	mpleting this co	ourse	, studen	ts will b	e able to:		
(general and specific	- clarify the basic concepts and principles of chemical							
competences):	thermodynamics,							
_	- apply l	knowledge in th	e fiel	d of che	emical tl	hermodyna	mics,	
	processes in solutions and colloidal systems, and at the phase							
	boundary.							
	- perform practical exercises.							

	The aforementioned knowledge is a necessary basis for the understanding and study of sources in the field of Food								
		chnology and food and	process engineering						
	Le	ctures.	process engineering	•					
Content of the	Ide	eal and realistic o	ases Basic conc	cents of chemical					
syllabus/norformanco	the	rmodynamics (internal	anaray anthalay	epts of chemical					
nlan (in short).		energy, free enthalpy, chemical potential). Fundamental laws of							
piun (in short).	che	chemical thermodynamics (zero. first. the second. third law of							
	the	thermodynamics) Phase equilibria and phase transitions							
		lligative properties of	solutions Freezing	pilase transitions.					
		notic pressure Phase-h	solutions. Treezing	Adsorption Kinetics					
		nbuc pressure. Thase-b	iscosity Electrolyte	solutions and their					
		physical processes. V	l mechanisms of	chemical reactions					
		lloidal systems Gels et	mulsions foams Stri	acture and stability of					
		loidal systems. Nutritio	nal colloidal systems	s and their properties					
		torials:	nai conoidai system	s and men properties.					
	Dis	stillation. Adsorption. I	Density and viscosity	v. Chemical kinetics.					
	Co	nductimetry. Potenti	ometry. Colourin	netry. Preparation,					
	dep	position and properties of	of colloids	5 1 /					
Evaluation in detail w	vithir	n European Credit Tran	esfer System						
(Example)									
STUDENT		LESSON HOURS	ECTS	GRADE					
OBLIGATIONS		(ASSESSMENT)							
Class attendance and		75	2,5	-					
activity									
Independent practical		45	1,5	40 %					
work (Lab. exercises)									
Midterm (2) or		60	2	60%					
Written exam		100		1000/					
TOTAL		180	6	100%					
Additional clarification	1:		1 . 1 1 .	11					
According to the Ruleb	OOK	on studying, the final g	rade is obtained as f	ollows:					
A = 91-100% 5 (excelled) D = 70.45000% 4 (excelled)	ent)	1)							
$B = 79 \ 10 \ 90\% \ 4 \ (very)$	yoor	1)							
C = 0/10/8% 3 (good) D = 55 to 66% 2 (good)	) siant	)							
D = 33 10 00% 2 (sufficience) E = 0 to 54% 1 (insufficience)	ciont	.) t)							
$\Gamma = 0.00.54\%$ 1 (msunit	ciem	()							
Compulsory	Z	Pilić, Physical Chemis	try I. Fram Ziral. N	Mostar, 2010.					
literature:	<b>P</b> .	Atkins, J. de Paula, Pl	HYSICAL CHEMI	STRY. 8th Edition.					
		ford University Press	2006						
	Z.	Pilić. Workbook- Phy	sical Chemistry, Fr	am Ziral. Mostar.					
	201	14.		<b>uni 211 un</b> , 11200 <b>u</b> n,					
	Z. 1	Pilić, I. Mišković, Pract	ticum in Physical Ch	emistry. Mostar					
	200	07. Interna skripta.	5	<b>,</b>					
Additional literature:	Me	ekjavić, Physical Chemi	istry 1, basic definiti	ons, examples and					
	tas	ks, Školska knjiga, Zag	reb 1996.						
	I. Mekjavić, Physical Chemistry 2, basic definitions, examples and								
	tas	ks, Golden marketing, Z	Zagreb 1999.	*					
		-							

Additional	
information on	
course:	

Course title						Course		
	MICROBIOLOGY					code		
Study programme						Study		
Cycle	Food Te	chnology, I				year	2.godina	
ECTS point value:		Hours per				Hours per		
	6	semester (l+t+s)	)			semester	45 P i 30 V	
				First	(I))	(l+t+s)		
Course access:		Comparative		-	Compo	arative		
		conditions:			condit	ions:		
Course approach:	Lecture	s Class			schedule:	Winter		
							semester	
Course teacher:								
		Višnja Vasilj, PhD						
Contact hours/consulta	tions:							
E-mail and phone num	ber:	2 hours per w	eek					
Asisstant		visnjavasilj@yahoo.com or visnja.vasilj@aptf.sum.ba						
		ured: 036/ 337 114 or mobile phone: 063/313 712						
Contact hours/consulta	tions:							
E-mail and phone num	ber							
Course title								
Course objectives:	The aim	of the course is	for	the stu	ident to	acquire bas	ic knowledge	
	about the basics of microbiology that enable understanding of							
	particular areas of microorganisms and their role, meaning and							
	function in nature and human life.							
Learning outcomes	Upon successful completion of the module, students will be							
-----------------------	--							
(general and specific	able to:							
competences):	- use basic knowledge of microbiology, the role and							
1 /	importance of microorganisms in nature and human life							
	- distinguish prokaryotes from eukaryotes based on							
	morphological, physiological and biochemical							
	characteristics							
	- explain the conditions of occurrence of the disease							
	- Classify and identify micro-organisms							
	- distinguish between the factors of nutrition, growth,							
	reproduction and death of microorganisms							
	- distinguish between microbial metabolism and metabolic							
	differences between microorganisms							
	- apply methods of isolation and identification of micro-							
	organisms							
	- distinguish viruses from other microorganisms							
	- select methods for suppressing the growth of							
	microorganisms							
	- apply the basic rules of safe operation in the microbiology							
	laboratory							
	- differentiate and select rootstocks for the cultivation of							
	particular types of microorganisms							
	- prepare a simple solid or liquid nutrient medium for the							
	cultivation of microorganisms							
	- make microscopic preparations							
	- Apply incroscopy techniques							
	- calculate the humber of microbes in the sample by default							
	- interpret the results of microbiological analyses							
	The content of the module includes an introduction to							
Content of the	microbiology - microbes in the environment role in substance							
svllabus/performance	transformation and human life: Classification of microorganisms							
nlan (in short):	(five empires, taxonomy, systematics). In the general part of							
	microbiology, the student is introduced to the structure and							
	function of prokaryotic cells (structure of functions and cellular							
	organelles) Structure and function of eukaryotic cells (structure							
	of function and function of cellular organelles). Determination							
	of the number of living microorganisms. Growth curve.							
	Fungi, yeasts and moulds, systematics and morphology,							
	propagation, nutrition and cultivation.							
	Prorists, morphology, prevalence, activity and reproduction.							
	Non-cellular entities - Viruses, morphology, traits,							
	classification.							
	Microbial growth and breeding and metabolism; Properties,							
	conditions of growth and development of microorganisms and							
	microbial metabolism; Metabolic differences among							
	microorganisms; Membrane transport and food requirements							
	(autotrophs, heterotrophs and hypotrophs). Physical and							
	chemical requirements for growth. Growing microbes, nutrient							
	mediums. Macromolecules.							

Metabolism, catabolic and anabolic reactions. Biological
catalysts- enzymes. Energy production and central energy
production pathways in which microorganisms participate.
Control and suppression of microbial growth. Microbiocidal and
microbial agents. Chemical agents for sterilization and
disinfection. Physical methods of sterilization.
The special section covering Microbial ecology biochemical
activity of microorganisms in cycles in nature. Biotic and abiotic
growth factors. Interaction between different organisms.

Evaluation in detail within European Credit Transfer System

(Example)			
STUDENT	LESSON HOURS	ECTS	GRADE
<b>OBLIGATIONS</b>	(ASSESSMENT)		
Class attendance	75	2,5	
Midterms and	60	2	Limit 55% ; Part in grade
preparation for			25%
continuous			Limit 55%; Part in grade
assessment or written			25%
exam			
Oral exam	45	1,5	Limit 55%; Part in grade
			50%
TOTAL	180	6	100%

Additional clarification: example

E.g. To pass the final exam, students are required to achieve a minimum score during class, which is 20% in total. During semester, two midterms are written. The final grade includes the results of the midterm exam, the final exam, the activity during the class and the evaluation of the seminar paper.

Seminar paper is graded as follows:

**0% = Paper is not written.** 

**2%** = The paper does not meet the formal criteria.

4% = The paper meets the formal criteria, but there are major deficiencies in the content.

6% = The paper meets formal and content criteria, but there are notable grammatical and spelling errors.

8% = The paper meets formal and content criteria, but there are minor grammatical and spelling errors.

**10%** = The paper is comprehensive, with correct grammar and spelling.

Presentation of the seminar paper is graded as follows:

**0% = Paper is not presented.** 

2% = Paper is read.

**4%** = Paper is partially read and unprepared.

6% = Paper is not read, but there are major deficiencies in the oral presentation.

8% = Presentation is well prepared, but minor errors in the speech are noticed.

**10% = Oral presentation is well prepared.** 

Midterms are graded as follows:

less than 50% correct answers = 0% ocjene

from 51% to 60% = up to 4% of grade

from 61% to 70% = up to 8% of grade

from 71% do 80% = up to 12% of grade

from 81% do 90% = up to 16% of grade

from 91% do 100%	= up to 20% of grade			
Written exam is grade	ed as follows:			
less than 50% correct	t answers = 0% ocjene			
from 51% to 60% =	up to 6% of grade			
from 61% to 70% =	from 61% to 70% = up to 12% of grade			
from 71% do 80% =	up to 18% of grade			
from 81% do 90% =	up to 24% of grade			
from 91% do 100%	= up to 30% of grade			
Additional clarification				
According to the Ruleb	ook on studying, the final grade is obtained as follows:			
A = 91-100% 5 (excelle	ent)			
B = 79 to 90% 4 (very	good)			
C = 67  to  78% 3  (good)	)			
D= 55 to 66% 2 (suffic	D = 55 to 66% 2 (sufficient)			
F = 0 to 54% 1 (insufficient)				
Compulsory	Duraković S.; Redžepović S.( 2003): "Introduction to General			
literature:	Microbiology" Kugler			
	Duraković S. (1996): Applied Microbiology Kugler			
	Duraković S. Duraković L.(2003): Mycology in Biotechnology,			
	Kugler			
Additional literature:	Hajsig D., Delaš F. (2016): Manual for Tutorials in General			
	Microbiology.			
	Stilinović B.: Hrenović J. (2009): Bacteriology Practicum, Kugler			

Course title						Course	
	ENGINEERING			code			
Study programme						Study year	2.
Cycle	Food Tec	Food Technology, I					
ECTS point value:	7,5	Hours per semest	er	III.		Hours per	90
		(l+t+s)				semester	
						(l+t+s)	
Course status:	Core	Prerequisites:			Co	mparative	
					COP	nditions:	
Course access:		Cla		ass			
					sch	nedule:	
Course teacher:		Prof Srećko Tor	nas	s, PhD			
Contact hours/consulta	tact hours/consultations:						
E-mail and phone number:		srecko.tomas@	otfo	os.hr			
Asisstant		Josipa Krezić, mag.ing.					
Contact hours/consulta	tions:						
E-mail and phone num	umber jjosipa.vukoja@gmail.com						
Course objectives:	The objectives of this course are:						
	Study of transfer processes: quantities of motion, heat and matter			t and matter			
	based on a unique approach to the transfer processes that underlie			that underlie			
	engineeri	engineering disciplines and applied sciences.					

Learning outcomes (general and specific competences):	After completing this cours 1. to clarify the phenomen amount of motion energy a	e, students will be able a and regularities in the	to: ne transfer of the	
competences).	2 define the effects of hy	drodynamic conditions	on transmission	
	phenomena.		on transmission	
	3. explain the basic laws an apply them, depending on amount of motion, heat or r	d equations at the macr the mechanism when natter.	oscopic level and transferring the	
	and matter to define the trai	nsport coefficients.	in or motion, neur	
	5. calculate and use units an	nd thermodynamic table	es.	
	<ul><li>6. interpret laboratory o meaning, and their connection</li><li>7. plan and manage time.</li></ul>	bservations and mea ion with relevant theory	surements, their	
Content of the syllabus/performance plan (in short):	Physical basics. Newton's law of viscosity. Basic laws of conservation of matter and energy. Mechanisms of transfer of matter and energy. Transmission of the amount of motion. The law of continuity. Bernoulli's theorem. Stream types and Reynolds number. Losses of energy during streaming. Circulation. Mixer flow. Flow-through the particle layer. Liquid transport. Transport of gases. Transport of solids. Heat transfer. Heat transfer by conduction. Convection heat transfer. Application of houndary layer theory in			
	the analysis of convection heat transfer. Heat transfer in a blender. The passage of heat. Heat transfer by radiation (radiation). Heat transfer devices. Transfer of substance. Diffusion of matter. Mass transfer by convection (vortex mass transfer). Application of boundary layer theory in substance transfer analysis. The analogy of the transfer of the amount of motion, matter and energy. Exercises: Auditory - solving computational examples related to problems of substance and energy transfer; laboratory and industrial.			
<b>Evaluation in detail</b> with	ithin European Credit Trans	fer System		
(Example)	L ESSON HOUDS	ECTS	CRADE	
ORLIGATIONS	LESSON HOURS (ASSESSMENT)	ECIS	GRADE	
Class attendance and	90	3	40%	
Midterm (2) or	135	45	60%	
Written exam	155	+,5	0070	
TOTAL	90	7,5	100%	
Additional clarification:		,		
According to the Rulebo	ook on studying, the final gr	ade is obtained as follo	ws:	
A = 91-100% 5 (excellent)				
B = 79  to  90% 4  (very good)				
C = 6/ to /8% 3 (good) D = 55 to (60) 2 (multi-signal)				
D = 55 to 66% 2 (suffic F = 0 to 54% 1 (insuffic	ient)			
Compulsorv	//////////////////////////////////////			
literature:	1. S. Tomas. M. Planir	nić, A. Bucić-Koiić: Tr	ansmission of	
	matter and energy.	Interna skripta, Ösijek,	2012.	

	2.	<ul> <li>S. Tomas, M. Planinić, A. Bucić-Kojić: <i>Transmission of matter and energy - Solved examples and tasks</i>. Interna skripta, Osijek, 2012.</li> <li>S. Tomas, M. Planinić, A. Bucić-Kojić: <i>Transmission of matter and energy</i>. <i>Formulas, diagrams and tables</i>, Osijek 2012.</li> </ul>
Additional literature:		
	1.	R.S. Brodkey, H. C. Hershey: Transport Phenomena.
		McGraw-Hill, New York, 1988.
	2.	J.M. Coulson, et al.: <i>Chemical Enginnering I-V</i> . Pergamon
		Press, Oxford. 1999.
	3.	R.H. Perry, D.W. Green: Perry's Chemical Engineer's
		Handbook. 7nd ed, McGraw-Hill, New York, 1997.
	4.	K. Ražnjević: Termodinamičke tablice. Svjetlost, Sarajevo,
		1989.
	5.	A.F. Mills: Basic Heat & Mass Transfer. 2nd ed., Prentice
		Hall, Upper Saddle River, New Jersey, 1999.

Course title	Biochemistry			Course	FT214		
						code	
Study programme					Study	II	
Cycle	Food Te	echnology, I				year	
ECTS point value:						Hours	
	7,5	Semester		I	Ι	per	
						semester	60+30+0
		<b>D</b>		•	2	(l+t+s)	
Course status:	core	Prerequisites:	Che	emistry	Comp	arative	
				2	condit	ions:	
Course access:		-			Class	schedule:	9-14 h
Course teacher:							
	Stanislava Talić, PhD						
Contact hours/consulta	Contact hours/consultations:						
E-mail and phone number:		Wedsnesday 12-14 h, FPMOZ, campus Rodoč, office					
	211 a						
Asisstant		Stanislava.talic	@fpr	noz.sun	1.b <u>a</u>	036 445 4	80
Contact hours/consultations:		Marijana Mark	ović,	senior a	assistan	t	
E-mail and phone num	ber	Wednesday 12	-14 h	or by a	ppointr	nent	
Course title		markovic_mari	jana (	@hotma	il.com		
Course objectives:	Acquiri	ng knowledge ab	out b	oiomolec	cules, th	eir structur	e, biological
	role and their mutual transformation in living organisms.						
Learning outcomes	Student	s will be able to:					
(general and specific	- Explain basic concepts about biomolecules and their metabolism.			netabolism.			
competences):	- Explai	in the processes	of nu	trient de	gradati	on, macron	nolecule
• <i>´</i>	biosynt	hesis processes a	nd er	nergy co	nversio	n processe	s in the
	body.	Ĩ		07		1	
	- Perform	n laboratory exerc	ises i	n bioche	mical la	boratories.	

