

**JOSIP JURAJ STROSSMAYER UNIVERSITY OF OSIJEK  
FACULTY OF FOOD TECHNOLOGY OSIJEK**



**SYLLABUS  
academic year 2018/2019**

**POSTGRADUATE UNIVERSITY (DOCTORAL) STUDY  
FOOD TECHNOLOGY AND NUTRITION**

**Osijek, November 2018**

## 1. GENERAL INFORMATION

### 1.1. Study name, area, field, branch

Postgraduate university (doctoral) study Food Technology and Nutrition for the academic degree of Doctor of Science (PhD.) in Biotechnical Sciences, scientific fields: Food Technology (4.0.5) and Nutrition (4.0.6).

### 1.2. Study provider / implementer

Josip Juraj Strossmayer University of Osijek  
Faculty of Food Technology Osijek  
Franje Kuhača 20, P.P. 709, 31000 OSIJEK  
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URL: <http://www.ptfos.unios.hr>  
e-mail: [office@ptfos.hr](mailto:office@ptfos.hr)

### 1.3. Admission Requirements

Applications for admission to postgraduate university study 'Food Technology and Nutrition' will be taken into consideration only if submitted by candidates who have completed graduate / undergraduate studies in the field of food technology, biotechnology and nutrition while those who have completed relating undergraduate or graduate studies (e.g. pharmacy, chemical engineering, engineering technology, agronomy, biology, chemistry and similar) in the Republic of Croatia or abroad can get admitted if they pass exams in courses within undergraduate and/or graduate study offered at the Faculty of Food Technology, which are deemed necessary for attending postgraduate university study "Food Technology and Nutrition". Such exams shall be passed prior to taking exams in postgraduate study courses. Decisions on supplemental exams are made by the Faculty Council following a proposal of the Committee for Obtaining a PhD Degree. The passed supplemental exams shall not be incorporated in the ECTS credit sum.

A postgraduate university can be attended by a person who has completed an undergraduate or graduate study within a relating scientific field with the GPA of at least 3.50 or above or an equivalent GPA in case of foreign students who were subject to other grading systems.

Exceptionally, candidates whose GPA achieved in the undergraduate or graduate study was below 3.50 can get accepted if their application is supplemented with references issued by two university professors working at the higher education institution which such candidates have graduated from. Decisions on an Admission Approval are made by the Faculty Council following a proposal of the Committee for Obtaining a PhD Degree.

After having been matriculated in the 1st year of study, candidates who have completed a relating scientific postgraduate master study can opt for recognition of corresponding ECTS credits obtained in compulsory and elective courses.

A completed scientific postgraduate study carries 15 ECTS credits in extracurricular activities.

Candidates who have completed a specialist postgraduate study within a relating scientific field can be, in accordance with a study programme, recognized corresponding ECTS credits obtained in elective courses.

A completed specialist postgraduate study carries 10 ECTS credits in extracurricular activities.

Foreign candidates are admitted to the study under the same conditions as Croatian citizens.

## 2. STRUCTURE AND ORGANIZATION OF THE PROGRAMME

The postgraduate university study is organized as a three-year study (6 terms).

The curriculum of the doctoral study includes as follows:

- Curricular activities (minimum 50 ECTS credits);

- Extracurricular activities (Table 4.2.2) (minimum 60 ECTS credits);
- Registration and defence of doctoral theses (20 ECTS credits);
- Scientific research under supervision and with assistance of a supervisor or co-supervisor, which is to result in preparation and defence of a doctoral thesis (50 ECTS credits).

Postgraduate doctoral study 'Food Technology and Nutrition' offers two majors:

1. Food Technology
2. Nutrition.

The curriculum of both majors of postgraduate doctoral study Food Technology and Nutrition consists of two groups of courses:

- compulsory (required) and
- elective.

The classes are scheduled for the first two years of the study whereat the students are required to obtain at least 50 ECTS credits on the grounds of curricular activities and exams.

First year students are obliged to obtain not less than 20 and not more than 30 ECTS credits as well as to take up at least two compulsory courses.

Second year students shall attend the rest of the compulsory and/or elective courses.

The rest of the necessary ECTS credits (minimum 130 ECTS credits) can be obtained through compulsory and elective activities, defence of the doctoral thesis topic and preparation and defence of the doctoral thesis.

The deadline for full-time study completion is five years and the deadline for part-time study completion is ten years. Pursuant to a decision of the Expert Board of the study provider, the deadline for study completion can be extended on justified grounds by another two years.

## 2.1. List of compulsory and elective courses

### COMPULSORY COURSES

#### Majoring: Food Technology

ISVU Code	Course	Class hours	L	P	S	ECTS	Lecturers
167606	Food process engineering	30	25	0	5	10	D. Kovačević, PhD, full prof. D. Šubarić, PhD, full prof. A. Pichler, PhD, assoc. prof.
167607	Food chemistry	30	20	5	5	10	M. Kopjar, PhD, full prof.
167608	Heat and mass transfer in food processing	30	25	0	5	10	S. Tomas, PhD, full prof. // M. Planinić, PhD, assoc. prof. A. Bucić-Kojić, PhD, assoc. prof.
167609	Experiment design and results analysis	30	15	10	5	10	M. Benšić, PhD, full prof. // M. Planinić, PhD, assoc. prof.

#### Majoring: Nutrition

ISVU Code	Course	Class hours	L	P	S	ECTS	Lecturers
167610	Nutritional needs throughout the life cycle	30	20	0	10	10	D. Čačić Kenjerić, PhD, full prof.
167611	Clinical nutrition	30	20	10	0	10	I. Banjari, PhD, assoc. prof.
167612	Physiological and biochemical aspects of nutrition	30	25	0	5	10	T. Klavec, PhD, full prof. // I. Strelec, PhD, assoc. prof.
167609	Experiment design and results analysis	30	15	10	5	10	M. Benšić, PhD, full prof. // M. Planinić, PhD, assoc. prof.