	Lectures: Introduction to I	Biochemistry. Molec	ular basis of living				
Content of the	organisms. Chemical bond	s among biomolecule	es.				
syllabus/performance	Amino acids. Peptides. Pro	teins: structure and f	function. Protein				
plan (in short):	isolation and purification to	echniques.					
	Enzymes: An active site. K	inetics. Inhibitors. V	itamins and				
	cofactors.						
	Lipids, triacylglycerols, co	mplex lipids, cell me	embranes, transport				
	through membranes.						
	Nucleotides. Nucleic acids	; the structure of DN	A and RNA. DNA				
	replication. Transcription.	replication. Transcription. Protein biosynthesis.					
	Carbohydrates. Monosacch	narides and polysaccl	narides. Structure				
	and role in the station.						
	Energetics of cellular reactions. Metabolism. Glycolysis. The citric						
	acid cycle. Respiratory chain. Oxidative phosphorylation.						
	Gluconeogenesis. Pentose	phosphate pathway.	Glycogen				
	metabolism. Photosynthesi	s and the Calvin cyc	le. Fat degradation				
	and synthesis.						
	Protein and amino acid bre	akdown. The urea cy	cle. Metabolism				
	integration.						
	Problems and tasks related	to ionization of amin	no acids and				
	proteins,						
	enzymatic kinetics and protein biosynthesis						
	<b>Tutorials:</b> Qualitative and quantitative analysis of proteins,						
	carbonydrates and lipids. Quantification of proteins. Isolation of						
	DNA from plant material. Enzymatic activity and kinetics. Protein						
	purification. Protein electrophoresis. Computer simulation.						
<b>Evaluation in detail</b> with	valuation in detail within European Credit Transfer System						
(Example)							
STUDENT	LESSON HOURS	ECTS	GRADE				

STUDENT	LESSON HOURS	ECTS	GRADE
OBLIGATIONS	(ASSESSMENT)		
Class attendance and	90	3	30%
activity			
Midterm (2) or	90	3	50%
Written exam			
Oral exam	45	1,5	20%
TOTAL	225	7,5	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 ( $e^{55}$  is et)

D = 55 to 66% 2 (sufficient) F = 0 to 54% 1 (insufficient)

$1 = 0.003 \pm 70.1$ (msun	
Compulsory literature:	<ul> <li>J.M. Berg, J.L. Tymoczko, L. Stryer, BIOCHEMISTRY, Školska knjiga 2013.</li> </ul>
	• R.K. Murray i sur., Harper's Illustrated Biochemistry, 28. izdanje, Medicinska naklada, Zagreb 2011.
Additional literature:	<ul> <li>Voet D. &amp; Voet J.G., Biochemistry,3<sup>rd</sup> Edition, John Wiley &amp; Sons, Inc.N.Y., 2004.</li> </ul>

• J.M. Berg, J.L. Tymoczko, L. Stryer, Biochemistry, 4 <sup>rd</sup> Edition, W.H. Freeman and Comp., New York.,2006.
• L. Stryer, Biochemistry, Školska knjiga, Zagreb, 1991;

Course title	BIOSTATISTICS			Course code:			
Study programme				Study	2		
Cycle	Food Tec	hnology. I		vear:	2.		
ECTS point value:	3	Semester	3	Hours pe	r 15+15		
Ders point vanie.	U	Semester	5.	semester	- 10+10		
				(1+t+s)			
Course status:	Core	Prereauisites:		Comparativ	e		
		1		conditions:			
Course access:		Class					
				schedule:			
Course teacher:		Prof Zrinka Kne	zović, Phl	D			
Contact hours/consulta	tions:	2 hours, 1 h per	week				
E-mail and phone numb	per:	zrinka.knezovic	@aptf.sun	<u>n.ba 036</u> 337-	104		
Asisstant							
Contact hours/consulta	tions:						
E-mail and phone numb	umber						
Course objectives:	"Learning by doing" is the best way to gain basic knowledge and						
	ability to understand, manage and analyze different types and						
	structures of data. It allows the student to understand the literature.						
Learning outcomes	The stude	ent will know/be a	ble to:				
(general and specific	- specify	and explain variab	oles and the	eir relationsh	nips in nature,		
competences):	- present	and apply a data a	nalysis m	ethod			
	- interpre	t the results of the	analysis.				
	The modu	ile is designed to	provide th	e student wit	h basic		
	theoretica	ll knowledge, with	an emph	asis on the pr	actical		
	applicatio	on of biostatistics i	methods c	of data descrip	otion (estimation		
	of mean a	ind variability par	ameters) a	and statistical	inference		
	(testing o	r hypotheses abou	t one, two	or more sam	iples and		
	variables,	). The module is c	oncerned	with the choi	ce of a suitable		
	Tashnala	analysis for vari	ous proble	f magnita	ch în Food		
Contant of the	History	gy, and the interp	line, Ver	inesults.	mag of variables.		
content of the	Dopulation	n and sample:	Erocuo	ables and ty	tion: Monsuring		
syllabus/perjormance	instrumer	n and sample,	variabili	ty in a sm	all sample only:		
pian (in snort).	Probabili	ty distribution a	nd some	more impo	an sample only,		
	distributio	ons: Confidence li	mits of th	e arithmetic r	nean: Student's - t		
	distributio	on. Testing the nu	ill hypoth	esis of the di	ifference between		
	average	values: t-test: F	- distribi	tion and F	- test Variance		
	Analysis Correlation and Regression						
<b>Evaluation in detail</b> w	ithin <i>Euro</i>	pean Credit Trans	fer Syster	n			
(Example)			,				
STUDENT	LESSO	N HOURS	ECTS		GRADE		
OBLIGATIONS	(ASSES	SMENT)	~				
Class attendance		30		1			

Independent tasks	15	0,5	5%						
Written exam	45	1,5	95%						
TOTAL	90	3	100%						
Independent taskss ar	e graded as follows:								
0% = Tasks not done									
1% = Tasks complete	1% = Tasks completed but unsatisfactory.								
2% = Tasks complete	d but only one correct								
3% = Tasks complete	l but with bigger errors								
4% = Tasks are well p	repared, but minor errors	are noted							
5% = Tasks are well p	repared and results are pr	esented correctly							
Written exam (held in	two partial sections):								
From 51-60% = 19%	of grade								
From 61-70% = 38%	of grade								
From 71-80% = 57%	of grade								
From 81-90% = 76%	of grade								
From 91-100% = 95%	o of grade								
According to the Ruleb	ook on studying, the final gr	ade is obtained as follo	ows:						
A = 91-100% 5 (excelle	ent)								
B = 79 to 90% 4 (very	good)								
C = 67  to  78% 3  (good)									
D = 55  to  66% 2  (suffice)	cient)								
F = 0 to 54% 1 (insuffic	cient)								
Compulsory	Biometrics – Knezović Z. 2	014. Publisher: Univer	rsity of Mostar.						
literature:									
Additonal literature:	Statistics for non-mathemat	icians -B.Petz 2001. P	ublisher Slap						
Additional	Notes: Working on Compu	ter-MS Excel							
information on									
course:									

Course title	FOOD SCIENCE					Course	
				code			
Study programme							II
Cycle	Food Tec	hnology, I				year	
ECTS point value:	5	Semester IV			Hours per	45 + 0 + 0	
						semester	
						(l+t+s)	
Course status:	core	Prerequisites:	-		Co	mparative	-
					со	nditions:	
Course access:	-				Cla	ass	-
	sci					nedule:	
Course teacher:		Prof Daniela Č	ačić	Kenjer	ić, I	PhD	

Contact hours/consultations:		-							
E-mail and phone numl	ber:	daniela.kenjeric@ptfos.hr							
Asisstant		-							
Contact hours/consulta	tions:	-							
E-mail and phone numb	ber	-							
Course objectives:	The object	tives of this cours	se are: to acquire basic	knowledge in the					
0	field of h	uman nutrition. Si	nce nutritional intake	depends on other					
	factors an	d market supply,	and food technologist	s participate in the					
	creation,	production and qu	ality control of produ	cts that ultimately					
	reach the	market and make	up a large part of nut	ritional intake,					
	students r	eceive guidance o	on proper nutrition thr	ough the course,					
	the intake	e recommendations of individual nutrients as well as							
	informati	on on trends in mo	odern nutrition.						
Learning outcomes	After con	ompleting this course, students will be able to:							
(general and specific	Define an	d explain proper i	nutrition guidelines.						
competences):	Describe	and explain daily	energy requirements.						
	Describe	the material and e	xplain the role of indi	vidual organs in					
	the digest	ion and absorption	n of nutrients.						
	Define an	and explain the role and daily needs of the organism for							
	nutrients	(proteins, carbohy	drates, fats, vitamins,	minerals, water).					
	Define an	and explain the meaning of different plant and animal foods							
	in the hur	human diet.							
	Define fu	ne functional nutrition and explain their role in a balanced diet.							
	Describe	and explain the ad	lvantages and disadva	ntages of genetic					
	engineeri	ng and sustainable	e nutrition as an appro	ach to population					
	nutrition.								
	Define an	d explain food-rel	lated hazards.						
	Describe	ways of assessing	diet quality and nutri	tional status.					
Content of the	• Basic pi	inciples of proper	nutrition - nutritional	guidelines.					
syllabus/performance	• The ene	rgy needs of the o	rganism.						
plan (in short):	• Physiol	bgy of the digestiv	e system.						
	• Macron	utrients: Protein, c	carbonydrates, fats.						
	• Microni	urients: vitamins a	and minerals.						
	• Fluid ne	reas of the body.							
	• Food of	piant origin.							
	• Function	allinai origin.							
	• Genetic	ally Modified Foo	de vel Sustainable Nu	trition					
	• The has	ics of food poison	ing						
	• Basics c	of nutrition quality	assessment and nutri	tional status					
	• Trends i	n contemporary n	utrition.	lional status.					
<b>Evaluation in detail</b> w	ithin Euro	pean Credit Trans	fer System						
	I DOGO		<b>D</b> CTEC	CDADE					
STUDENT ORLICATIONS	LESSO	SON HOURS ECTS GRADE							
Class attendance and	(ASSES		15						
activity	40	1,5							
Midterm (2) or	60		2	70%					
Written exam	00		<i>–</i>	1070					
Oral exam	45	1.5 30%							

TOTAL	150	5	100%				
Additional clarification:							
During the semester, the	ee partial exams are written	, all of which have the s	same weight				
factor in the final grade	Partial examinations are op	tional, and all partial ex	aminations				
replace the written exam	nination.	_					
According to the Ruleb	ook on studying, the final gr	ade is obtained as follo	ws:				
A = 91-100% 5 (excelle	ent)						
B = 79 to 90% 4 (very s	good)						
C = 67  to  78% 3  (good)							
D = 55 to 66% 2 (suffic	ient)						
F = 0 to 54% 1 (insuffic	tient)						
Compulsory	M.L. Mandić: Food Science	e, Faculty of food techn	ology Osijek.				
literature:	literature: Osijek 2003.						
Additional literature:	G. Krešić: Food Trends, The Faculty of Tourism and Hospitality						
	Management, Opatija, 2012	•					

Course title							
	WATER MICROBIOLOGY					code	
Study programme						Study	
Cycle	Food 7	Food Technology, I					2. year
ECTS point value:						Hours	
	6	Semester				per	45P+15V+15S
				Second (II)		semester	
						(l+t+s)	
Course status:		Prerequisites:		- Compa		rative	
					conditi	ons:	
Course access:	Lectures			Class schedule:		Summer	
							semester

Course teacher:		Vižnia Vasili DhD						
Contact hours/consulta	tions	visija vasij, i lid						
<i>E-mail and phone number</i>	her	2 hours per weel	7					
Asisstant		visniavasili@val	visniavasili@vahoo.com.or.visnia.vasili@antf.sum.ha					
15:55:0011		$\frac{\text{visingle value}}{\text{office: +36/337}}$	$\frac{\text{visiju} \text{vasij} \text{e galoo.com}}{\text{office}}$ of $\frac{\text{visiju} \text{vasij} \text{e upu.sum.ou}}{\text{visiju}}$					
Contact hours/consulta	tions:		111					
<i>E-mail and phone number</i>	ber		2 hours per week					
Course title		visnia	visniavasili@vahoo.com: +36.337.114					
Course objectives:	The o	biective of the c	course is for the st	udent to acquire basic				
jj	knowl	edge about the tax	konomy of microorg	anisms from foodstuffs				
	togeth	together with the primary habitats of selected microorganisms that						
	are of	are of extreme importance in foodstuffs. Successfully passed the						
	modul	e ensures the cont	inuation of study at o	other or similar graduate				
	studies	s related to nutrition	on and human health	1.				
Learning outcomes	- Expl	ain the techniques	s of control and prote	ection of foodstuffs,				
(general and specific	- Identify the bacteria most commonly found in foods,							
competences):	- Classify micro-organisms originating in foods.							
	The content of the module covers the basic principles that are related							
Contant of the	to the peremeters that affect the growth survival and death of							
svllahus/nerformance	microbes in foods							
nlan (in short):	Classification of microorganisms originating in foods through a							
	moder	n approach in the	taxonomy of bacter	ia.				
	Eukar	votic microorgani	sms coming from fo	ods				
	Fungi	- morphology and	l systematics;					
	Micro	scopic mycelial fu	ingi;					
	Yeasts	- morphology an	d systematics;					
	Protist	- morphology and	d systematics;					
	Non-c	ellular entities						
	Viruse	s-morphology and	d systematics.					
	Micro	biology and micro	bial spoilage of bas	tic foodstuffs (meat and				
	poultr	y, the microbiolog	gy of "food from the	e sea"; microbiology of				
	plant j	products; microbi	ology of milk and n	l of the microbiological				
	III wat	<i>i</i> of food	lage of food; contro	i of the microbiological				
	Contro	of hygiene of fo	od industry operator	rs				
<b>Evaluation in detail</b> w	ithin <i>Eı</i>	iropean Credit Tr	ansfer System					
STUDENT	STU	)ENT	STUDENT	STUDENT				
OBLIGATIONS	OBLI	GATIONS	OBLIGATIONS	OBLIGATIONS				
Pohađanje nastave		75	2,5					
Seminarski rad		15	0,5	10%				
(pismeni i usmeni)								
Kolokviji i priprema		60 2 25%						
za kontinuiranu		25%						
provjeru znanja ili								
pismeni ispit			-					
Usmeni ispit		30	1	40%				
UKUPNO		180	6	100%				

Additional explanation: example

E.g. To pass the final exam, students are required to achieve a minimum score during class (20% in total). During semester two midterms are written. The final grade includes the results of the midterm exam, the final exam, the activity during the class and the evaluation of the seminar paper. Seminar paper is graded as follows: 0% = Paper is not written. 2% = The paper does not meet the formal criteria. 4% = The paper meets the formal criteria, but there are major deficiencies in the content. 6% = The paper meets formal and content criteria, but there are notable grammatical and spelling errors. 8% = The paper meets formal and content criteria, but there are minor grammatical and spelling errors. 10% = The paper is comprehensive, with correct grammar and spelling. Presentation of the seminar paper is graded as follows: 0% = Paper is not presented. 2% = Paper is read. 4% = Paper is partially read and unprepared. 6% = Paper is not read, but there are major deficiencies in the oral presentation. 8% = Presentation is well prepared, but minor errors in the speech are noticed. 10% = Oral presentation is well prepared. Midterms are graded as follows: less than 50% correct answers = 0% ocjene from 51% to 60% = up to 4% of grade from 61% to 70% = up to 8% of grade from 71% do 80% = up to 12% of grade from 81% do 90% = up to 16% of grade from 91% do 100% = up to 20% of grade Written exam is graded as follows: less than 50% correct answers = 0% ocjene from 51% to 60% = up to 6% of grade from 61% to 70% = up to 12% of grade from 71% do 80% = up to 18% of grade from 81% do 90% = up to 24% of grade from 91% do 100% = up to 30% of grade 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** Duraković S., Delaš F., Stilinović B., Duraković L., (2002): Modern *literature:* food microbiology, first book, Kugler Duraković S. Delaš F., Duraković L., (2002): Modern food microbiology, second book, Kugler Duraković S., Duraković L. (2001): Food microbiology, third book, Kugler

Duraković S., Duraković L. (2003): Mycology in Biotechnology,
Kugler
Duraković S., Duraković L. (2000): Special Microbiology, Kugler

Course title	FOOD QUALITY CONTROL			Course	FT223		
						code	
Study programme						Study year	2.
Cycle	Food Tec	chnology, I					
ECTS point value:	6	Semester		IV		Hours per	45p + 45v
_						semester	_
						(l+t+s)	
Course status:		Prerequisites			Ca	omparative	
					СО	nditions:	
Course access:					Cl	ass	
					sci	hedule:	

Course teacher:		Prof Jelka Pleadin, PhD					
Contact hours/consulta	tions:	by appointment					
E-mail and phone number	ber:	pleadin@veinst.hr; ++385 1 6123 626					
Asisstant		Kristina Batinić, dipl. ing.					
Contact hours/consulta	tions:	by appointment	by appointment				
E-mail and phone numb	ber	kbatinic@faz.b	a; 063 319 300				
Course objectives:	The object	ctives of this cou	rse are:				
U U	Understa	nd the importanc	e of food quality contract	rol and consumer			
	protection	n	1				
	Know the	Know the ingredients that make up the composition of different					
	types of f	foods					
	Understa	nd the basic prin	ciples in food/product	quality control			
	Master th	e methods used	in food quality tests				
	Be able to	o apply credible	test methods in determ	nining food quality			
	paramete	rs					
Learning outcomes	After con	npleting this cou	rse, students will be al	ole to:			
(general and specific	Define pa	arameters that rej	present food quality				
competences):	Clarify th	e requirements o	of the food quality man	nagement system			
	Clarify le	gislation require	ments on food quality	and declaration			
	Describe	the application of	of analytical methods i	n determining food			
	propertie	s and product ch	aracterization				
	To argue	the advantages a	and disadvantages of a	nalytical methods			
	in charac	terizing food pro	operties and new trends	s in product			
0	analytics	11 .	. 1	1 /			
Content of the	After con	npleting this cou	rse, students will be at	ble to:			
syllabus/perjormance	Clorify th	arameters that re	present rood quality	a comont sustam			
pian (in snori):	Clarify la	regulation require	on the 1000 quality has	and declaration			
	Describe	the application of	of analytical methods i	n determining food			
	propertie	and product ch	or allarytical illetious i	li determining 100d			
	To argue	the advantages a	and disadvantages of a	nalytical methods			
	in charac	terizing food pro	perties and new trends	s in product			
	analytics	terizing rood pro	perfies and new trends	s in product			
	unurgeres						
<b>Evaluation in detail</b> w	ithin <i>Euro</i>	pean Credit Tra	nsfer System				
(Example)		•					
STUDENT	STUDE	NT	STUDENT	STUDENT			
OBLIGATIONS	OBLIG	ATIONS	OBLIGATIONS	<b>OBLIGATIONS</b>			
Pohađanje nastave	90		3	0%			
Kolokviji ili Pismeni	60		2	80%			
ispit							
Usmeni ispit	30	0 1 20%					
UKUPNO	180		6	100%			
Additional clarification	:						
According to the Ruleb	ook on stu	dying, the final g	grade is obtained as fo	llows:			
A = 91-100% 5 (excelle	ent)						
B = 79  to  90% 4  (very  30%  even 30%  eve	good)						
C = 67  to  78% 3  (good)	)						
D = 55 to 66% 2 (suffic	cient)						

Compulsory	Rouessac, F., Rouessac, A. (2000) Chemical Analysis, Modern						
literature:	Instrumental Methods and Techniques, Willey&Sons, New York.						
Additional literature:	Nielsen, S.S. (2003) Food Analysis, Kluwer Academic/Plenum						
	Press, New York.						
	Babić, I., Đugum, J. i sur. (2014) Introduction to Food Safety,						
	Institut za sanitarno inženirstvo, Ljubljana.						
	Food Standards and Regulations						
Additional							
information on	Teacher's literature is available in the form of ppt presentations.						
course:							

Course title	FOOD PACKAGING	Course	FT224
		code	
Study programme		Study year	II
Cycle	Food Technology, I		

ECTS point value:	4	Semester	IV	Hours p semester (l+t+s)	per er	30+15+0			
Course status:	Core	Prerequisites:		Comparate conditions	ive				
Course access:				Class schedule:	<u>.</u>	Summer semester			
Course teacher:	<u> </u>	Prof Lidija Jakobe	k. PhD			5011105001			
Contact hours/consulta	tions:	Monday 12-14 h,	other da	ys by appoi	intme	nt			
E-mail and phone num	ber:	lidija.jakobek@pt	lidija.jakobek@ptfos.hr. 00 385 31 224 325						
Asisstant		-							
Contact hours/consulta	tions:	-							
E-mail and phone num	ber	-							
Course objectives:	The obje	ctives of this course	e are:						
	- explain	the function of pac	kaging a	and its impo	ortanc	e in the			
	preservat	ion of packaged for	ods						
	- give ba	sic knowledge of pa	ckaging	g materials u	used f	for food			
	packagin	g - : - 1	1	· · · · · · ·	4	f f a statistic			
	- give ba	sic knowledge of th	е раска	ging require	ement	is for certain			
	- explain	nackaging methods	and the	impact of	miora	tion processes			
	on packa	ged foods		impact of	mgra	aton processes			
	- introdu	ce students to the ba	sics of	the analysis	s of in	dividual			
	packagin	g materials		J ~-~					
Learning outcomes	After cor	npleting this course	, studen	ts will be al	ble to	:			
(general and specific	- Properly interpret and explain the function of packaging and how								
competences):	to create packaging								
	-Define different types of packaging materials and explain their properties and applications in food packaging								
	-Indepen	-Independently analyze and evaluate the properties of packaging							
	materials	als							
	-Explain	ain what packaging and packaging materials are used and							
	why they	ey are used to package particular foods							
	-Explain	and clarify the impact of various factors that reduce the							
	quality o	f packaged foods			a da				
	-Explain	the impact of migra	tion and	aging mem	ous	food quality			
Content of the	Lectures	The importance	and rol	e of packa	nging.	Division and			
svllabus/performance	function.	Elements of pack	caging	creation. P	ackag	ing materials:			
plan (in short):	metals (	white sheet, alum	inium,	chrome sh	heet,	steels), glass,			
	plastics,	multilayers, pa	aper,	cardboard,	WO	ood, textiles,			
	biodegra	dable and edible ma	aterials.	Packaging	forms	. Packaging of			
	certain t	ypes of foodstuffs	s (cerea	lls, bakery	and	confectionery			
	products	meat and fish, mill	c and m	ilk products	s, alco	holic and non-			
	alcoholic	beverages). Foo	d pres	ervation n	netho	ds, packaging			
	atmosph	(vacuum and asept	lic pack	aging, mod	uned	and controlled			
	in the	food-packaging en	ironmo	ackaging. C	Dor Dor	meations and			
	mioration	is mechanism of	perme	ation a b	harrie	r of material			
	propertie	s. Packaging and the	e enviro	nment. Eco	-frien	dly packaging.			

 oxygen and light).
(packaging design for various foods - foods sensitive to moisture,
layers in multilayer materials). Quality of packaged food
materials (resistance of flexible materials to grease, separation of
adhesiveness of lacquer). Analysis of polymeric and multilayer
packaging (determination of thickness, amount of lacquer,
(determination of capillary water absorption). Analysis of metal
(determination of grammage and thickness). Paper analysis
Tutorials: Analysis of the dimensions of the packaging material

**Evaluation in detail** within *European Credit Transfer System* 

(Example)			
STUDENT	STUDENT	STUDENT	STUDENT
OBLIGATIONS	OBLIGATIONS	OBLIGATIONS	<b>OBLIGATIONS</b>
Pohađanje nastave i	45	1,5	10%
angažiranost na			
nastavi			
Vježbe	15	0,5	10%
Kolokvij (2) ili	60	2	80%
Pismeni ispit			
UKUPNO	120	4	100%

Additional clarifications:

During the semester, students are required to attend classes and to hand in ten work assignments during the class (points). Besides, they must complete the tutorials (points). The exam consists of two partial exams (optional, they are scored if they are taken), but it can also be taken through written exams (they are scored).

The total grade includes:

- work assignments (each work assignment with a minimum of 1 point and a maximum of 10 points)

- tutorials (each tutorial brings a maximum of 10 points; the average value of all tutorials - **a maximum of 10 points**)

- two partial exams (each brings a maximum of 40 points, which is a total of 80 points) or one written exam (**a maximum of 80 points**)

## Total Points - 100

Points:

-Task assignments 5.5 to 10 points

-Exercises 5.5 to 10 points

-Partial exam 22 to 40 points (two partial 44 to 80 points)

-Written exam 44 to 80 points

\*Total 55 to 100 points (55 to 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)

\*only for a written exam

Compulsory	-Jakobek, L., Teaching materials (presentations)
literature:	-Jakobek, L. Script for laboratory exercises
	-Vujković, I., Galić, K., Vereš, M. Food Packaging. Tectus, Zagreb,
	2007.
Additional literature:	Robertson, G.L. Food Packaging-Principles and practice. Marcel
	Dekker, New York, 1993.

Course title	RAW MATERIALS OF ANIMAL	Course	
	ORIGIN	code	

Study programme				Study ye	ar druga				
Cycle	prehram	ena tehnologija, I							
ECTS point value:	4	Semester	IV	Hours per semester (1+t+s)	r 30+15+0				
Course status:	OS	Prerequisites:		Comparative	e				
Course access:				Class	Summer				
Course access.				schedule.	semester				
Course teacher		Prof Stanko Ivat	nković P	nD	semester				
Contact hours/consulta	tions:	Friday od 9-10 a							
<i>E-mail and phone num</i>	ber:	Stanko.ivankovi	c@aptf.s	um.ba. 036 33	37 121				
Asisstant		Vinko Batinić, s	enior assi	stant					
Contact hours/consulta	tions:								
E-mail and phone numb	ber	Vinko.batinic@	aptf.sum.	ba					
Course objectives:	The obje	ctives of the cours	se "Anim	al raw materia	als" are to get				
U U	acquainte	ed with animal ray	v materia	ls that are use	d for human				
	consump	tion or further pro	ocessing i	n technologic	al processes. They				
	acquire b	asic knowledge a	bout mea	t, milk, fish, ł	noney, eggs,				
	diseases,	HACCP system,	control a	nd classificati	on of raw				
	materials	s, etc.							
Learning outcomes	After con	npleting this cour	se, studer	its will be abl	e to:				
(general and specific	- explain	the basic settings	for the p	roduction of r	aw materials of				
competences):	animal o	rigin,							
	- describ	to the surviviliant value of the react							
	- calculat	e and apply market classification and astagorization of							
	- describ	be and apply market classification and categorization of							
Contout of the	Decie cot	attinger state and prospects of graduation of your material							
syllabus/performance	of anima	lorigin milk con	is state and prospects of production of raw materials						
nlan (in short).	transport	annual origin, milk, composition, factors of production, milking,							
piun (in short).	meat nu	tritional value spe	ecies of a	nimals and br	eeds of livestock				
	game, fis	sh and poultry me	at. marke	classification	n and				
	categoriz	ation of meat. HA	ACCP sys	tem, honey, p	hysical and				
	chemical	properties, types,	, applicati	ons in the foc	od industry. Eggs,				
	species, o	chemical composi	tion, qual	ity and applic	cation in the food				
	industry.	Livestock transpo	ort, slaugl	nter, cattle cla	ssification.				
Evaluation in detail w	ithin <i>Eurc</i>	ppean Credit Tran	sfer Syste	т					
(Example)	GENER	N 100	GTUD						
STUDENT			STUDENT STUDENT						
OBLIGATIONS		AHUNS	UBLIG	ATIONS	OBLIGATIONS				
Ponadanje naslave i angažiranost na nastavi	43		1,3						
Kolokvii (2) ili	45		15		60%				
Pismeni isnit			1,5		0070				
Usmeni ispit	30		1		24%				
UKUPNO	120		4		100%				
Additional clarification	:								
According to the Ruleb	ook on stu	dving, the final g	rade is ob	tained as foll	According to the Rulebook on studying, the final grade is obtained as follows:				

A = 91-100% 5 (excelle	A = 91-100% 5 (excellent)				
B = 79 to 90% 4 (very	good)				
C = 67  to  78% 3  (good)					
D = 55 to 66% 2 (suffic	cient)				
F = 0 to 54% 1 (insufficient	F = 0 to 54% 1 (insufficient)				
Compulsory	Kovačević, D. (2005): Raw materials of the food industry - meat				
literature:	and fish, prehrambeno tehnološki fakultet, udžbenik, Osijek				
Ivanković, S I sur (2013): Raw materials of animal origin.					
Udžbenik, Mostar					
Additional literature:	Journal "Dairy" and journal "Meat"				

Course title	RAW MATERIALS OF PLANT			Course			
G. 1		UKIGIN			code		
Study programme Cvcle	Food Teo	chnology, I			Study year	2	
ECTS point value:		Semester			Hours per	60	
, A	5		IV		semester	(45 + 15 + 0)	
					(l+t+s)	(43+13+0)	
Course status:	core	Prerequisites:	-	Ca	omparative	_	
	0.1	11 1		CO	nditions:		
Course access:	Students	enrolled		Cl	ass	According to	
Course teacher		Prof Drago Šuba	rić	501	neuule.	schedule	
Contact hours/consulta	tions:	Prof Antun Jozin	ović				
<i>E-mail and phone num</i>	ber:	Students will be	informed	lab	out the dates of	of the	
		consultation at le	ctures, e	xer	cises and e-ma	ul.	
Asisstant		drago.subaric@p	tfos.hr +	385	31 224 312;		
		ajozinovic@ptfo	<u>s.hr</u> +385	5 31	224 336		
Contact hours/consulta	tions:	Nikolina Kajić, d	lipl.ing.a	gr.			
<i>E-mail and phone num</i>	ber	Tuesday; 10-11 h	1				
Course title	<b>751</b> 1 *	<u>nikolina.kajic@a</u>	ptmo.org	7			
Course objectives:	The obje	ctives of this cours	se are:		of aloat origi		
	the most	important ingradi	iw mater	1als	of plant origi	al products	
	By know	t important ingredients for processing and final products.					
	to proper	to properly select the processing method, the student acquires					
	knowled	knowledge of the importance of individual components in the					
	technolo	ological quality assessment					
Learning outcomes	After completing this course, students will be able to:						
(general and specific							
competences):	• Define botanical and technological classification and properties						
	of raw m	• Explain the physical and chemical changes in the raw materials of					
	plant origin and the most important ingredients and their						
	importance in the assessment of technological quality						
	Describ	be the factors that a	affect the	qua	ality of raw m	aterials of	
	plant orig	gin and their produ	cts.	1	5		
	• Describ	be the conditions for	or pickin	g an	nd storing raw	materials for	
	fresh con	sumption and/or p	rocessin	g.			
	• Explair	ify the basic raw r	naterials	and	l properties of	raw materials	
	for the confectionery and starch industries.						
	• Explain sugar beet properties and storage conditions.						
	• Explain the properties of raw materials for the production of tea,						
Content of the	Physical	and chemical char	iges in ra	w r	naterials of pl	ant origin	
syllabus/performance	(fruits, v	egetables, tobacco	, cereals,	oil	seeds, sugar b	eet, cane,	
plan (in short):	cottee, c	bcoa) and ingredie	nts with	an e	emphasis on fa	actors	
	certain of	ule quality of final opponents in the t	i iooa pi echnolog	odu ricei	icts and the im	sment	
	Botanica	and technologica	l classifi	cati	on. The most	important	
	Botanica	tanical and technological classification. The most important					

	species and varieties. Basic storage conditions. Harvesting and storage conditions for use in the fresh state and/or processing. Selected laboratory exercises (analysis).					
<b>Evaluation in detail</b> wi	Evaluation in detail within European Credit Transfer System					
STUDENT OBLIGATIONS	STUDENT OBLIGATIONS	STUDENT OBLIGATIONS	STUDENT OBLIGATIONS			
Pohađanje nastave i angažiranost na nastavi	60	2				
Kolokvij (3) ili Pismeni ispit	60	2	80%			
Usmeni ispit	30	1	20%			
UKUPNO	150	5	100%			