## ELECTIVE COURSES (4 or 6 ECTS credits)

### Majoring: Food Technology

ISVU Code	Course	Class hours	L	P	S	ECTS	Lecturers
167614	Advances in technology oils and fats	20	15	4	1	6	T. Moslavac, PhD, full prof.
167615	Advances in technology, processing and preservation of fruits and vegetables	20	15	0	5	6	N. Nedić Tiban, PhD, full prof.
167616	Achievements in technology of carbohydrates	20	14	3	3	6	J. Babić, PhD, full prof. // D. Šubarić, PhD, full prof. Đ. Ačkar, PhD, assoc. prof.
167617	Advancements in wine technology	20	15	5	0	6	A. Pichler, PhD, assoc. prof.
167618	Advances in technology of flour production and processing	20	15	0	5	6	D. Koceva Komlenić, PhD, full prof. // M. Jukić, PhD, assoc. prof.
167619	Advances in dairy processing	20	15	0	5	6	J. Hardi, PhD, full prof. // V. Slačanac, PhD, full prof. M. Lučan, PhD, asist. prof.
167620	Meat and fish technology achievements	20	15	0	5	6	D. Kovačević, PhD, full prof. // Ž. Cvetnić, PhD, full prof. Krešimir Mastanjević, PhD, assoc. prof.
167621	Technology of indigenous meat products	20	15	5	0	6	D. Kovačević, PhD, full prof. // Krešimir Mastanjević, PhD, assoc. prof.
167622	Malting and brewing technology: selected chapters	20	15	0	5	6	V. Krstanović, PhD, full prof. // N. Velić, PhD, assoc. prof. Kristina Mastanjević, PhD, asist. prof.
167623	Novel food packaging materials	20	15	0	5	6	L. Jakobek Barron, PhD, assoc. prof.
167624	Food microbiology	20	15	0	5	6	H. Pavlović, PhD, assoc. prof.
167625	Mycotoxicology	20	10	5	5	6	B. Šarkanj, PhD, asist. prof.
167626	Food quality and safety management	20	15	0	5	6	Lj. Primorac, PhD, full prof.
167627	Application of sensory analysis in the food industry	20	10	5	5	6	Lj. Primorac, PhD, full prof.
167629	Development of new products in food industry	20	15	0	5	6	M. Kopjar, PhD, full prof.
167630	Instrumental methods of analysis	20	10	0	10	6	D. Čačić Kenjerić, PhD, full prof. // L. Jakobek Barron, PhD, assoc. prof. I. Strelec, PhD, assoc. prof. J. Pleadin, PhD, assoc. prof.
167631	Modern extraction techniques in food engineering	20	15	0	5	6	A. Bucić-Kojić, PhD, assoc. prof. // M. Planinić, PhD, assoc. prof. S. Jokić, PhD, assoc. prof.
167632	Modelling the kinetics of special drying techniques in food process engineering	20	10	0	10	6	S. Tomas, PhD, full prof. // M. Bilić, PhD, full prof. M. Planinić, PhD, assoc. prof.
167633	Non-destructive methods of processes and food analysis	20	15	0	5	6	D. Magdić, PhD, full prof.

ISVU Code	Course	Class hours	L	P	S	ECTS	Lecturers
167634	Natural organic compounds	20	15	0	5	6	D. Gašo-Sokač, PhD, assoc. prof.
167635	Emerging water treatment technologies	20	10	5	5	6	M. Habuda-Stanić, PhD, assoc. prof.
167636	Waste management in food industry	20	10	0	10	6	M. Tišma, PhD, assoc. prof. // N. Velić, PhD, assoc. prof.
167637	Food process design and optimisation	20	10	5	5	6	D. Velić, PhD, full prof. // S. Jokić, PhD, assoc. prof. J. Lukinac Čačić, PhD, asist. prof.
167638	Organic food production and processing	20	15	0	5	6	D. Velić, PhD, full prof.
167639	Achievements in technology of confectionary products	15	12	0	3	4	D. Šubarić, PhD, full prof. // J. Babić, PhD, full prof. Đ. Ačkar, PhD, assoc. prof.
167640	Generic procedures in alcoholic beverages technology	15	8	0	7	4	B. Miličević, PhD, full prof.
167643	Technology of functional cereal-based products	15	15	0	0	4	D. Koceva Komlenić, PhD, full prof. // M. Jukić, PhD, assoc. prof.
167644	Minimally processed fruits and vegetables	15	10	0	5	4	N. Nedić Tiban, PhD, full prof.
167645	Food additives	15	12	0	3	4	D. Šubarić, PhD, full prof. // J. Babić, PhD, full prof. Đ. Ačkar, PhD, assoc. prof.
167646	The energy efficiency of the process of the food industry	15	10	0	5	4	S. Budžaki, PhD, assoc. prof.

## Majoring: Nutrition

ISVU Code	Course	Class hours	L	P	S	ECTS	Lecturers
167647	Functional foods	20	10	0	10	6	D. Čačić Kenjerić, PhD, full prof.
167648	Dietary supplements	20	10	0	10	6	M. Jašić, PhD, full prof. // D. Čačić Kenjerić, PhD, full prof. I. Banjari, PhD, assoc. prof.
167650	Phytonutrition	20	15	0	5	6	I. Banjari, PhD, assoc. prof.
167651	Nutrition from the aspect of public health	20	15	0	5	6	I. Banjari, PhD, assoc. prof.
167652	Nutritional epidemiology	20	15	0	5	6	M. Miškulin, PhD, full prof. // D. Čačić Kenjerić, PhD, full prof.
167654	Dietary assessment and nutritional status	20	15	0	5	6	D. Čačić Kenjerić, PhD, full prof.
167656	Alternative nutrition	15	10	0	5	4	T. Klavec, PhD, full prof. // I. Banjari, PhD, assoc. prof.
167658	Nutritional aspects of food preparation	15	10	0	5	4	B. Šarkanj, PhD, asist. prof.

ISVU Code	Course	Class hours	L	P	S	ECTS	Lecturers
167659	Weight reduction diets and prevention of obesity	15	15	0	0	4	T. Klačec, PhD, full prof. // I. Strelec, PhD, assoc. prof. D. Čačić Kenjeric, PhD, full prof.
167660	Nutrition and sport	15	5	0	10	4	D. Čačić Kenjeric, PhD, full prof.
167661	Food – drug interactions	15	10	0	5	4	T. Klačec, PhD, full prof.
167662	Biochemical analytics in nutritional research	15	10	3	2	4	B. Šarkanj, PhD, asist. prof. // S. Džijan, PhD, asist. prof.
167663	Selected topics in food toxicology	15	10	0	5	4	T. Klačec, PhD, full prof.