Additional clarifications:

The student must complete 70% of the lecture hour and 100% of the seminar hour in order to have right for the signature in the index and to take the exams, i.e. the final written exam. Assessment: The midterm is optional. If the student has passed all the exams (and accept the overall grade), he or she does not have to take the final exam - the total grade, in this case, is the arithmetic mean of the grades obtained from the exams. The final exam (consisting of the written part) is compulsory for students who have not passed 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	1. J. Babić, D. Šubarić, Đ. Ačkar (2011.): Technology of Sugar					
literature:	(interna skripta). Prehrambeno tehnološki fakultet Sveučilišta					
	Josipa Jurja Strossmayer-a u Osijeku.					
	2. J. Babić, D. Šubarić, Đ. Ačkar (2012.): Technology of					
	Starch(interna skripta). Prehrambeno tehnološki fakultet					
	Sveučilišta Josipa Jurja Strossmayer-a u Osijeku.					
	3. L. Goldoni (2004.): Tehnologija konditorskih proizvoda: kakao i					
	čokolada. Kugler, Zagreb.					
	4. P. W. Van der Poel, H. Schiweck, T. Schwartz: Sugar					
	Technology. Verlag Dr. Albert Bartens KG-Berlin, 1998.					
	5. R. L. Whistler, J. N. BeMiller, E. F. Paschall (1984): Starch,					
	Chemistry and technology. Academic press, Orlando, SAD.					
	6. A. A. Kader, Postharvest technology of Horticultural Crops,					
	Sec.Ed., 1992, Univ.of California, Division of Agriculture and					
	Natural Resources Publication 3311.					
	7. T. Lovrić i V. Piližota 1994, Tehnologija konzerviranja i prerade					
	voća i povrća, ur. akademik Milan Maceljski, Nakladni zavod,					
	GLOBUS, Zagreb.					
	8. Ž. Ugarčić-Hardi: Poznavanje sirovina u prehrambenoj industriji.					
	Biljni dio: Žitarice, mahunarke, uljarice. (interna skripta).					
	Prehrambeno tehnološki fakultet Sveučilišta Josipa Jurja					
	Strossmayer-a u Osijeku, 2001.					

Course title	PROCE	PROCESSES IN FOOD INDUSTRY			Course code	FT311
Study programme						3
Cycle	Food Tec	chnology, I				-
ECTS point value:	7	Semester	Winte	r	Hours per semester (l+t+s)	(45+30+15)
Course status:	Core	Prerequisites:		Co co	omparative nditions:	
Course access:				Cl sci	ass hedule:	
Course teacher:		Dr. sc. Anita Juri	ć, docen	t		
Contact hours/consulta	tions:					
E-mail and phone num	ber:	ajuric2@gmail.co	<u>om;</u> + 38	7 6.	3 315 680	
Asisstant		Anita Jurić, PhD				
Contact hours/consulta	tions:	By appointment				
E-mail and phone num	ber	ajuric2@gmail.co	<u>om;</u> + 38	76	3 315 680	
Course objectives:	The object	ctives of this cours	e are to g	gain	:	
	- knowled	lge of the processe	es, device	es ai	nd application	ns of the
	canning p	process used in the	food ind	usti	ry,	
	- general	knowledge of the	physical	and	chemical and	l nutritional
	changes t	that occur on food during its processing				
Learning outcomes	After con	npleting and taking	g this cou	irse.	, students wil	
(general and specific	- to meas	ure and analyze the	e rheolog	gica	l properties of	t solid, semi-
competences):	liquid and	liquid and liquid food products,				
	- to meas	to measure, analyze and interpret phase transitions at low				
	products	$\alpha$ = explain the principles of conservation				
	- apply di	different processes of food preservation and use appropriate				
	- appry unterent processes of toou preservation and use appropriate devices					
	- determine the proper application of particular canning processes					
	concernir	rning the preservation of the quality and satisfactory				ctory
	durability	of food products,	and		5	5
	- identify	the type of proc	ducts an	d tł	neir physical	and chemical
	character	istics, optimize th	e proces	ss p	parameters fo	r the selected
	canning p	processes.				
Content of the	heology.	Rheological prope	rties of li	iqui	d materials (I	Newtonian and
syllabus/performance	Newtonia	n fluids). Facto	ors affe	ctin	g rheologic	al properties.
plan (in short):	Methods	and apparatus for c	letermini	ng	the rheologica	al properties of
	liquid ar	nd semi-liquid m	aterials.	Flu	uid transport	. Rheological
	propertie	s of suspensions	, granu	lar	and powder	red materials.
	Rheologi	cal properties of	of solid	l r	naterials. T	hermophysical
	properties	s of food. Phase tr	ansitions	s at	low temperat	ures. Methods
	IOF dete	tical models)	pnysical	1	vity Sometics (	DIA, DSC,
	Multipho	ucal illouels).	water a	nda	vity. Sorptic	a of complay
	systeme	Dielectric prop	rties	nua f f	ny phenomer Food Princip	a of complex
	preservat	ion. Heat preserv	vation (	nast	eurization	terilization) -
	principle	procedures and	devices	R	efrigeration	canning - the
	principle	and method of in	nplement	atic	on. Canning i	n a controlled

	atmosphere. Freezing - Principle, mechanism of ice formation,
	processes and devices. Changes during freezing and storage of
	frozen products. Concentration by evaporation, concentration by
	freezing, concentration by membrane processes. Canning by drying
	- principle, methods of implementation, procedures and devices.
	Multiphase drying procedures. Specific drying procedures:
	lyophilization, osmodehidration. Food preparation for drying.
	Changes during drying. Rehydration and stability of dehydrated
	products. Bio-conserving. Canning accessories. Conservation by
	ionizing radiation.
Evaluation in detail w	ithin European Credit Transfer System

D'ununton in douin vitaini European erean riansjer System							
STUDENT	LESSON HOURS	ECTS	GRADE				
OBLIGATIONS	(ASSESSMENT						
Class attendance and	90	3	10%				
activity							
Seminar paper	30	1	20%				
Midterm (2) or	60	2	40%				
Written exam							
Oral exam	30	1	30%				
TOTAL	210	7	100%				
Additional clarification	:						
Compulsory	Z. Herceg: Processes in	Food Industry (Prehr	ambeno- procesno				
literature:	inženjerstvo 1), Plejada, Z	agreb 2011.					
	2. T. Lovrić: Processes in the food industry with the basics of food						
	engineering, Hinus, Zagre	0, 2003.					

Course title	WATER TECHNOLOGY AND WASTEWATER TREATMENT				Course code		
Study programme Cycle	Food Tech	nology, I		Study year	3		
ECTS point value:	5	Semester	Semester V			Hours per semester (l+t+s)	45+15
Course status:	core	Prerequis ites:			Compa conditi	rative ons:	
Course access:					Class s	chedule:	
Course teacher:		Anita Ivank	ković, PhE	)			•
Contact hours/consultatio	ns:	via e-mail o	or before a	nd afte	er the lec	ture	
E-mail and phone	e number:	anita.ivanko	ovic@apt	.sum.b	a : 063 3	346 488	
Asisstant		Marijana M	Iarković				
Contact		via e-mail o	or before a	nd afte	er the tut	orials	
hours/consultatio	ns:						
E-mail and phone	e number:	markovic_	marijana@	@hotma	ail.com;	063 465 862	
Course	The object	ives of this c	ourse are:				
objectives:	Introduce s	students to th	e physical	l and cl	hemical	properties of	natural
	waters, the	quality of w	ater for pa	articula	r purpos	es, legal regu	ilations, as
	well as pol	lution and w	astewater	treatm	ent.		
Learning	After comp	pleting this c	ourse, stud	lents w	ill be ab	le to:	
outcomes	- identify t	he types of p	roblems th	hat mag	y arise in	practice that	t relate to
(general and	the materia	al presented,					
specific	- measure	water quality		1.	C (	1.	
competences):	- define ph - describe a	and apply tec	temical in thnologica	dicator	s of wate	er quality, or water treati	ment
Content of the	Water qual	lity. Physical	indicator	s of wa	ter quali	ty. Chemical	indicators
syllabus/perfor	of water qu	uality. Biolog	gical indic	ators o	f water c	uality. Wate	r
mance plan (in	classificati	on. Technolo	ogical proc	cedures	s for wat	er preparation	n: filtration,
short):	flocculatio	n, deferrizati	on and de	manga	nization,	water disinf	ection. Ion
	exchangers	s. Membrane	procedure	es. Tec	hnologic	cal schemes:	drinking
	water tech	nology, cooli	ng water,	boiler	water		
	Sources of	water pollut	10n: dome	stic wa	istewater	r, industrial w	vastewater,
	stormwater	r, cooning wa	ller. Proce	aures I	or pre- a	nd first-stage	ewater
	Procedures	Physical Pi	ige cleann rocedures	Chem	ical Proc	rilliu Deglee	- orical
	Procedures	s. 1 hysicai 1 i	loccuures,	Chem		coures, biolo	Jgicai
	Tutorials:	,. Water analys	is: pH_co	nductiv	vitv. alka	linity, total h	ardness
	dissolved of	oxygen, chen	nical oxve	en den	nand, bio	chemical ox	vgen
	consumpti	on, nitrogen	compound	ls, chlo	orides, su	lfates, iron, a	ursenic.
	Decarboni	sation and wa	ater softer	ing. Fl	occulati	on of colloida	ally
	dispersed p	particles in w	ater by JA	R test.			-
Evaluation in de	tail within <i>I</i>	European Cr	edit Trans	fer Sys	tem		

STUDENT		LESSON HOURS	S ECTS GRADE						
OBLIGATIONS	5	(ASSESSMENT)							
Class attendance	and	60	2						
activity									
Seminar paper		45	1,5	40%					
Midterm or Writt	en	45	1,5	60%					
exam									
TOTAL		150	5	100%					
Additional clarifie	catio	cation: After passing the midterm from the practicum and completing th							
laboratory diary,	comp	oleting seminar work, stu	idents take a written exam,	which can also be					
taken earlier pre-	exam	).							
According to the	Rulel	book on studying, the fir	hal grade is obtained as follo	ows:					
A = 91-100% 5 (e	excell	lent)							
B = 79 to 90% 4 (	(very	good)							
C = 67  to  78% 3  (	(good	1)							
D = 55  to  66% 2	(suffi	cient)							
F = 0 to 54% 1 (11	nsutti	$\frac{1}{1} = \frac{1}{1} $		+'1-'1					
Compulsory	• •	I. I.Gulic: Water Cond	<i>litioning</i> , Hrvatski savez gra	idevinskih					
itterature:	inze	enjera, Zagreb, 2003.		~					
	inžo	2. S. Tedeschi, <i>Waler P</i>	rolection, Hivalsko drustvo	gradevinskin					
	IIIZC	3 I Mijetović M Mete	ošić Water Technology 72	areb $2007$					
		J = D Malus	osie, water rechnology, Za	gico, 2007.					
		www.studentnet.hr/u	mloads/20070402151101 <b>z</b> a	stitavoda 1 ndf					
		D Malus D Vouk H	landbook for Effective App	lication of Plant					
		Sanitary Wastewater	Treatment Plants, University	ity of Zagreb					
		Zagreb.2012.		ity of Zugroo,					
		www.constructedwe	tlands.net/Prirucnik Malus	-Vouk print.pdf					
		5. A. Štrkalj, Pollution	and Water Protection, Sisal	k, 2014.					
		https://www.simet.u	nizg.hr/nastava/predavanja/	studij/onecisc					
		enje-i-zastita-voda	• • •	•					
		6. K. Košutić, Physica	l and Chemical Processes o	f Water					
		Treatment, 2009.,							
		www.fkit.hr/files//	Fizikalno_kemijski_proces	i_obradbe_voda.p					
		<u>df</u>							
		7. https://www.grad.un	izg.hr//2.6 <b>Prociscava</b>	nje_otpadnih_vo					
		<b>da</b> %5B6%5D.pdf							
4 7 7 7		1 D (1 1 1 (2007)							
Additional		1. Bratby, John (2006.	), Coagulation and floccula	ation in water and					
literature:		Wastewatertreatment	, JohnBratby, Published b	Y INA					
		Publishing, London, 2 Bulabaak on Limit V	UK, 2000.	rmful Substances					
		2. Kulebook on Linne V for Technological W	Values of Hazardous and Hazardous and Hazardous	d into the Public					
		Sewerage System or	ustem or Secondary Deceiver (Slythene nevine						
		Federacije RiH" bro	BiH" broi 50/07)						
		3. Višekruna A. Lukić	5. J., Wastewater from the Al	luminium Factory					
		Međunarodna konfe	rencija. Upravlianie opas	snim i neonasnim					
		otpadom. Zbornik ra	dova, Zenica, 2010.	moor wommin					
		1 ,	, , ·						

Course title				Course	FT313		
<u> </u>	I	COD CHEMIST	KI	code	2		
Study programme	<b>F</b> 1 <b>F</b>			Study	3		
Cycle	Food Tec	hnology, I		year			
ECTS point value:		Semester		Hours pe	er		
	5		V.	semester	45+15+0		
				(1+t+s)			
Course status:	core	Prerequisites:		Comparativ	'e		
		•		conditions:			
Course access:				Class sched	lule		
Course teacher:		Prof Mirela Kor	oiar. PhD				
Contact hours/consulta	tions:	e-mail	J /				
E-mail and phone num	ber:	mirela.kopiar@1	otfos.hr: (	00385 31 224	4 309		
Asisstant		Iosina Vukoja 1	nao ino :	aliment			
Contact hours/consulta	tions	vosipu vunoju, i	11ug. 111g.				
E-mail and phone num	hor:						
Course objectives	Analytica	l approach to foo	d chamist	ry food com	nosition		
Course objectives.	nroccocin	a and stability du	ring store	ry, 1000 com	position and		
	processii	processing and stability during storage. Food composition and					
	properties. Chemical and biochemical reactions that can occur in						
<b>x</b> • /		ng nanding, proc	$\frac{1}{1}$	i storage.	1		
Learning outcomes	I. Explain	the importance	of knowin	g the chemic	cal composition.		
(general and specific	2. Explan	the factors that a	affect the	change in pro	oduct quality		
competences):	during pr	ocessing and store	age.				
	3. Descril	be the main food	ingredient	s and explair	n their impact on		
	product q	uality.					
	4. Descril	be the most impor	tant chem	ical reaction	s involving the		
	major foc	d ingredients.					
	5. Explain	n the importance a	and stabili	ty of pigmen	nts during		
	processin	g and storage.					
	6. Explain	n the formation ar	nd importa	ance of flavo	uring substances.		
	7. Explain	n the importance	and stabili	ty of vitamir	ns during		
	processin	g and storage.		-	-		
	8. Explain	the importance	of mineral	s.			
Content of the	Definition	n of Food Chemis	try. An ar	proach to the	e study of food		
svllabus/performance	chemistry	. Chemical and b	iochemica	al reactions th	hat can lead to		
plan (in short):	changes i	n food quality and	l safety. F	food as a disr	persion system.		
1	Food Ing	edients: Water (	Carbohvdr	ates. Lipids	Amino Acids		
	Pentides	Proteins Vitamir	s. Minera	ls. Dves Fla	vor Substances		
	Enzymes	and the role they	nlav as n	art of complete	ex biochemical		
	systeme a	nd the changes th	ev under	o during foo	d processing and		
	environm	ental factors	ey underg	, country 100	a processing and		
Evaluation in datail w	ithin Euro	nan Cradit Tran	sfor Susta	11			
Evaluation in utian w		Jean Crean Iran.	sjer Syster	11			
STUDENT	LESSO	N HOURS	ECTS		GRADE		
OBLIGATIONS	(ASSES	SSMENT)					
Class attendance and	60		2		0		
activity							

Midterm (2) or	90	3	100%				
Written exam							
Oral exam	150	5	100%				
Additional clarification	s:						
Students are obliged to	do the practical part of teach	ning or exercise. They	can pass the exam				
through partial exams o	r by taking the written exam	. Throughout the seme	ester, students				
take two partial exams	and one additional exam. A	student who has a posi	itive grade from at				
least one partial exam c	an take the additional exam.						
The partial exam is grad	ded as follows:						
A = 90 - 100% 5 (exce	ellent)						
B = 80 - 89.9% 4 (ver	y good)						
C = 70 - 79.9% 3 (goo	d)						
D = 60 - 69.9% 2 (suff	ficient)						
The written exam is gra	ded as follows						
A = 90 - 100% 5 (exce	ellent)						
B = 80 - 89.9% 4 (ver	y good)						
C = 70 - 79.9% 3 (goo	d)						
D = 60 - 69.9% 2 (suff	ficient)						
Compulsory	Belitz, HD., Grosch, W.,	Schieberle, P.: Food C	hemistry.				
literature:	Springer, 2004.						
	Damodaran, S., Parkin, K.I	, Fennema, O.R.: Fei	nnema`s Food				
	Chemistry. CRC Press, 200	)8.					
	Hui, Y.H.: Food Biochemis	stry and Food Processi	ng. Blackwell				
	Publishing. 2006.						
	Coultate, T.P.: Food: The C	Chemistry of its Comp	onents. The Royal				
	Society of Chemistry. 2002	)					

Course title	PROCESS MEASUREMENT AND MANAGEMENT					Course code	FT314
Study programme						Study	3
Cycle	Food Tec	hnology, I				year	_
ECTS point value:	5	Semester		V		Hours per semester (l+t+s)	45+15+0
Course status:		Prerequisites:			Co co	omparative nditions:	
Course access:					Cl	ass schedule	According to schedule
Course teacher:		Prof Mirjana Či	urli	n, PhD			
Contact hours/consulta	tions:	By appointment	t				
E-mail and phone num	ber:	mcurlin@pbf.ht	<u>r</u> G	SM 098	316	14746	
Asisstant							
Contact hours/consulta	tions:						
E-mail and phone num	ber:						
Course objectives:							
Lagraning outcomes	Gaining a systematic approach in metrology, knowledge and experience on the methodology of planning an experiment in the technical field, experience in the choice of measurement methods, analysis of measurement accuracy and statistical evaluations of experimental results. Gaining insight into basic concepts about the management of technical systems, structural forms of management, and analysis of system dynamics. Acquiring knowledge of synthesis and analysis of linear systems using the transfer functions of basic technological operations in food technology. In addition to the theoretical basis, practical knowledge of the methods of adjusting the PID parameter for higher-degree models with time-delay						lge and ment in the ent methods, uations of ment of nd analysis of ear systems erations in ge of the egree models
Learning outcomes (general and specific competences):	<ul> <li>After completing this course, students will be able to:</li> <li>1. Interpret basic concepts of process management measurement systems</li> <li>2. Calculate measurement errors and parameters when calibrating the instruments used to measure process quantities</li> <li>3. Select the appropriate interfaces to connect the computer to the instrumentation</li> <li>4. To analyze the linearity of the system by applying the transfer functions of the basic technological operations in the food technology process.</li> <li>5. Analyze the stability of the management of the food technology process</li> <li>6. Design the parameters of the PID controller for higher-degree models with time-delay</li> </ul>						

Content of the	Basic concepts of measure	ement systems for con	nputerized process					
syllabus/performance	control. Measurement error analysis and instrument calibration.							
plan (in short):	Interfaces for connecting computers to measuring instruments.							
	Measuring systems for t	he physical sizes of	biotechnological					
	processes (level, humidit	ty, flow, pressure, t	emperature, pH).					
	Process management measurements (optical density, dissolved							
	oxygen, CO2, ). Automatic FIA measuring systems. NIR process							
	measurement analyzer. C	hemometrics for tech	nological process					
	management. Biosensors f	for control and contro	l of technological					
	processes. Laser compos	sition measurement	methods. Process					
	dynamics analysis using tra	ansfer functions. Regu	latory circuits and					
	controller adaptation. Proce	ess management stabil	ity. Application of					
	artificial intelligence algorithms to control and control of							
	technological processes (neural networks, fuzzy logic genetic							
	algorithm).							
	Fundamentals of optimal process management according to							
	economic and environmental criteria.							
Evaluation in detail wi	thin European Credit Trans	sfer System						
(Example)	X							
STUDENT	LESSON HOURS	ECTS	GRADE					
OBLIGATIONS	(ASSESSMENT)							
Class attendance and	60	2						
activity								

TOTAL 150 Additional clarifications:

15

45

30

Seminar paper

Midterm (2) or

Written exam Oral Exam

Students write 2 partial written exams and then take the oral exam. Students in each partial exam solve theoretical and computational tasks from individual chapters, which are divided into sub-questions, each of which is scored with a certain number of points depending on the difficulty (from 2 to 8). The maximum number of points for each partial exam is 30 points. The oral exam carries 20 credits and seminar paper 20 credits. The minimum score for a positive grade on each partial exam is 54%.

0,5

1.5

1

5

20%

60%

20%

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:	M.Čurlin: Process measurement and guidance, PBF, 2014/2015 ili 2016.
	Šurina T. Basics of Automatic Control, Školska knjiga , Zagreb, 1991.

	<ul> <li>P.C. Chau, A. Varma "Process Control: A First Course with MATLAB", Cambridge University Press", 2002</li> <li>G. Stephanopoulos "Chemical Process Control", An Introduction to Theory and Prosting", Pronting Hell, 1005.</li> </ul>
	to Theory and Flactice, Flentice Hall, 1995.
Additional literature:	W.H. Ray "Advaced Process Control", McGraw Hill, New York,
	1981
	Yong-Zai Lu "Industrial Intelligent Control", John Wiley, New
	York, 1998
	Znanstveni radovi iz područja mjerenja i upravljanja u tehnološkim
	procesima.
	Hrvatski časopis Kemija u industriji, rubrika "Mjerna i
	regulacijska tehnika".

Course title	HYG	IENE AND SANI	TATION		Course	
Study programme					Study	3
Cycle	Undergrad	luate study – Food	technology	v	vear	5
ECTS point value:	<b>4</b>	Semester	6	,	Hours per	60
Leis point vanae.	-	Semester	0		semester	00
					(1+t+s)	
Course status:	Core	Prerequisites:		Co	mparative	
		1		со	nditions:	
Course access:				Tir	ne schedule:	Winter
						semester
Course teacher:		Jozo Grbavac, F	hD			
Contact hours/consulta	tions:	Thursday, 15-16	5			
E-mail and phone num	ber:	grbavac.jozo@g	mail.com	, 06	3-288-672	
Asisstant		Leona Puljić, B	Sc			
Contact hours/consulta	tions:					
E-mail and phone num	ber:	leona.puljic@ap	otf.su.ba,	036	-337-129	
Course objectives:	The obje	ctives of this cou	rse are: ac	qui	ring basic kno	wledge in the
	field of	hygiene and sat	nitation i	n fo	ood productio	on. Since the
	productio	on of healthy food	is current	t top	oic among foo	d producers in
	the worl	d, as well as in	our cour	ntry,	students will	ll acquire the
	knowledg	ge required to pro	duce it in	this	course, taking	g into account:
	preventio	on of microbial c	ontaminal	10n	of food, efficiency of another	cient cleaning
	and use of	maintananaa af r	ation, app	incai	ion of good i	food hypriono
	and the E	ACCP system	nocess ph	unts,	starr nygrene	, 1000 Hygielle
I parning outcomes	After cor	npleting this cour	se studen	ts w	vill be able to:	
(general and specific		ipicing this cour	se, studen	15 V	in de able to:	
<i>competences</i> ):	- to argue	the importance of	of hygiene	in f	food safety, to	o identify
	pathways	of contamination	to the m	ost i	mportant path	logens and to
	know ho	w to control the n	nost impor	tant	pathogens at	the food
	industry	level,	1		1 0	
	- apply th	e legal requireme	ents for hy	giei	nic control of	the intake of
	hazards,	the growth of mic	ro-organi	sms	and cross-cor	ntamination in
	the food	processing plant,	and			
	- to expla	in the parameters	, evaluate	the	means and w	ays, and to
	know ho	w to organize and	control th	ie ei	fficiency of w	ashing,
	cleaning	and sanitation in	the food in	ndus	stry.	1 1 1
Content of the	Basics	of hygiene and	d sanıtat	10n	in the fo	od industry.
syllabus/performance	Nilcroorg	anisms. Sources	OI CONTA	inin	ation of 1000	and process
pian (in snori):	piants. H	d Causas, Classier	s (staff).	r00)	u nygiene. Fo	ou roisoning,
	nroper	cleaning of a	ig and sam	uZI. ar	ng agents for f	t Chemical
	contamin	ation of food	Methode	of	sanitation (	Cleaning and
	sanitation	actor of 1000. Systems Was	te manao	eme	ent Pest cor	itrol (insects
	rodents, l	pirds). HACCP Sy	ystem (Ris	sk A	nalysis and C	ritical Control

<b>Evaluation in detail</b> w	Points). Good manufacturing practice, good hygiene practice, good laboratory practice. Law regulations. Tutorials: We will deal with the following questions individually for each industry: plant design requirements and links to hygiene and sanitation, major pathogens, cleaning and sanitizing products and equipment. Establishment of HACCP system.				
		insjer System	1		
STUDENT	LESSON HOURS	ECTS	GRADE		
OBLIGATIONS	(ASSESSIVIENT)	2	100/		
Class attendance and	60	2	10%		
Sominor nonor	15	0.5	100/		
Midtorm (2) or	13	0,5	70%		
Written exam	50	1	70%		
Oral exam	15	0.5	10%		
TOTAL	120	4	100%		
A = 91-100% 5  (excelled B = 79  to  90% 4  (very g C = 67  to  78% 3  (good) D = 55  to  66% 2  (suffic F = 0  to  54% 1  (insuffice G = 0.00%)	ent) good) ient) eient)				
Compulsory literature:	<ol> <li>N. G. Marriott: Essentials of food sanitation., International Thomson Publishing, 1997.</li> <li>C. De W. Blackburn, P. J. McClure: Foodborne pathogens. Hazards, risk analysis and control. CRC Press, Boston, New York, Washington, 2002.</li> <li>W. Turžića HACCP i bioligne generation Zecord. 2000.</li> </ol>				
Additional literature: Additional information on course:	<ol> <li>S. Duraković: Applied Microbilogy. PTI Zagreb, 1996.</li> <li>S. Duraković: Food Microbiology. Medicinska naklada Zagreb, 1991.</li> <li>S. Duraković, L. Duraković: Mikrobiologija namirnica. Kugler Zagreb, 2001.</li> </ol>				

Course title	TECHNOLOGICAL DESIGN I				I	Course code	
Study programme						Study	
Cycle	Food Te	chnology, I		year	3.		
ECTS point value:						Hours per	
	4	Semester		sum	nmer	semester	30+30+0
						(l+t+s)	
Course status:	core	Prerequisites:	-		Compa	ırative	
					conditi	ons:	9
Course access:					Class s	schedule	Summer
<u>C</u>		Drof Moto Diliá					semester
Course teacher:		Prof Mate Billic	, PND				
Contact hours/consults	tions	Prof Stela Jokic	, PhD	orn	arconall	<b>x</b> z)	
<i>Contact nours/consulta</i>	hon:	every day (via e	-man	or p	ersonan	y)	
E-mail and phone num	ber.	stela jokic@ptf	$\frac{98.111}{2}$				
		<u>0038531224320</u>					
Asisstant		Josipa Vukoia.	, mag. ii	ng.			
Contact hours/consulta	tions:	Svakodnevno (v	via e-m	nail (	or perso	nallv)	
<i>E-mail and phone num</i>	ber:	jjosipa.vukoja@	gmail	l.con	n		
Course objectives:	To qual	fy the student for	or the	des	ign of t	he Technol	ogy project,
,	which is	the basis for furt	her de	esign	ing, i.e.	, for definin	g the project
	tasks of	other projects (co	nstruc	ction	, mecha	nical engine	eering, etc.).
Learning outcomes	1. Prope	rly interpret, com	pare a	and d	lifferent	iate the stag	ges of
(general and specific	technolo	gical design.					
competences):	2. Defin	e the role of a foc	od engi	inee	r - desig	ner.	
	3. Descr	ibe, analyze and o	compa	are p	ossible	design	
	project/t	echnical-technolo	ogical	solu	tions an	d define the	project
	task.	4		ام مر م	fl 1	o	lang of
	4. Draw	lechnological sci	iemes	and	noor pi	ans/layout p	bians of
	5 Apply	computers in the	- desig	m of	techno	logical proc	esses
	6 Analy	ze and produce a	halan		f matter	and energy	for the
	technolo	gical unit under o	conside	erati	on.	und energy	
	7. Defin	e production stan	dards a	and	analyze	process spe	cifications.
	8. Distin	guish and choose	altern	nativ	e techno	ology soluti	ons and
	evaluate	investment invest	tment	s.			
	9. Prope	rly interpret and o	differe	entia	te legal	provisions r	elated to
	technolo	gical design and	food e	engir	neering.		
	10. Com	pare and apply th	e acqu	uired	knowle	dge for the	design of the
	technolo	gical project.				1 •	• • •
Content of the	Introduc	tion to design: de	signin	ng as	a comp	lex engineer	ring activity.
synabus/performance	Processi	ig of design pha	ses: ie	asib	nity stu	uy, investm	ent program
piun (in snori):	design 9	Setting the project	part). At tack	, pro	basic r	y, main an reparatory	work for the
	idea of	investing Analy	sis of	the	market	. raw mater	rials, energy