### 3. INFORMATION ON INDIVIDUAL EDUCATIONAL COMPONENTS

GENERAL INFORMATION		
<b>Course lecturer</b>	D. Kovačević, PhD, full prof. D. Šubarić, PhD, full prof. A. Pichler, PhD, assoc. prof.	
<b>Course title</b>	<b>Food process engineering</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	compulsory	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	10
	<b>Number of curricular units – hours (L+P+S)</b>	30 (20 + 5 + 5)
COURSE DESCRIPTION		
<b>Course objectives</b>		
Students will gain knowledge about new trends in food process engineering, condition and properties of water in food and special knowledge of the rheological properties of food and methods of their determination. main food constituents, their structure and food properties. In addition, they will gain knowledge about thermophysical properties of food and their application in equipment and plant designing, about their experimental determination and calculation with mathematical models. In addition, students will gain the special knowledge about advancements in food preservation and their application in the food industry.		
<b>Course requirements</b>		
There are no requirements.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- interpretation of new trends in food process engineering, food processing and preservation</li> <li>- define and describe forms of water and its thermodynamic properties in food</li> <li>- define thermophysical and rheological properties of food and methods of their determination</li> <li>- analyze developments in individual processes of the food industry</li> <li>- describe and explain the application of microorganisms starter cultures and enzymes in food technology</li> </ul>		
<b>Course content</b>		
<p>Advances in food process engineering, production and preservation of food. Water forms, thermodynamic properties of bound (unfreeze) water and sorption of water in food. Rheological properties of liquid and semi-liquid food, specific rheological parameters and their application, determining the rheological properties of certain types of food. Thermophysical properties of food. Influence of different additives, chemical composition and structure of the food and the type and phase transitions of water in food to the thermal conductivity, specific heat capacity, enthalpy, thermal diffusivity, density and initial freezing point of food. Thermal analysis and mathematical models for determining of thermophysical properties of food. Achievements in the application of freezing process, cooling and controlled atmosphere, dehydration, concentration, membrane and separation processes (pressing, clarification and filtration). Application of starter cultures of microorganisms and enzymes in food technology. Minimally processed foods. Non-thermal method of food preservation, conservation with barriers, bacteriocin. Advances in aseptic preservation of food.</p> <p>Seminar: preparation of seminar in consultation with professors.</p>		
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork	<input checked="" type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input checked="" type="checkbox"/> mentorship <input type="checkbox"/> other _____

<b>Comments</b>							
<b>Students' liabilities</b>							
Participation on lectures (or distance learning), conducting lab work, seminar prepared and oral exam passed.							
<b>Student activity and performance monitoring</b>							
Attendance	0.5	Participation	1.5	Seminar paper	3	Experimental work	
Exam/written		Exam/oral	5	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Student will be evaluated through preparation of seminar and success at exam.							
<b>Compulsory reading</b>							
<p>Lovrić T: Procesi u prehrambenoj industriji s osnovama prehrambenog inženjerstva, HINUS, Zagreb, 2003.          Lelas V: Prehrambeno –tehnološko inženjerstvo 1, Fizička svojstva hrane, Golden marketing-Tehnička knjiga, Zagreb, 2006.          Herceg Z: Procesi konzerviranja hrane, Novi postupci, Golden marketing-Tehnička knjiga, Zagreb, 2009.          Sweat V.E. : Thermal Properties in Foods. Marcel Dekker, Inc., Basel-Hong Kong, 1992.          Harwalker V.R., Ma C.Y. : Thermal Analysis of Foods. Elsevier Applied Science, London – New York, 1990.          Pozderović A. : Procesi u prehrambenoj industriji, Prehrambeno inženjerstvo, Prehrambeno tehnološki fakultet, Predavanja, Osijek, 2014.</p>							
<b>Recommended reading</b>							
<p>Herceg Z.: Procesi u prehrambenoj industriji, Prehrambeno-procesno inženjerstvo 1, Plejada, Zagreb, 2011.          Brennan J.G., Butters J.R., Cowell N.D and Lilley E.V.: Food engineering operations, Third edition, Elsevier applied science, 1990.          Mulder M.: Basic principles of membrane technology, Kluwer Academic Publishers, 1996.          Toldrá, F., Hui, Y.H., Astiasaran, I., Nip, W.K., Sebranek, J.G., Silveira, E.T.F., Stahnke, L.H., Talon, R. Handbook of fermented meat and poultry. Blackwell publishing, Oxford, UK, 2007.</p>							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
		<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>			
		Procesi u prehrambenoj industriji s osnovama prehrambenog inženjerstva, Sveučilište u Zagrebu, HINUS, Zagreb, 2003	10				
		Prehrambeno –tehnološko inženjerstvo 1, Fizička svojstva hrane, Sveučilište u Zagrebu, Golden marketing-Tehnička knjiga, Zagreb, 2006.	2				
		Procesi konzerviranja hrane, Novi postupci, Sveučilište u Zagrebu, Golden marketing-Tehnička knjiga, Zagreb, 2009.	2				
		Thermal Properties in Foods. Marcel Dekker, Inc., Basel-Hong Kong, 1992.	1				
		Thermal Analysis of Foods. Elsevier Applied Science, London – New York, 1990.	1				
		Procesi u prehrambenoj industriji, Prehrambeno inženjerstvo, Prehrambeno tehnološki fakultet, Predavanja, Osijek, 2014.	1 (PDF) (web.str.PTF.Os)				
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>							
Procedures, and processes for conducting certain activities related to monitoring, assurance and improving the quality of studies will be conducted in accordance with the applicable Manual for monitoring and quality assurance of higher education in the Faculty of Food Technology Osijek. Course lecturer can carry out other ways of monitoring the quality depending on the specifics of the course.							