Evaluation in detail w	sources and manpower. Choice of location, micro-location and situation plan. Defining a project: analyzing the technological process. Demonstration of possible technological and technical solutions to a premised project assignment. Capacity selection: installed, optimal technical and economic capacity. Creating a situational plan by arranging production and auxiliary production facilities. Selection, calculation and layout of process equipment in space (floor plans). Magnification of technological processes and technological equipment. Supply of energy. Fire prevention technology. Introduction to the basic principles of construction. Application of computers in the development of technological schemes and layout of machines in the layout (MS Visio). Conceptual design.						
OBLIGATIONS	LESSON HOURS (ASSESSMENT)	ECIS	GRADE				
Class attendance	60	2					
Midterms and	45	1,5	80				
preparation for final							
written exam		<u> </u>	• • •				
Oral exam	15	0,5	20				
TOTAL	120	4	100%				
Additional charmention: 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	1. A. Lopez-Gomez, G.V. Barbosa-Canovas, Food Plant Design						
literature:	<ul> <li>(Food Scienceand Technology), Marcel Dekker, 2005.</li> <li>2. B. Maroulis, G. D. Saravacos, Food Process Design (Food Science and Technology), Marcel Dekker, 2003.</li> <li>3. F. Šef, Ž. Olujic, Projektiranje procesnih postrojenja, SKTH, KUI, Zagreb, 1988.</li> </ul>						
Additional literature:	<ol> <li>C. Barker, S., Kimmings, C., Philips, GCSE Design and Technology: FoodTechnology, Causeway Press, 1996.</li> <li>E. Beer, Prirucnik za dimenzioniranje uređaja kemijske procesne industrije,SKTH/KUI, Zagreb, 1994.</li> <li>W. D. Seider, J. D. Seader, D. R. Lewin, Proces Design Principles Synthesis,Analysis and Evaluation of Process Flowsheets, J. Wiley &amp; Sons, 2000.</li> </ol>						
Course title	THE PR OF RAY	OCESSING TEC W MATERIALS ORIGIN	Course code				
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Study programme					Study	3	
Cycle	Food Tec	chnology, I					
ECTS point value:	8	Semester	6		Hours per semester	75+30+0	
					(l+t+s)		
Course status:	Core	Prerequisites:	-	$\begin{bmatrix} C \\ c \\$	omparative nditions:	-	
Course access:				Cl	ass	Lj.S.	
				SC	hedule:		
Course teacher:		Holder: Prof Dr	rago Šuba	rić, 1	PhD		
		Associates:					
		Prof Jurislav Ba	abić, PhD	)			
		Prof Tihomir M	Ioslavac,	PhD			
		Prof Marko Juk	cić, PhD				
Contact hours/consulta	tions:	1 hour per weel	<u> </u>				
<i>E-mail and phone num</i>	ber:	jbabic@ptfos.h	<u>r; +385 3</u>	1 224	1 333		
Asisstant	<i></i>	11 1					
Contact hours/consulta	itions:	I hour per weel	X				
E-mail and phone num	ber:	times of this por					
Course objectives:	The objectives of this course are: Gaining basic knowledge of milling, baking, and the basics of pasta and biscuit production. Besides, the course aims to acquire knowledge in the basics of starch technology, the basis of sucrose production from sugar beet and the basis of chocolate technology. To acquire knowledge related to the storage and processing of fruits and vegetables in order to obtain quality and safe products. The aim is also to acquire basic knowledge in the technology of storage and processing of oilseeds and the production of edible vegetable oils. Students recognize the causes of oil deterioration and ways to effectively stabilize the oil.						
Learning outcomes	Expected	a chamical corre	les:	furh	at and deseri	ha tha	
(general and specific	importan	ce of individual	componer	ts in	the evaluation	on of the	
competences).	technolog	gical quality of the	e grain	105 111			
	• Explain	the technologica	al process	of p	reparing, stor	ing and	
	grinding	grain	1	1	1 8	0	
	• Define	baking properties	s and desc	ribe	rheological p	roperties of	
	flour					_	
	• Describ	e the basic stage	s of techn	olog	ical processes	s for the	
	production	on of bakery, bisc	uit and p	astry	products		
	• Explain	biochemical and	l physico	chem	ical changes	during the	
	process of production of flour products						

	• Define the basic stages of the corn starch production process
	• Define the basic stages of the production process of modified
	starches and starch hydrolysates
	• Define the basic methods of sugar production from sugar beet
	• Define the basic processes in chocolate production
	• Clarify the chemical composition of fruits and vegetables and
	changes during ripening
	• Apply technologies and techniques for fruit processing and
	production of individual fruit products
	• Apply technologies and techniques for vegetable processing and
	production of vegetable products
	• Clarify the development of fruit and vegetable-based products
	• State the chemical composition of vegetable oils.
	• Indicate the composition of the raw materials for oil production
	and the importance of storing oilseeds.
	• Explain the preparation of raw materials for processing
	(conditions, devices).
	• Define basic crude oil production processes (pressing, extraction).
	• Define the basic process of refining crude vegetable oils.
	• Indicate the storage of vegetable oils and their stabilization.
	• State the use of by-products of the oil industry.
	• Define the basics of oil-based product technology
Content of the	Lectures: Fundamentals of cereal processing technology Production
svllabus/performance	of flour. Flour milling operations. Milling products. Bread and
plan (in short):	pastry production processes. Bakery products. Quality assessment,
I the transferred of the transfe	
	transportation, packaging and storage of bakery products. Raw
	transportation, packaging and storage of bakery products. Raw materials, operations and processes in pasta production technology
	transportation, packaging and storage of bakery products. Raw materials, operations and processes in pasta production technology and biscuit and wafer production technology. Extrusion process and
	transportation, packaging and storage of bakery products. Raw materials, operations and processes in pasta production technology and biscuit and wafer production technology. Extrusion process and products. Fundamentals of starch technology. Basics of sugar beet
	transportation, packaging and storage of bakery products. Raw materials, operations and processes in pasta production technology and biscuit and wafer production technology. Extrusion process and products. Fundamentals of starch technology. Basics of sugar beet production technology. The basics of chocolate technology.
	transportation, packaging and storage of bakery products. Raw materials, operations and processes in pasta production technology and biscuit and wafer production technology. Extrusion process and products. Fundamentals of starch technology. Basics of sugar beet production technology. The basics of chocolate technology. Chemical composition of fruits and vegetables. Changes during
	transportation, packaging and storage of bakery products. Raw materials, operations and processes in pasta production technology and biscuit and wafer production technology. Extrusion process and products. Fundamentals of starch technology. Basics of sugar beet production technology. The basics of chocolate technology. Chemical composition of fruits and vegetables. Changes during ripening and maturation. Processing methods. Production of fruit-
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	transportation, packaging and storage of bakery products. Raw materials, operations and processes in pasta production technology and biscuit and wafer production technology. Extrusion process and products. Fundamentals of starch technology. Basics of sugar beet production technology. The basics of chocolate technology. Chemical composition of fruits and vegetables. Changes during ripening and maturation. Processing methods. Production of fruit- based products (fruit juices, pectin gel-based products, candied fruits, compotes, fruit salads, frozen fruits, dried fruits, olive processing,). Vegetable-based products (vegetables preserved by thermal sterilization, marinated vegetables, potato products, tomato products, mushroom products, dried vegetables, frozen vegetables). Fundamentals of vegetable oil technology. Composition of vegetable oils. Raw materials for oil production (seeds, pits, fruits).
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	transportation, packaging and storage of bakery products. Raw materials, operations and processes in pasta production technology and biscuit and wafer production technology. Extrusion process and products. Fundamentals of starch technology. Basics of sugar beet production technology. The basics of chocolate technology. Chemical composition of fruits and vegetables. Changes during ripening and maturation. Processing methods. Production of fruit- based products (fruit juices, pectin gel-based products, candied fruits, compotes, fruit salads, frozen fruits, dried fruits, olive processing,). Vegetable-based products (vegetables preserved by thermal sterilization, marinated vegetables, potato products, tomato products, mushroom products, dried vegetables, frozen vegetables). Fundamentals of vegetable oil technology. Composition of vegetable oils. Raw materials for oil production (seeds, pits, fruits). Oilseed storage. Preparation of oilseeds for processing. Production of vegetable oils (refined, unrefined, cold-pressed). Production of
	transportation, packaging and storage of bakery products. Raw materials, operations and processes in pasta production technology and biscuit and wafer production technology. Extrusion process and products. Fundamentals of starch technology. Basics of sugar beet production technology. The basics of chocolate technology. Chemical composition of fruits and vegetables. Changes during ripening and maturation. Processing methods. Production of fruit- based products (fruit juices, pectin gel-based products, candied fruits, compotes, fruit salads, frozen fruits, dried fruits, olive processing,). Vegetable-based products (vegetables preserved by thermal sterilization, marinated vegetables, potato products, tomato products, mushroom products, dried vegetables, frozen vegetables). Fundamentals of vegetable oil technology. Composition of vegetable oils. Raw materials for oil production (seeds, pits, fruits). Oilseed storage. Preparation of oilseeds for processing. Production of vegetable oils (refined, unrefined, cold-pressed). Production of crude oil by pressing (pre-press, final press). Production of crude oil
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	transportation, packaging and storage of bakery products. Raw materials, operations and processes in pasta production technology and biscuit and wafer production technology. Extrusion process and products. Fundamentals of starch technology. Basics of sugar beet production technology. The basics of chocolate technology. Chemical composition of fruits and vegetables. Changes during ripening and maturation. Processing methods. Production of fruit- based products (fruit juices, pectin gel-based products, candied fruits, compotes, fruit salads, frozen fruits, dried fruits, olive processing,). Vegetable-based products (vegetables preserved by thermal sterilization, marinated vegetables, potato products, tomato products, mushroom products, dried vegetables, frozen vegetables). Fundamentals of vegetable oil technology. Composition of vegetable oils. Raw materials for oil production (seeds, pits, fruits). Oilseed storage. Preparation of oilseeds for processing. Production of vegetable oils (refined, unrefined, cold-pressed). Production of crude oil by pressing (pre-press, final press). Production of crude oil by extraction with the organic solvent. Oil refining. Oil stabilization and storage. By-products of the oil industry. Fundamentals of
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relevant to the quality of	f the oilseeds. Testir	ng the quality of						
<b>Evaluation in detail</b> within European Credit Transfer System								
LESSON HOURS ECTS GRADE								
(ASSESSMENT)	25	10						
105	3,5	10						
20	5	00						
45	1,5	30						
240	8	100%						
lete 70% of the class schee	dule and 100% of the	class schedule to						
in the index and the exams,	, i.e. the final written e	exam.						
dterm is optional. The seco	ond midterm is not con	nditioned with the						
have the right to go to one of	of the corrective tests,	in which they can						
des from the I or II midtern	n. The corrective exam	n is conditioned by						
. If the student has passed	both tests (and is satis	fied with the total						
not have to take the final e	exam - in this case, a	total grade is the						
rades of both grades from	midterms. The final ex	consisting of						
is compulsory for students	who have not passed	the course through						
ondition for admission to the	he oral part of the exa	am is a completed						
rade includes the results of	the midterms or final	written exam and						
4 1 1 6 11								
oth exams are graded as foll	OWS:							
11  swers = 0%  of grade								
to 45% of grade								
to 60% of grade								
orade								
6170  to  5070 = 7570  of grade								
According to the Rulebook on studying the final grade is obtained as follows:								
nt)								
bod)								
,								
ent)								
ent)								
	relevant to the quality of vegetable oils. Oil oxidation hin European Credit Trans LESSON HOURS (ASSESSMENT) 105 90 45 240 ete 70% of the class sched in the index and the exams determ is optional. The second ave the right to go to one of des from the I or II midterm of the student has passed in the stu	relevant to the quality of the oilseeds. Testin         vegetable oils. Oil oxidation rate analysis.         hin European Credit Transfer System         LESSON HOURS       ECTS         (ASSESSMENT)       ECTS         105       3,5         90       3         45       1,5         240       8         ete 70% of the class schedule and 100% of the in the index and the exams, i.e. the final written e dterm is optional. The second midterm is not contave the right to go to one of the corrective tests, des from the I or II midterm. The corrective exam         If the student has passed both tests (and is satis not have to take the final exam - in this case, a rades of both grades from midterms. The final exam is compulsory for students who have not passed to ondition for admission to the oral part of the exam rade includes the results of the midterms or final exam are graded as follows:         nswers = 0% of grade       to 30% of grade         to 45% of grade       to 60% of grade         to 60% of grade       odow of grade         ot on studying, the final grade is obtained as follow:         nt)       pod						

Compulsory literature:	1. S. Kljusurić: An Introduction to Wheat Milling Technology. Faculty of Food Technology, Josip Juraj Strossmayer University of Osijek, Osijek, 2000.
	2. Y. Pomeranz: Wheat: Chemistryand Technology. Volume I and II. American Association of Cereal Chemists, St. Paul, Minnesota, 1988.
	3. J. E. Krugerand R.B. Matsuo: Pasta andNoodle Technology, American Association of Cereal Chemists, St. Paul, Minnesota, 1996.
	4. Luka Goldoni: CONFECTIONERY PRODUCTS TECHNOLOGY - Cocoa and chocolate. Kugler, 2004, Zagreb.
	5. Luka Goldoni: CONFECTIONERY PRODUCTS TECHNOLOGY - Candy. Kugler, 2004, Zagreb.
	<ol> <li>Sugar Technology, Internal Script, Faculty of Food Technology Osijek, 2011.</li> </ol>
	7. Starch Technology, Internal Script, Faculty of Food Technology Osijek, 2011.
	8. Fruit and vegetable technology (internal material)
	9. T. Lovrić, V. Piližota: Preserving and processing fruits and vegetables. Zagreb 1994.
	10. D. Swern: Bailey Industrial Oil and Grease Products, Knowledge, Zagreb, 1972.
	11. B. O. Matijašević, J. Turkulov: Technology of oils and fats, University of Novi Sad Faculty of Technology, Novi Sad, 1980
	12. F. Shahidi: Bailey's industrial oil & fat products, Volume 5, Edible Oil and Fat Products: Processing Technologies, Wiley-Interscience, 2005.
Additional literature:	1. Internal teaching materials from the lectures

Course title	THE TECHNOLOGY OF PROCESSING RAW MATERIALS OF ANIMAL ORIGIN				In the course		
Study program Cycle	Undergrad	uate (Bs)			Year of study	III.	
ECTS value of the mark:	4	Semester	VI		Hours per semester (l+e+s)	451 (23+22) +30e	
Course status:	Regular	Prerequisites:	No	Con term	nparative ns:	No	
Course access:	Students e	enrolled in the course Time tead			e of ching:	According to the advertised terms on the bulletin board and web portal	
Course teacher:		Jozo Grbavac, P Marija Jukić-Gr	c, PhD, Associate Professor and Grbavac, PhD, Assistant Professor				
Contact hours/ Consul	tations:	6					
E-mail address and ph	one	grbavacj@yahoo.com					
number:		jgmarija@gmail	.com				
Assistant		Leona Puljić, BSc.					
Contact hours/ Consul	tations:	6					
E-mail address and ph number:	one	leonapuljic224@gmail.com; 036 / 337-129					
Course objectives:	The objectives of this course are: To study the composition, properties, nutritional value and differences in the processing technology of animal origin. Animal transport, slaughter and slaughter of animals. Trimming and chilling of carcasses. Postmortal changes in meat, meat ripening. Market classification and meat categorization. Meat preservation (cooling and freezing), chemical methods of meat preservation (salting and brining), smoked meat. Systematization of meat and fish products. Technological processes and devices for the production and preservation of meat and fish products. Production of hygienic quality milk. Primary processing and milk processing. Milk cooling, heat treatment of milk and description of major dairy products. HACCP in the processing of raw materials of animal origin. Veterinary and sanitary measures and controls in the production and processing of animal origin. Legislation in the processing of raw materials of animal origin.						
Learning outcomes (general and specific	After attending and passing this course, students will know / be able to: Connect basic knowledge in the technology of processing raw materials of animal origin. Students will be introduced to the						

competences)	processing of raw materials of animal origin. Students will be acquainted with the basic technological and hygienic quality requirements of raw material of animal origin. Students will be introduced to the implementation of reference, standard and routine analyzes during the processing of raw materials of animal origin. Students will be familiar with the current legislation in the field of processing raw materials of animal origin, as well as the requirements and implementation of the HACCP system in the processing technology of raw materials of animal origin.						
Content of the syllabus / Performance plan (in brief):	The module provides an overview of the fundamental knowledge of the processing technology of raw materials of animal origin. Through the module students are introduced to the basics of technological processes in the technology of processing of raw materials of animal origin. Students will be familiar with the basic technological processes of processing meat and milk, as well as the hygiene requirements in their production.						
Method of teaching (mark in bolded printing)	Lectures	Exerci	ises	Seminars		Independent tasks	
r 0,	Consultations	Mento	oring work	Field training		Other	
	Remarks:						
Student obligations							
Student monitoring and evaluation	Attending classes	Activit teachin	ties during	Seminar pap	er	Practical work	
(mark in bolded printing)	Oral exam	Writte	en exam	Continous assessment		Essay	
<b>Detailed rating</b> of the <i>(Example)</i>	European point trar	ısfer sys	tem				
STUDENT OBLICATIONS	LESSON HOURS COURSE IN ECTS-u COURSE OF						
Class attendance and	30	.)	1			ALUATION	
engagement in			-				
teaching							
Seminar paper	30		1		20%	0	
Colloquium (2) or Written exam	50		2		60%	, 0	
Oral exam	30 1 20%						

Additional clarification:

According to the Study regulations, 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 (inadequate)

Compulsary	1. Kovačević, D. (2001): Chemistry and technology of meat and fish,
literature:	PTF-Osijek, Osijek (university textbook).
	2. Živković, J. (2001): Hygiene and Technology of Meat (Part I), (2nd
	Supplemented Edition), Veterinary Faculty, University of Zagreb,
	Zagreb.
	3. S. Miletić: Milk and dairy products, Croatian Milk Society Zagreb,
	1994.
Supplementary	1. Fidel, Toldra (2010): Handbook of Meat Processing,
literature:	WileyBlackwell; 1 edition.
	2. Tratnik, LJ. (1998): Milk-technology, biochemistry and
	microbiology. Croatian dairy association, Zagreb.
More information	
about the course	

# INSET: Calendar of classes

Number of	Hours	THEMES AND LITERATURE
teaching units	( <i>h</i> )	
<i>I</i> .	2	Title: Primary slaughter and postmortal changes in meat.
II.	2	Title: Categorization of meat for processing.
III.	2	Title: Color, pH value and ability to attach meat water.
IV.	2	Title: Meat preservation procedures.
V.	3	Title: Effects of certain methods of preserving the meat quality.
VI.	2	Title: Equipment and machinery in the meat industry.
VII.	3	Title: Technological processes of production of meat products in chunks,

		chopped meat and smoked meat products.
VIII.	2	Title: Production of bacon and other meat products.
IX.	2	Title: Influence of chemical composition of fish on changes during
		processing and storage of fish. Methods for evaluating freshness of
		chilled and frozen fish.
Х.	2	Title: Distribution of meat products with regard to durability and the
		method of preservation used and packaging.
XI.	1	Title: Safety and quality of meat products.
XII.	3	Title: Milk cooling, heat treatment of milk, milk performance check,
		description of major dairy products.
XIII.	2	Production of consumer milk, packaging of consumer's milk, production
		line for consumer's milk.
XIV.	3	Title: Fermented milk, the basis of fermented milk production.
XV.	2	Title: The basics of production of cream and butter.
XVI.	2	Title: Cheese, cheese division and basic processes in cheese production
		technology.
XVII.	2	Title: The basics of ice cream production and frozen desserts.
XVIII.	2	Title: Sensory evaluation of animal products.
XIX.	3	Title: Haccp in the processing technology of raw materials of animal
		origin.
XX.	3	Title: Veterinary and sanitary measures, along with legislation in the
		processing technology of raw materials of animal origin.

# **ELECTIVE COURSES**

Course title	WINE TECHNOLOGY					Course code	
Study programme	Study year 3. year						
Cycle	Food Tech	nology, I		1			
ECTS point value:	6	Semester	· 6.		Hours per	45 + 10 + 5	
					(l+t+s)		
Course status:	elective	Prerequisit	Prerequisit Con		nparative		
		es:			con	ditions:	
Course approach:	3-year-stu	dents			Cla	ss schedule	According
						to schedule	
Course teacher:		Tihomir Prusina, PhD					
Contact hours/consultations: By appointment							
<i>E-mail and phone number:</i> <u>tiho@</u>			tiho@vinarija-citluk.ba 063 313 952				
Asisstant Andrea Ka			Andrea Karlović				
Contact hours/consulte	By appointment						
E-mail and phone num	ber:	andreaodak	@gm	ail.com			

Course objectives:	<ul> <li>The objectives of this course are:</li> <li>Acquire basic knowledge of the chemical composition of musts and wines, the influence of certain technological processes of production on changes in the composition of wine and the influence on organoleptic properties</li> <li>Acquire basic knowledge about the procedures of primary grape processing, wine production technology, permitted procedures for processing and processing of musts and wines, care, storage, maturation and bottling of wine, as well as methods of wine quality assessment,</li> </ul>						
	acquainted with basic phy	sicochemical analyzes of r	nusts and wines.				
Learning outcomes (general and specific competences): Content of the syllabus/performanc e plan (in short):	<ul> <li>After completing this course, students will be able to:</li> <li>Determine the moment of grape harvesting,</li> <li>Make basic physical and chemical analyzes of musts and wines,</li> <li>Clarify the chemical compounds of grapes, musts and wine,</li> <li>Choose suitable wine dishes and machines that will ensure optimal conditions for wine production,</li> <li>Describe and apply methods of application and determine the required amount of oenological agents in particular wine production processes,</li> <li>cherish and preserve wine,</li> <li>Make a sensory evaluation of wine,</li> <li>Classify and explain the specific flaws and diseases of the wine and prevent them from occurring,</li> <li>Detect, identify and self-correct specific diseases and defects of wine.</li> </ul>						
<b>Evaluation in detail</b> w	quality of the wine. ithin <i>European Credit Tran</i>	nsfer System					
STUDENT		FCTS	GRADE				
OBLIGATIONS	(ASSESSMENT)		GRADE				
Class attendance and activity	60	2	0 %				
Midterm (2) or Written exam	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. Lectures and PowerPoint presentations
merature.	2. Herjavec, S .: Winemaking-Internal Script, Faculty of Agriculture, University of Zagreb.
	3. Jeromel, A .: Tutorials in Viticulture - Internal Script, Faculty of Agriculture, University of Zagreb.
	4. Radovanovic, V .: Wine Technology, IRO "Construction Book", Belgrade, 1986.
	5. Law on Wine of FB&H, <b>Official Gazzettes, no. 55 on 27.6.2012.</b>
Additional literature:	1. Zoričić, M.: Wineries (Podrumarstvo), Nakladni Zavod
	Globus,
	2. Jackson, R.: "Wine science", Academic press, 2000.
	3. Riberau-Gayon, P., D., Dubourdieu, B., Doneche, A.,
	Lonvaud: Handbook of enology-The microbiology of Wine
	and Vinification, Volume 1, Paris 2006.
	4. Riberau-Gayon, P., D., Dubourdieu, B., Doneche, A.,
	Lonvaud: Handbook of enology-The Chemistry of Wine,
	Stabilization and Treatments, second adition Volume 2 Paris
	Stabilization and Treatments, second edition volume 2, Fairs,

Course title	PRODUCTION OF ALCOHOLIC DRINKS					Course code		
Study programme						Study	3	
Cycle	Food Tec	hnology, I				year		
ECTS point value:	4	Semester		6		Hours per semester (l+t+s)	30+15+0	
Course status:	Elective	Prerequisites:		- Compa conditi		vrative ons:		
Course access:		Class			Class s	chedule		
Course teacher:	Course teacher:			Prof Borislav Miličević, PhD				
Contact hours/consulta	tions:	Josip Volarević dipl.ing.						
E-mail and phone num								
Asisstant	bmilicevic@ptfos.hr; +385 31 224 300							
Contact hours/consultations:		Andrea Odak						
E-mail and phone num								
Course title		andreaodak@gmail.com						

Course objectives:	The aim of the course is to	provide students	with the knowledge				
	necessary to guide the produ	ction of strong alco	bholic beverages and				
	to research in the field. T	The lectures cover	all aspects of the				
	production of the aforementioned products, starting with the quality						
	of the raw material, product	ion conditions, qua	lity control, hygiene				
	conditions and other elements necessary for the production of						
	quality and safe consumer p	roduct.					
	During the tutorials, student	s will work in grou	ups and will process				
	individual production and an	nalytical techniques					
Learning outcomes	After completing the course	students will:					
(general and specific	- explain and enforce legi	slation and regula	tions related to the				
competences):	production and marketing of	alcoholic beverage	es				
	- independently plan, pre	pare and manage	e generic alcoholic				
	beverage production process	ses					
	- explain the basic concepts	and principles ne	cessary to guide the				
	development and research p	rocess in the field					
Content of the	Definition of the subject. Ec	onomic importance	of the production of				
syllabus/performance	strong alcoholic beverages i	n the world, the Eu	ropean Union and in				
plan (in short):	Croatia, legal legislation.Ray	w materials for the	production of strong				
	alcoholic beverages, basic pl	nysicochemical char	racteristics and basic				
	biochemical processes in th	ne raw material. P	rocesses of primary				
	processing of raw materials	for the production	of strong alcoholic				
	beverages. Alcoholic ferr	nentation, chemist	try, dynamics and				
	products of alcoholic	fermentation, mi	croorganisms and				
	technological processes in	the fermentation	of strong alcoholic				
	beverages, basic processe	s of colloidal a	nd microbiological				
	stabilization, separation and	purification and ec	cological disposal of				
	products. Distillation - b	asic principles, d	lynamics, chemical				
	changes, distillation devi	ices and system	s. Procedures for				
	standardizing strong alcoho	lic beverages, prep	paration of distillate				
	dilution water, preparation	of alcoholates, flav	vours and additives.				
	Maturation and care of stron	g alcoholic beverag	es, physicochemical				
	processes in maturation, fina	alization of strong	alcoholic beverages.				
	Special technological prod	uction methods: p	production of grape				
	brandy; wine distillates, co	gnac, brandy, gra	pevine, grape marc,				
	mullet, wine. Fruit distillates	and fruit spirits; br	andy made of plums,				
	pears, berries. Production	of alcoholic be	verages by special				
	procedures (whiskey, rum, t	equila, vodka), cere	eals. Manufacture of				
	liqueurs and other spirits. I	ntroduction to the	basics of chemical,				
	physical and sensory testin	ng of the quality	of strong alcoholic				
	beverages.						
	Tutorials: physicochemical	methods of analysis	s of strong alcoholic				
	beverages (determination of	alcoholic strength	- pycnometer, total				
	extract - drying, total ad	cidity - titration,	higher alcohols -				
	spectrophotometrically, tota	l sugars) sensory o	evaluation of strong				
	alcoholic beverages by DLC	method. Industrial	exercises.				
Evaluation in detail wi	thin European Credit Transf	er System					
STUDENT	LESSON HOURS	ECTS	GRADE				
OBLIGATIONS	(ASSESSMENT)						

Class attendance and	45	1,5	20%
activity			
Midterm (2) or	45	1,5	30%
Written exam			
Oral exam	30	1	50%
TOTAL	120	4	100%

# Additional clarification:

The student must complete 70% of lectures and 100% of the tutorials to qualify for the signature in the index and the possibility to take midterms, or final exam.

<u>Grading policy:</u> Midterms are compulsory. Taking II. midterm is not conditioned with the first midterm. Students have the right to take one of the corrective tests, in which they can take or improve their grade of the I. or II. midterm. Correction exam is conditioned bypassing of I and/or II. midterm.

The final exam (oral part) is compulsory for all students. Completed midterms are prerequisites for passing the oral part of the exam. The final grade includes the results of the midterm exam and the final (oral) part of the exam, activity during the class and/or evaluation of the seminar paper.

Seminar paper is graded as follows:

**0%** = **Paper** is not written.

**2%** = The paper does not meet the formal criteria.

4% = The paper meets the formal criteria, but there are major deficiencies in the content.

6% = The paper meets formal and content criteria, but there are notable grammatical and spelling errors.

8% = The paper meets formal and content criteria, but there are minor grammatical and spelling errors.

**10%** = The paper is comprehensive, with correct grammar and spelling.

Presentation of the seminar paper is graded as follows:

**0% = Paper is not presented.** 

2% = Paper is read.

**4%** = Paper is partially read and unprepared.

6% = Paper is not read, but there are major deficiencies in the oral presentation.

8% = Presentation is well prepared, but minor errors in the speech are noticed.

**10% = Oral presentation is well prepared.** 

Midterms are graded as follows:

less than 50% correct answers = 0% ocjene

from 51% to 60% = up to 4% of grade

from 61% to 70% = up to 8% of grade

from 71% do 80% = up to 12% of grade

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from 81% do 90% = up to 16% of grade
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from 91% do 100% = up to 20% of grade

Written exam is graded as follows:

less than 50% correct answers = 0% ocjene

from 51% to 60% = up to 6% of grade

from 61% to 70% = up to 12% of grade

from 71% do 80% = up to 18% of grade

from 81% do 90% = up to 24% of grade

from 91% do 100% = up to 30% of grade

Additional clarification:

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

	~						
A = 91-100% 5 (excelle	A = 91-100% 5 (excellent)						
B = 79 to 90% 4 (very g	good	)					
C = 67  to  78% 3  (good)	)						
D = 55 to 66% 2 (suffic	ient)						
F = 0 to 54% 1 (insuffic	cient)						
Compulsory	1.	V. Marić: Biotechnology and Raw Materials, Stručna i					
literature:		poslovna knjiga d.o.o., Zagreb, 2000.					
	2.	B. Miličević: Fruit brandies and distillates - sparks of					
		technology BMMZ consulting, Požega, 2004.					
	3.	J.H. Bryce, G.G. Steward: Distilled Spirits: Tradition and					
		innovation, Nottingham University Press, UK, 2004.					
	4.	4. A.J.Buglass, Handbook of Alcoholic Beverages, Wiley Ltd.					
		Chichester UK 2011.					
Additional literature:	1.	AOAC: Official Methods of analysis. Association of Official					
		Chemists, Arlington, VA, USA, 2000.					
	2.	A.H.P. Varnam, J.P. Sutherland: Beverages, technology,					
		chemistry and microbiology, Chapman and Hall, London, 1994.					
	3.	L.M. Rose: Distillation design in practice, Elsevier Applied					
		Science, Amsterdam, 1985.					
	4.	L. Nykanen, H. Suomalainen: Aroma of beer, wine and distilled					
		alcoholic beverages, Akademie Verlag, Berlin, 1983.					
	5.	Materials from lectures.					