GENERAL INFORMATION		
<b>Course lecturer</b>	M. Kopjar, PhD, full prof.	
<b>Course title</b>	<b>Food chemistry</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	compulsory	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	10
	<b>Number of curricular units – hours (L+P+S)</b>	30 (20 + 5 + 5)
COURSE DESCRIPTION		
<b>Course objectives</b>		
Students will gain knowledge about main food constituents, their structure and food properties. In addition, they will gain knowledge about reactions (and factors/conditions) that can occur during processing, preservation and storage of raw materials of plant and animal origin and food products. Obtained knowledge they will apply in preparation of seminar.		
<b>Course requirements</b>		
There are no requirements.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- describe main group of constituents and individual constituents</li> <li>- describe factors that are affecting chemical and biochemical changes of constituent during processing, preservation and storage</li> <li>- interpretation of changes of foo constituents and it influence on quality and stability of food constituent during processing, preservation and storage</li> <li>- election of group of constituents and estimation of it role (function) and stability</li> </ul>		
<b>Course content</b>		
<p>Chemical and biochemical reactions and their influence on quality and safety of food during processing, preservation and storage. Chemical and physical interactions between food constituents during processing and storage. Factors that affect stability of constituents (carbohydrates, lipids, proteins, vitamins, pigments and aroma compounds, anorganic compounds, enzymes) and changes caused by those factors during processing and storage of food. Food as dispersed system. Enzymatic reactions and factors affecting them (reaction mechanisms and kinetic of degradative changes). Vitamins. Loss of vitamins. Pigments of plant and animal origin. Aroma compounds in food and changes during processing and storage. Bioactive compounds in food and their stability during processing and storage. Anorganic compounds and influence of processing on its content. The most important antioxidants in food.</p> <p>In the laboratory, student will be introduced to some specific analytical methods that are used for determination of changes in food during processing and storage.</p> <p>Seminar: preparation of seminar in consultation with professors.</p>		
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input checked="" type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork	<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____
<b>Comments</b>		
<b>Students' liabilities</b>		

Participation on lectures (or distance learning), conducting lab work, seminar prepared and oral exam passed.							
<b>Student activity and performance monitoring</b>							
<i>Attendance</i>	0.5	<i>Participation</i>	1.5	<i>Seminar paper</i>	3	<i>Experimental work</i>	
<i>Exam/written</i>		<i>Exam/oral</i>	5	<i>Essay</i>		<i>Research</i>	
<i>Project</i>		<i>Continuous knowledge check</i>		<i>Presentation</i>		<i>Practical work</i>	
<i>Portfolio</i>							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Student will be evaluated through participation at lectures (consultations), preparation of seminar and success at exam.							
<b>Compulsory reading</b>							
<p>Preedy VR: Processing and Impact on Active Components in Food, Elsevier, 2015.          Belitz HD, Grosch W, Schieberle P: FoodChemistry, Springer, 3rd revised and extended ed., 2004.          Belitz HD, Grosch W, Schieberle P: FoodChemistry, Springer, 4th revised and extended ed., 2009.          Damodaran S, Parkin KL, Fennema OR: Fennema`s FoodChemistry. CRC Press, 2008.          Richardson T, Finley JW: Chemical changes in food during processing. Westport, Connecticut: The AVI Publishing Company, Inc., 1985.          Potter NN, Hotchkiss JH: FoodScience (3th ed.), Chapman&amp;Hall, New York, 1978.</p>							
<b>Recommended reading</b>							
Scientific and professional journals.							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
		<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>			
		Processing and Impact on Active Components in Food, Elsevier, 2015.	1				
		Food Chemistry, Springer, 4th revised and extended ed., 2009.	1				
		Fennema`s Food Chemistry. CRC Press, 2008.	1				
		Food Chemistry, Springer, 3rd revised and extended ed., 2004.	1				
		Chemical changes in food during processing. Westport, Connecticut: The AVI Publishing Company, Inc., 1985.	1				
		Food Science (3th ed.), Chapman & Hall, New York, 1978.	1				
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>							
<p>Procedures, and processes for conducting certain activities related to monitoring, assurance and improving the quality of studies will be conducted in accordance with the applicable Manual for monitoring and quality assurance of higher education in the Faculty of Food Technology Osijek.          Course lecturer can carry out other ways of monitoring the quality depending on the specifics of the course.</p>							

GENERAL INFORMATION	
<b>Course lecturer</b>	S. Tomas, PhD, full prof. // M. Planinić, PhD, assoc. prof. A. Bucić-Kojić, PhD, assoc. prof.
<b>Course title</b>	<b>Heat and mass transfer in food processing</b>
<b>Study programme</b>	Food Technology and Nutrition
<b>Majoring</b>	Food Technology
<b>Course status</b>	compulsory

<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>						
<b>Credits and curricular formats</b>	<b>ECTS</b>						
	<b>Number of curricular units – hours (L+P+S)</b>						
	10						
	30 (25+0+5)						
<b>COURSE DESCRIPTION</b>							
<b>Course objectives</b>							
Understanding the heat and mass transfer phenomena is particularly important for food processing. Student will be introduced to the phenomena of heat and mass transfer in unsteady-state conditions and to unit operations that take place with heat and mass transfer.							
<b>Course requirements</b>							
No enrolment requirements.							
<b>Expected learning outcomes</b>							
<ul style="list-style-type: none"> <li>- to interpret the Fourier equation</li> <li>- to describe the mechanisms of conductive and convective heat transfer</li> <li>- to explain the factors that affect the convective heat transfer coefficient and overall heat transfer coefficient</li> <li>- to distinguish and describe the molecular and convective mass transfer</li> </ul>							
<b>Course content</b>							
Multidimensional and unsteady state heat conduction (Fourier equation in Cartesian, cylindrical and spherical system; Cooling /heating rate). Heat transfer under unsteady state by convection (Forced convection; Natural convection; Combined forced and natural convection; Determination of convective heat transfer coefficient; Determination of overall heat transfer coefficient for variable temperature difference). Unsteady state molecular mass transfer or diffusion (Fick's law of diffusion; Diffusion through the membrane). Free and forced convective mass transfer (Determination of mass transfer coefficient by dimensional analysis; analogy between convective heat and mass transfer; Theory of equivalent boundary layer). Application of stochastic models in the analysis of unit operations involving heat and mass transfer.							
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures	<input checked="" type="checkbox"/> single-case research					
	<input checked="" type="checkbox"/> seminars and workshops	<input type="checkbox"/> multimedia and network					
	<input type="checkbox"/> practice	<input type="checkbox"/> laboratory practice					
	<input type="checkbox"/> distance learning	<input type="checkbox"/> mentorship					
	<input type="checkbox"/> fieldwork	<input type="checkbox"/> other _____					
<b>Comments</b>							
<b>Students' liabilities</b>							
Lectures and seminars attendance, seminar paper and oral exam.							
<b>Student activity and performance monitoring</b>							
Attendance	0.5	Participation	0.5	Seminar paper	4	Experimental work	
Exam/written		Exam/oral	5	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
The final grade is given on the basis of students' overall performance: attendance, activity during lectures, accepted and graded seminar paper and positively graded oral exam.							
<b>Compulsory reading</b>							
Tomas S: <i>Prijenos topline i tvari. Interna skripta</i> , Prehrambeno tehnološki fakultet, Osijek, 2014.							
<b>Recommended reading</b>							
Ibarz, A, Barbarosa-Cánovas GV: <i>Unit Operations in Food Engineering</i> . Boca Raton, CRC Press LLC, 2003.							