Course title	Ecology				Course code		
Study programme Cycle	Food Technology, I					Study year	III
ECTS point value:	4	Semester		VI		Hours per semester (l+t+s)	20 + 10
Course status:	Elective	Prerequisites:	Comp			mparative Iditions	
Course access:		Cla				iss schedule	
Course approach:	Danijela Petrović, PhD						
Course teacher:		By appointment	t				
Contact hours/consulte	sultations: <u>danijela.petrovi</u>			aptf.sur	<u>n.ba</u>	L	

E-mail and phone number:							
Asisstant							
Contact hours/consulta	tions:						
Course objectives:	Knowled relation w basic stru potentials as a basis environm	Knowledge of the basic principles of human ecology and its relation with other sciences and acquiring knowledge about the basic structures of the population, its distribution and its growth potentials, and understanding of the structure of the environment as a basis for acquiring knowledge about the possibilities of environmental management					
Learning outcomes (general and specific competences):	<ul> <li>distingu</li> <li>explain</li> <li>explain</li> <li>argue th</li> <li>biodivers</li> </ul>	<ul> <li>distinguish ecology from environmental protection;</li> <li>explain modern environmental characteristics.</li> <li>explain the basic principles of the biodiversity concept,</li> <li>argue the importance of ecological and biological protection of biodiversity.</li> </ul>					
Content of the syllabus/performance plan (in short):	Historical development, ecology and environmental protection, basic concepts (ecosystems, ecological potential, ecological strategies, sustainable development). The concept and basic features of biodiversity. Levels and forms of biodiversity. Pollutants, sources, effects, ecological effects. The concept and basic features of biodiversity. Levels and forms of biodiversity. Pollutants, sources, effects, environmental effects. Population size in the past. Population abundance. Trophic relations. Potentials and regulators of continuous population growth. Capacity accepts. The size of the global population.						
Evaluation in detail w	ithin Euro	pean Credit T	ransfer System				
STUDENT OBLIGATIONS	LESSO (ASSES	N HOURS SMENT)	ECTS	GRADE			
Class attendance and activity	30		1				
Midterm (2) or Written exam	60		2	60%			
Oral exam	30		1	40%			
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)							

Course title	Food Products Market			Course			
						code	
Study programme						Study year	1.
Cycle	Food Tec	hnology, I					
ECTS point value:	4	Semester 2.			Hours per	20+10+0	
						semester	
						(l+t+s)	
Course status:	elective	Prerequisites:			Со	mparative	
		con			<i>iditions:</i>		
Course access:					Cla	iss	
		schedu				nedule:	
Course teacher:		Prof Marko Ivanković, PhD					
Contact hours/consulta	Contact hours/consultations:						
E-mail and phone num	ber:	<u>mivankovic@faz.ba</u> , 036 335 052					

Asisstant		Marija Lasić, dipl.oec. dipl. nov.						
Contact hours/consultat	tions:							
E-mail and phone numb	er:	marija.lasic@aptf.sum.ba , 036 337 110						
Course objectives:	The object	tives of this cours	e are:					
·	Since kno	Since knowledge of the market and its specifics is a prerequisite						
	for a succ	for a successful business, the main objective of the module is to						
	bring stuc	lents closer to the	way the market econor	my system				
	works. Th	ne proposed progra	am will enable the acqu	uisition of a				
	global and	d integrated under	standing of the differen	nt instruments,				
	technique	es and strategies in	the agri-food market.	Furthermore,				
	global and	d domestic market	t institutions, as well as	s sales channels,				
	will be ex	plained. Students	will be introduced to c	consumer trends				
	as well as	the latest ways to	label products					
Learning outcomes	After con	pleting this cours	e, students will be able	e to:				
(general and specific	- Ex	xplain the market	concept and how it wo	rks.				
competences):	- D	escribe the specifi	cs of the agri-food mai	·ket				
	- D	escribe trends in th	he international market					
	- D	istinguish betweer	h basic market designat	tions of origin				
	an	and quality.						
	- D	- Describe sales channels, their advantages and						
	dı	sadvantages.		•				
	- Ex	xplain the role and	I importance of market	institutions.				
Content of the	Historica	l development, ma	irket concept and defin	ition, market				
syllabus/performance	types and	functions, market	specificities. Agricult	ural Market				
plan (in short):	Analysis.	market participan	as in agri-1000 product	is. The other of				
	agri-1000	actors of supply, the elasticity of supply, condition of supply,						
	for agri f	r agri-food products: demand concept demand conditions						
	demand f	mand factors, the electicity of demand, demand curve						
	Consump	tion of agri-food r	roducts Placement of	agri-food				
	products.	wholesale and ret	ail trade Plans and pla	ces of placement				
	Turnover of agri-food products. Trends in putrition and							
	consumpt	tion behaviour. Co	onsumer information ar	nd protection				
	Overview of the international market in the field of agribusiness							
	Domestic and foreign market institutions. External trade in agri-							
	food products and trends.							
Evaluation in detail wi	thin Euro	pean Credit Trans	fer System					
		·						
STUDENT	LESSO	N HOURS	ECTS	GRADE				
OBLIGATIONS	(ASSES	SMENT)						
Class attendance and	30		1					
activity								

activity			
Midterm (2) or	60	2	50%
Written exam			
Oral exam	30	1	50%
TOTAL	120	4	100%
Additional clarification:			

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

A = 91-100% 5 (excelle	A = 91-100% 5 (excellent)					
B = 79 to 90% 4 (very good)						
C = 67  to  78% 3  (good)	C = 67  to  78% 3  (good)					
D = 55 to 66% 2 (suffic	cient)					
F = 0 to 54% 1 (insufficient	cient)					
Compulsory	Kolega, A., Božić, M. (2001): Croatian Agricultural Market,					
literature:	Marketing, Zagreb					
	Ante Kolega, Agricultural Product Marketing, Globus Publishing					
	House, Zagreb, 1994.					
Additional literature:	Tracy, M. (1996): Food and Agriculture in a Market Economy, An					
	Introduction to Theory, Practice, and Politics					
	Kolega, A., Kovačić, D. (1995): Successful Sales, Marketing,					
	Zagreb					
	Other literature and online sources for specific topics as					
	recommended by the subject teacher					
Additional	• •					
information on						
course:						

Course title	WATER MICROBIOLOGY (proposal for a new course)			Course code	
Study programme				Study	2. year
Cycle	Food Tee	chnology, I		year	
ECTS point value:				Hours	
	4	Semester		per	25 hours
					L

				III	semester	5 hours	
			(1	(third) (l+t+s)		S	
			sei	emester			
Course status:	elective	Prerequisites:	-	Comp condit	arative tions:		
Course access:				Class		Winter	
		schedule: se			semester		
Course teacher:		Višnia Vasili. PhD					
Contact hours/consultations:	Predrag Ivanković, PhD						
<i>E-mail and phone number:</i>		2 hours					
Asisstant		visnja.vasilj@aptf.sum.ba or					
		visnja.vasilj@a	visnia.vasili@apmfo.org				
Contact hours/consultations:							
<i>E-mail and phone number:</i>							
Course title							
Course objectives:	The cour	se aims to give a	n ove	rview c	of current k	nowledge	
3	about a	quatic environr	nents.	its	physical,	chemical,	
	biologica	al contaminants	as w	ell as	the micro	organisms	
	found in	n each of them	. Th	e focu	s will the	en be on	
	contamir	nants that make	water	incapa	ble of drin	iking, and	
	methods for water purification will be discussed in detail as						
	well as laboratory tests used to determine water safety.						
Learning outcomes	- explain the basic principles of the historical development						
(general and specific	of water microbiology, basic information on the						
competences):	morphology, physiology and systematics of						
	microorg	ganisms,					
	- to defir	e and describe th	ne dis	tributio	n of micro	organisms	
	in nature	, the typology of	aqua	tic bas	ins of the o	ecological	
	lower an	d the biocenosis	of nat	ural aqu	uatic enviro	onments,	
	- argue for micro-organisms and products of their activity						
	on water quality,						
	- to argu	e the importance	or mi	croorga	inisms in w	astewater	
	activated	l processes (Dioi	Ogica	i treatin	nent, treati	nent with	
	- determi	ine the intensity of	f mic	, robiolo	ngical proce	20020	
Content of the	• The co	ntent of the mod		worg th	o bosio pri	noinlos of	
syllabus/nerformance nlan	the histo	rical developme	nt of	water	microbiolo	norpies of	
(in short).	informat	ion on the	morn	hology	nhysiol	ogy and	
	systemat	ics of microorga	nisms	norogy,	, physion	ogy und	
	• In micr	obiology of water	the	student	gets acqua	inted with	
	the distri	ibution of micro	organ	isms in	nature, tv	pology of	
	water basins of ecological lower biocenosis of natural			of natural			
	aquatic environments						
	• Nature and sources of water pollution testing of water			g of water			
	quality from a microbiological point of view						
	• Microorganisms as sanitary indicators of water quality.			er quality.			
	phyto an	d zooplankton	5			1 37	

	• Impact of microorganisms and products of their activity
	on water quality
	• Importance of microorganisms in wastewater treatment
	processes (biological treatment, purification with activated
	sludge and biofilters)
	• The role of microorganisms in the circulation of matter (C
	circulation, decomposition of organic matter, S, N, Mg, P
	and Si in aqueous media)
	• Determination of the intensity of microbial processes
<b>Evaluation in detail</b> within <i>Eur</i>	ropean Credit Transfer System

STUDENT OBLIGATIONS	LESSON HOURS (ASSESSMENT)	ECTS	GRADE
Class attendance and activity	30	1	
Midterm (2) or	60	2	60%
Written exam			
Oral exam	30	1	40%
TOTAL	120	4	100%

Additional clarification: example

E.g. To pass the final exam, students are required to achieve a minimum score during class, which is 20% in total. During semester, two midterms are written. The final grade includes the results of the midterm exam, the final exam, the activity during the class and the evaluation of the seminar paper.

Seminar paper is graded as follows:

0% = Paper is not written.

2% = The paper does not meet the formal criteria.

4% = The paper meets the formal criteria, but there are major deficiencies in the content.

6% = The paper meets formal and content criteria, but there are notable grammatical and spelling errors.

8% = The paper meets formal and content criteria, but there are minor grammatical and spelling errors.

**10%** = The paper is comprehensive, with correct grammar and spelling.

Presentation of the seminar paper is graded as follows:

**0%** = Paper is not presented.

2% = Paper is read.

**4%** = Paper is partially read and unprepared.

6% = Paper is not read, but there are major deficiencies in the oral presentation.

8% = Presentation is well prepared, but minor errors in the speech are noticed.

**10%** = Oral presentation is well prepared.

Midterms are graded as follows:

less than 50% correct answers = 0% ocjene

from 51% to 60% = up to 4% of grade

from 61% to 70% = up to 8% of grade

from 71% do 80% = up to 12% of grade

from 81% do 90% = up to 16% of grade

from 91% do 100% = up to 20% of grade

Written exam is graded as follows:

less than 50% correct answers = 0% ocjene

from 51% to 60% = up to 6% of grade

from 61% to 70% = up to 12	% of grade			
from 71% do 80% = up to 18	8% of grade			
from 81% do 90% = up to 24	4% of grade			
from 91% do 100% = up to 30% of grade				
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:	Duraković S. Redžepović:" Applied Microbiology,			
	Kuglov, 2003.			
	Dodić J. Grahovac J." Industrial Microbiology", Faculty			
	of Technology, Novi sad, 2013			

Course title		Course	
	ENVIRONMENTAL PROTECTION IN	code	
	THE FOOD INDUSTRY		
Study programme		Study year	III.
Cycle	Food Technology, I		

ECTS point value:	4	Semester	6.	Hours p	er :	18+7+5	
				(l+t+s)	1		
Course status:	Elective	Prerequisite	s: -	Comparative		_	
		1		conditions:			
Course access:				Class schedule	?		
Course teacher:		Prof Radica	ı Ćorić, Ph	D			
		Prof Stanko	) Ivankovi	ć, PhD			
Contact hours/const	ultations:	by appointment					
E-mail and phone n	umber:	radica.coric@aptf.sum.ba					
		stanko.ivankovic@aptf.sum.ba					
Asisstant							
Contact hours/consi	ultations:						
E-mail and phone m	umber:						
Course objectives:	The object	ives of this co	ourse are:	where and a set the		ann ant (a ail	
	Introduce	siudenis io in	e basic col	mponents of the	enviro n or	Jumeni (Soll,	
	especially	from agricult	ural source	s (on pig and i	n or i noultry	y farms atc.)	
	and from	food process	arai source sino nlants	es (on pig unu p (meat_industry)	, hreu	weries etc.)	
	Besides. th	jood process ne course aim	s to acaua	int students with	the a	ictivities and	
	measures	of environme	ntal protec	ction, environme	ental le	egislation in	
	BiH and t	BiH and the EU, and their implementation through EU directives,					
	HACCP st	andard and IS	SO standard	ds (ISO 9001 and	d ISO I	14001).	
Learning	After completing this course, students will be able to:						
outcomes	- Explain c	and analyze so	ources and	types of pollution	n of en	vironmental	
(general and	component	ts (soil, water,	air) espec	ially from the ag	ricultu	ire and food	
specific	industry,						
competences):	- to argue the impact of pollution on the environment.						
	- apply pre	pply preventative activities and measures in the preservation,					
	protection	n and improvement of the quality of the environment.					
	- Fian ana	a solve environmental problems.					
Content of the	Introducto	ry lecture Ra	tional use o	of environmental	comp	onents (soil	
svllabus/nerforma	water. air)	and maintain	ing their e	cological stabilit	v. Glol	bal Climate	
nce plan (in	Change wi	th special refe	erence to g	reenhouse gas er	nission	ns, Soil	
short):	degradatio	on, Eutrophica	tion, Quali	ity standards of e	environ	nmental	
	component	ts (soil, water,	air), Fund	amentals of Sust	tainabl	le	
	Developme	ent, Corporate	e Social Res	sponsibility, Con	tinuou	is Reduction	
	of Dischar	ge and Waster	water Burd	en, Proper Disp	osal of	f	
	Technological and Other Waste, Utilization of Alternative Energy						
	Sources, Environmental Impact Management, Monitoring						
	Establishn	Establishment, Environmental Permit, Compliance with Good					
	Manufactu	acturing Fractices, HACCP Systems, ISO Standards 9001 and					
	agricultur	out and other standards and regulations relevant to					
Evaluation in detai	Within Fu	n production, copean Credit	Transfer S	vstem	nviron		
(Example)		opean creat	i runsjer D	ysicht			
STUDENT	LESS	ON HOURS	ECTS		GRA	DE	
OBLIGATIONS	(ASSE	SSMENT)					

Class attack laws and	20	1			
Class allendance and	50	1	-		
Seminor nonon	20	1	250/		
Midtarra (2) or	30		23%		
Midteriii (2) or	45	1,5	50%		
Written exam	15	0.5	250/		
	15	0,5	25%		
IUIAL	12014100%				
Additional clarificati	ON:		11		
According to the Rul	ellows on studying, the	final grade is obtained as to	llows:		
A = 91-100% 5 (exc) $D = 70 t_0 00\% 4$ (we)	ellent)				
B = 79  to  90% 4  (ver	ry good)				
C = 0/10/8% 3 (gol D 55 to 660/2 (gol	DO)				
$D = 55 \ 10 \ 00\% \ 2 \ (subE = 0 \ to \ 540/ \ 1 \ (incur)$	fficient)				
F = 0.0034% I (insu	incient)				
C					
Compulsory	1 Indifano N (	016). Food loss and wasta	in EU low botwoon		
merature:	1. Lucilero, N., (	well being and the implie	III EU law between		
	sustainability of	well-being and the implic	ations for the food		
	System and the	environment. Agriculture	e and Agricultural		
	2 Damas Č 201	8 (2010) 282-289.	n comint Ecoulty of		
	2. Benac, C., 2013: Environmental protection, script, Faculty of				
	Civil Engineering, University of Kijeka Colin E (1988): Characterization of Industrial Wester				
	Industry and Environmental I-II-III UNEP Vol 11 No 1 1/88				
	A Earling A 200	ronmental, 1-11-111, UNEP,	V01. 11, IN0. 1 1/88.		
	4. Farina, A., 200	7: Principles and methods in	l landscape ecology.		
	Springer, Dourec	$\frac{1}{2} \sum_{i=1}^{n} \frac{1}{2} \sum_{i=1}^{n} \frac{1}$	-1 C - 1 1 Weten		
	5. Evangelou, V	(P. (1998): Environmenta	al Soil and Water		
	(2000): Down	Applications. John whey	& SONS LIC EEA		
	(2000): Down	to earth: Soll degradatio	n and sustainable		
	Gevelopment in E	(200) $(200)$ $(1)$	21st century		
	6. Belamaric, I	J., (2006): Climate Char d En anges Efficiences Fund	nge, Eco Keview,		
	Environmental ar	a Energy Efficiency Fund,	vol 2, no. 5		
	/th Basic, F. $(200)$	b): Sustainable managemen	t and soil protection		
	- The basis of sus	ainable development, manu	script, University of		
	Zagreb, Faculty	of Agriculture, Departmen	it of General Plant		
	Production, Zagro				
	8. A. Skoric. (199	(1): Soil composition and pr	operfies, Faculty of		
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