Incropera FP, DeWitt DP, Bergman TL, Lavine AS: Fundamentals of Heat and Mass Transfer. John Wiley & Sons, 2006.  
McCabe WL, Smith JC, Harriott P: Unit Operations of Chemical Engineering. McGraw-Hill, New York, 2005.  
Mujumdar AS: Handbook of Industrial Drying. CRC Press LLC, New York, 2006.  
Welti-Chanes J, Vélez-Ruiz JF, Barbarosa-Cánovas GV: Transport Phenomena in Food Processing. Boca Raton, CRC Press LLC, 2003.

**Number of items of compulsory reading with respect to the number of students attending the course**

Title	Number of items	Number of students
Prijenos topline i tvari	10	

**Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)**

Procedures, and processes for conducting activities related to monitoring, assurance and improving the quality of studies. The above mentioned will be conducted following the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Quality monitoring can be carried out dependent on course specifics.

**GENERAL INFORMATION**

<b>Course lecturer</b>	M. Benšić, PhD, full prof. // M. Planinić, PhD, assoc. prof.	
<b>Course title</b>	<b>Experiment design and results analysis</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology; Nutrition	
<b>Course status</b>	compulsory	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	10
	<b>Number of curricular units – hours (L+P+S)</b>	30 (15+12+3)

**COURSE DESCRIPTION**

**Course objectives**

The aim of the course is to broaden the acquired knowledge that will enable students to do independent scientific research in the field of nutritional technology and nutrition, which includes: research planning, setting of research tasks and hypotheses, population selection and analysis, application of statistical analyzes of experimental data using basic statistical methods and statistical programs, and interpretations of the results obtained.

**Course requirements**

No enrolment requirements.

**Expected learning outcomes**

- characterize the statistical model used in statistical inference
- characterize the statistical method and the properties of the statistics used in statistical inference
- propose a statistical model and method for the analysis of real experimental data
- apply computers and appropriate software packages when analyzing data
- critically study and apply new literature for statistical inference
- to argue the benefits, but also the limitations, of statistical analysis of data in application
- present the results of statistical analyzes

**Course content**

<p>Statistical inference on one variable:</p> <ul style="list-style-type: none"> <li>- estimation and interpretation of distribution, expectations, variance and other numerical characteristics of distribution</li> <li>- estimation by a reliable interval</li> <li>- testing of statistical hypotheses about proportion, quantiles, expectation and in general about distribution (binomial test, z-tests, sign test, t-test)</li> </ul> <p>Statistical inference of two or more variables:</p> <ul style="list-style-type: none"> <li>- methods for inferring differences between two continuous distributions - coupled and unbound sampling (t-tests, z-tests, F-test, KS-test, MWW-test)</li> <li>- analysis of contingency tables (conditional distributions, <math>\chi^2</math>-independence test, Fisher's exact test, McNemar test, binomial sign test, odds ratio)</li> <li>- measures of association / correlation of continuous variables (correlation coefficient and tests on correlation amount, rank correlation, Kendall's <math>\tau</math>, simple linear regression)</li> <li>- statistical inference on multiple variables for independent sampling (ANOVA, KW-ANOVA)</li> </ul>							
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures	<input checked="" type="checkbox"/> seminars and workshops	<input checked="" type="checkbox"/> practice	<input type="checkbox"/> distance learning	<input type="checkbox"/> fieldwork	<input checked="" type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____
<b>Comments</b>							
<b>Students' liabilities</b>							
Attending lectures, exercises and seminars. Preparation and presentation of seminar paper (papers) on a given topic.							
<b>Student activity and performance monitoring</b>							
Attendance	1	Participation	1	Seminar paper	1	Experimental work	
Exam/written		Exam/oral	3	Essay		Research	
Project		Continuous knowledge check		Presentation	4	Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
The final grade includes evaluation of activities during exercises and seminars, preparation of seminar paper (papers) and its presentation at the final (oral) exam.							
<b>Compulsory reading</b>							
M. Benšić, N. Šuvak, <i>Primijenjena statistika</i> , Sveučilište u Osijeku – Odjel za matematiku, 2013. <a href="http://www.mathos.unios.hr/ptfstatistika/00_statistika.pdf">http://www.mathos.unios.hr/ptfstatistika/00_statistika.pdf</a>							
D. J. Sheskin, <i>Handbook of Parametric and Nonparametric Statistical Procedures</i> , CRC Press, 2003.							
<b>Recommended reading</b>							
G. K. Bhattacharyya, R.A. Johnson, <i>Statistical Concepts and Methods</i> , John Wiley and Sons, New York 1977.							
M. Benšić, N. Šuvak, <i>Uvod u vjerojatnost i statistiku</i> , Sveučilište u Osijeku – Odjel za matematiku, 2013. <a href="http://www.mathos.unios.hr/uvis/UVIS_knjiga_final/UVIS_knjiga_web.pdf">http://www.mathos.unios.hr/uvis/UVIS_knjiga_final/UVIS_knjiga_web.pdf</a>							
J. T. McClave, P. G. Benson, T. Sincich, <i>Statistics for Business and Economics</i> , Prentice Hall, New York, 2001.							
G. McPherson, <i>Applying and Interpreting Statistics: A Comprehensive Guide</i> , Springer, 2001.							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
Title				Number of items		Number of students	
M. Benšić, N. Šuvak, <i>Primijenjena statistika</i>				unlimited (available for free)			
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>							
Procedures, and actions for conducting certain activities related to monitoring, security and improving the quality of studies will be conducted in accordance with the applicable Manual for monitoring and quality assurance of higher education of the Faculty of Food Technology Osijek. Course teacher can carry out other ways of monitoring the quality depending on the specifics of the course.							

GENERAL INFORMATION							
<b>Course lecturer</b>	D. Čačić Kenjerić, PhD, full prof.						
<b>Course title</b>	<b>Nutritional needs throughout the life cycle</b>						
<b>Study programme</b>	Food Technology and Nutrition						
<b>Majoring</b>	Nutrition						
<b>Course status</b>	compulsory						
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>						
<b>Credits and curricular formats</b>	<b>ECTS</b>				10		
	<b>Number of curricular units – hours (L+P+S)</b>				30 (20+0+10)		
COURSE DESCRIPTION							
<b>Course objectives</b>							
To introduce student with specific nutritional needs of various life cycle groups and their causes.							
<b>Course requirements</b>							
None defined.							
<b>Expected learning outcomes</b>							
<ul style="list-style-type: none"> <li>- to define and explain specific nutritional needs throughout the life cycle</li> <li>- to analyse dietary habits adequacy in various groups</li> <li>- to apply gained knowledge in defining individual nutritional needs</li> </ul>							
<b>Course content</b>							
Reasons of variation in nutritional needs throughout the lifecycle. Diet and reproduction. Diet in growth and development. Adulthood diet.							
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork			<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____			
<b>Comments</b>							
<b>Students' liabilities</b>							
To prepare seminar. To approach the exam.							
<b>Student activity and performance monitoring</b>							
Attendance	0.5	Participation	0.5	Seminar paper	3	Experimental work	
Exam/written		Exam/oral	6	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Student's achievements will be evaluated through the course activities, individual seminar preparation and exam.							
<b>Compulsory reading</b>							

Mitchel MK: Nutrition across the life span, Saunders, USA, 2003.		
<b>Recommended reading</b>		
Sharlin J, Edelstein S: Essentials of life cycle nutrition, Jones and Bartlet Publishers, Ontario, 2011. Langley-Evans S: Nutrition: a lifespan approach, Wiley-Blackwell, UK, 2009. Morgan JB, Dickerson JWT (Ed): Nutrition in early life, Wiley, UK, 2003. Bernstein M, Schmidt Luggen A: Nutrition for the older adults, Jones and Bartlett Publishers, Sudbury, Massachusetts, 2010.		
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>		
<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>
Nutrition across the life span	1	
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
Procedures for monitoring and improvements of study programme will be applied in accordance with Guidelines for monitoring and assurance of quality at the Faculty of Food Technology Osijek. Additional measurements and activities may be applied if required by lecturer due to course nature.		

GENERAL INFORMATION		
<b>Course lecturer</b>	I. Banjari, PhD, assoc. prof.	
<b>Course title</b>	Clinical nutrition	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Nutrition	
<b>Course status</b>	compulsory	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	10
	<b>Number of curricular units – hours (L+P+S)</b>	30 (20+10+0)
COURSE DESCRIPTION		
<b>Course objectives</b>		
On the basis of presented information students will understand the importance of clinical nutrition, with understanding of all of its specifics. Students will also learn specifics of dietary recommendations for specific, the most common diseases/conditions in hospital setting. Additionally, students will learn to apply presented information on inpatient menu planning diagnosed with certain disease (e.g. diabetes).		
<b>Course requirements</b>		
None.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- to define and explain aspects and specifics of clinical nutrition</li> <li>- to describe and explain specifics of management of hospital kitchen, with special emphasis on implementation of the HACCP system</li> <li>- to differentiate energy and nutritional needs of people diagnosed with different diseases/conditions</li> <li>- to differentiate, explain and analyse specifics of clinical nutrition according to specific disease (e.g. liver diseases)</li> <li>- to formulate inpatient menu diagnosed with a disease (e.g. recovery after an myocardial infarction), with the analysis of available information related with the specifics of an inpatient menu planning</li> </ul>		



<b>Course content</b>					
Introduction with the basics and specifics of clinical nutrition, i.e. inpatient nutrition. Introduction with specifics of the HACCP system in hospital kitchen and some important aspects related with its implementation. Defining energy and nutritional requirements for people diagnosed with a certain disease/condition. Defining specifics of clinical nutrition of the most important diseases and conditions, and according to their prevalence among hospitalized patients, and includes gastrointestinal diseases with organs (e.g. liver), diabetes, cardiovascular diseases, oncology, lung diseases, etc. Familiarization with some of the rare metabolic diseases (e.g. phenylketonuria). All information given at the lectures will be used as a basis for practical individual work where basic principles for inpatient menu planning will be set. Students will work on specific diet for a diabetic patient and according to their interest on other diseases/conditions.					
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures	<input type="checkbox"/> seminars and workshops	<input checked="" type="checkbox"/> single-case research	<input checked="" type="checkbox"/> multimedia and network
		<input checked="" type="checkbox"/> practice	<input type="checkbox"/> distance learning	<input type="checkbox"/> laboratory practice	<input type="checkbox"/> mentorship
		<input type="checkbox"/> fieldwork		<input type="checkbox"/> other _____	
<b>Comments</b>					
<b>Students' liabilities</b>					
Students are expected to actively participate in the lectures, which will encourage critical thinking and argument discussion. Students will be given a task in a form of a presentation of an inpatient menu plan, according to given baseline parameters. For this task students are expected to use all aspects covered in the lectures, and together with the analysis and critical thinking provide solution for the given problem, i.e. menu planning.					
<b>Student activity and performance monitoring</b>					
Attendance		Participation		Seminar paper	Experimental work
Exam/written	3	Exam/oral	4	Essay	Research
Project		Continuous knowledge check		Presentation	Practical work
Portfolio					3
<b>Grading and student performance evaluation during the course and at the final exam</b>					
Grading will include the assessment of practical work that includes individual activities during practices and work on multimedia computer programme (3 ECTS), than the written exam (3 ECTS), and finally the oral exam which has the highest impact on the student's final grade (4 ECTS), that assess student's active and creative approach towards problems related with the field of clinical nutrition.					
<b>Compulsory reading</b>					
Mahan LK, Escott-Stump S, Raymond JL(ed): <i>Krause's Food &amp; Nutrition Therapy, 13 Ed.</i> Saunders Elsevier, St. Louis, 2012. Štimac D, Krznarić Ž, Vranešić Bender D, Obrovac Glišić M: <i>Det therapy and clinical nutrition.</i> Medical Publishing Co., Zagreb, 2014. Mandić M. L.: <i>Diet therapy.</i> Faculty of Food Technology Osijek, Osijek, 2014. Guyton, AC, Hall, JE: <i>Textbook of medical physiology, 11th ed.</i> Medical Publishing Co., Zagreb, 2006.					
<b>Recommended reading</b>					
Escott-Stump S: <i>Nutrition and Diagnosis-Related Care, 7th ed.</i> Wolters Kluwer, 2012. Available relevant scientific papers.					
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>					
Title		Number of items		Number of students	
Krause's Food & Nutrition Therapy		1			
Diet therapy and clinical nutrition		2			
Diet therapy		2			
Textbook of medical physiology		2			
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>					



Certain procedures, i.e. actions related with the follow-up, assurance and quality improvement of the study programme will be implemented according to the Manual on follow-up and quality assurance in higher education at the Faculty of Food Technology Osijek in effect.  
Course lecturer can conduct other forms of quality assessment depending on the course specificities.

GENERAL INFORMATION		
<b>Course lecturer</b>	T. Klapac, PhD, full prof. // I. Strelec, PhD, assoc. prof.	
<b>Course title</b>	<b>Physiological and biochemical aspects of nutrition</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Nutrition	
<b>Course status</b>	compulsory	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	10
	<b>Number of curricular units – hours (L+P+S)</b>	30 (25+0+5)
COURSE DESCRIPTION		
<b>Course objectives</b>		
Understanding the role of nutritive and non-nutritive food components by explaining physiological, biochemical and molecular aspects of their action.		
<b>Course requirements</b>		
No requirements.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- describe biomolecules, structure and function of cells and tissues</li> <li>- define biochemical individuality</li> <li>- describe physiology of food digestion</li> <li>- define molecular bases of metabolism</li> <li>- identify critical points of interaction between food components and body on the molecular level</li> <li>- use specialized scientific literature in the fields of molecular biology and biochemistry</li> <li>- formulate new dietary regimes, functional foods and supplements</li> </ul>		
<b>Course content</b>		
Cellular physiology, heredity and biochemical individuality (genetic and epigenetic factors), anatomy and physiology of food digestion, metabolism of nutrients and toxicants, genetic, molecular and biochemical bases of interaction between food components and bodily systems (cardiovascular, immune, endocrine, nervous), carcinogenesis and chemoprevention, oxidative stress and the role of antioxidants, physiological aspects of aging and the role of nutrition.		
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input checked="" type="checkbox"/> distance learning <input type="checkbox"/> fieldwork	<input checked="" type="checkbox"/> single-case research <input checked="" type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input checked="" type="checkbox"/> mentorship <input type="checkbox"/> other _____
<b>Comments</b>		
<b>Students' liabilities</b>		
Seminars and individual assignments linked to scientific literature search and understanding.		

<b>Student activity and performance monitoring</b>							
Attendance		Participation		Seminar paper	2	Experimental work	
Exam/written		Exam/oral	7	Essay		Research	1
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Ability to perform independent research in the field will be assessed on the basis of written seminars, individual assignments, and oral examination.							
<b>Compulsory reading</b>							
Berg JM, Tymoczko JL, Stryer L, Gatto GJ Jr: Biochemistry. WH Freeman & Co., 2012. Klapec T, Strelec I: Prehrambena biokemija. PTF Osijek, 2016.							
<b>Recommended reading</b>							
Guyton AC, Hall JE: Textbook of medical physiology. Elsevier Saunders, 2006. Klapec T: Osnove toksikologije s toksikologijom hrane. PTF Osijek, 2016. Newsholme EA, Leech TR: Functional biochemistry in health and disease. Wiley-Blackwell, 2010. Niculescu MD, Haggarty P: Nutrition in epigenetics. Wiley-Blackwell, 2011. Stipanuk MH, Caudill MA (ur.): Biochemical, physiological, and molecular aspects of human nutrition. Elsevier Saunders, 2013. Whitney E, Rolfes SR: Understanding nutrition. Wadsworth, Cengage Learning, 2011.							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
			<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>		
			Biochemistry (PDF)				
			Prehrambena biokemija (PDF)				
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>							
Procedures, and actions for conducting certain activities related to monitoring, security and improving the quality of studies will be conducted in accordance with the applicable Manual for monitoring and quality assurance of higher education of the Faculty of Food Technology Osijek. Course teacher can carry out other ways of monitoring the quality depending on the specifics of the course.							

<b>GENERAL INFORMATION</b>		
<b>Course lecturer</b>	T. Moslavac, PhD, full prof.	
<b>Course title</b>	<b>Advances in technology oils and fats</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	6
	<b>Number of curricular units – hours (L+P+S)</b>	20 (15+4+1)
<b>COURSE DESCRIPTION</b>		
<b>Course objectives</b>		
They acquire new knowledge in the field of quality and characteristics of raw materials for the production of vegetable oils, which are important for the quality of the final products. Upgrading of specific knowledge that an understanding of the technology of production of vegetable oils from a variety of raw materials and		

refining of crude oil, with an emphasis on process parameters in each stage of the refining process. Gaining knowledge about of quality properties and oxidation stability (sustainability) of oil, fats and product and application options in the production of various products in food and non-food industry.							
<b>Course requirements</b>							
There are no requirements for enrollment.							
<b>Expected learning outcomes</b>							
<ul style="list-style-type: none"> <li>- New enriched varieties of oilseeds for the production of vegetable oil</li> <li>- Indicate achievements in the production of cold pressed, unrefined and refined vegetable oils</li> <li>- Meet new trends in oil production (extraction with supercritical gases, etc.).</li> <li>- Understand and distinguish able refining of crude oil and by-products of oil industry applications</li> <li>- New trends in the stabilization of oils and fats and explain the problems frying</li> <li>- To implement the analytical methods for assessing the degree of oxidation of oils and fats and the determination of oxidation stability</li> </ul>							
<b>Course content</b>							
<p>New insights into the breeding of raw material for the production of vegetable oils (new varieties). The composition and properties of vegetable oils derived from new varieties. The achievements in the production of unrefined and cold pressed edible oils. Modern trends in the production of vegetable oil (extraction with supercritical gases, etc.). Refining of crude oils (chemical, physical) with emphasis on the application of membrane processes. Production of phospholipids and its modification (chemical, enzymatic). The use of vegetable oils and by-products (phospholipids, cake, meal) in the food industry and in non-food purposes. The production specifics of fats of animal origin. The stabilization of oil and fats by using natural antioxidants (extracts of herbs) and synergist. Detection of primary and secondary products of oxidation oils and fats. The achievements and the ability to determine oxidation stability of oil. Chemistry and technology of frying foods and quality score. Directions of development of products based on vegetable oils. Legislation. Practices: The rating of the quality of raw material for the production of vegetable oils. Determining the optimal of process parameters pressing oilseeds on utilization of oils. Determination of quality parameters of vegetable oils and animal fats. Oxidation stability of oils and fats. Determination of rheological properties of products based on vegetable oils.</p>							
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork			<input checked="" type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input checked="" type="checkbox"/> laboratory practice <input checked="" type="checkbox"/> mentorship <input type="checkbox"/> other _____		
<b>Comments</b>							
<b>Students' liabilities</b>							
Participation in lectures, finished laboratory practice, a seminar work from the appropriate course content and exam concerning.							
<b>Student activity and performance monitoring</b>							
Attendance	0.5	Participation	0.5	Seminar paper	1	Experimental work	
Exam/written		Exam/oral	3	Essay		Research	1
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Work of student will be evaluated school attendance, activity in class and implementation of laboratory practice. Grading of students will be carried out by seminar work and by passing the oral examination.							
<b>Compulsory reading</b>							
<p>Hamm W, Hamilton RJ: <i>Edible Oil Processing</i>. Sheffield Academic Press, CRC Press, 2000.            Shahidi F: <i>Bailey's Industrial Oil &amp; Fat Product</i>. sixth edition, Volume 5, Edible Oil and Fat Products Processing Technology, Wiley-Interscience, 2005.            Gunstone DF: <i>Oils and Fats in the Food Industry</i>. Wiley-Blackwell, 2008.            Gunstone DF: <i>Vegetable Oils in Food Technology: Composition, Properties and Uses</i>. Blackwell, 2002.</p>							

<b>Recommended reading</b>		
Shahidi F: <i>Bailey's Industrial Oil &amp; Fat Product</i> . Sixth Edition, Volume 1-6, Wiley-Interscience, 2005. Various of journals.		
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>		
<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>
Edible Oil Processing, 2000.	1	
Bailey's Industrial Oil & Fat Product, sixth edition, Volume 5, Edible Oil and Fat Product: Processing Technology, 2005.	1	
Oils and Fats in the Food Industry, 2008.	1	
Vegetable Oils in Food Technology: Composition, Properties and Uses, 2002.	1	
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
The procedures, or proceedings of conducting certain activities related to monitoring, security and improving the quality of study will be conducted in accordance with the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Course teacher may also carry out other ways of monitoring the quality depending on the specifics of the object.		

GENERAL INFORMATION		
<b>Course lecturer</b>	N. Nedić Tiban, PhD, full prof.	
<b>Course title</b>	<b>Advances in technology, processing and preservation of fruits and vegetables</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	6
	<b>Number of curricular units – hours (L+P+S)</b>	20 (15+0+5)
COURSE DESCRIPTION		
<b>Course objectives</b>		
Students will gain knowledge about the latest developments/advancements in the technology of processing and preservation of fruits and vegetables, certain operations and processing methods, using various additives to improve the characteristics of the product, the use of new packaging materials and all significant possibilities of the use/reuse (utilization) of by-products in the processing of fruits and vegetables in order to obtain high-quality products.		
<b>Course requirements</b>		
No enrolment requirements.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- to describe the basic factors of the quality of fruits and vegetables and products during storage, processing and distribution</li> <li>- to describe and analyse existing and new procedures in technology for processing and preservation of fruits and vegetables</li> <li>- assess (design) and recommend new trends in technology of processing fruits and vegetables</li> </ul>		

<b>Course content</b>							
<p>Developments and trends in the processing and preservation of fruits and vegetables. Economic, technological and nutritional aspects of processing and preservation. Safety and quality of fruits and vegetables after harvest. Advances in the chemistry of aromatic compounds and pigments of fruits and vegetables. Advances in technology of some groups of fruit and vegetables. Utilization of by-products and waste in the industry for processing and preservation of fruits and vegetables. Advances in the production of the prepared and semi-prepared food based on fruits and vegetables. Handling finished products. Seminar: seminar work in consultation with the course lecturer.</p>							
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork			<input checked="" type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____		
<b>Comments</b>							
<b>Students' liabilities</b>							
Lectures and seminars attendance (and/or distance learning), seminar in paper (written essay) and passed oral exam.							
<b>Student activity and performance monitoring</b>							
Attendance	0.5	Participation	0.5	Seminar paper	2.5	Experimental work	
Exam/written		Exam/oral	2.5	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Students will be evaluated through participation on the lectures (consultation), making the seminar and success at the final (oral) exam.							
<b>Compulsory reading</b>							
<p>Tressler DK, Joslyn MA: Fruit and vegetable juice: processing technology, 1961.            Connor JM: Food processing: an industrial power house in transition, 1988.            Lovrić T, Piližota V: Tehnologija konzerviranja i prerade voća i povrća (ur. akademik Milan Maceljki), Nakladni zavod, GLOBUS, Zagreb, 1994.            Jongen W: Improving the safety of fresh fruit and vegetables, Woodhead Publishing, 2005. (Prof. personal issue)            Bart J, Cano M P, Gusek T, Sidhu JS, Sinha N: Handbook of Fruits and Fruit Processing (Y.H. Hui Ed.) Blackwell, 2006.            Evranuz EÖ, Siddiq M, Ahmed J: Handbook of Vegetables &amp; Vegetable Processing, Wiley-Blackwell (N. K. Sinha Ed., Y.H. Hui, Admin. Ed.), 2011.            Huang Q: Nanotechnology in the food, beverage and nutraceutical industries, Woodhead Publishing, 2012. (Prof. personal issue)</p>							
<b>Recommended reading</b>							
Scientific and professional journals.							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
Title		Number of items		Number of students			
Tehnologija konzerviranja i prerade voća i povrća (ur. akademik Milan Maceljki), Nakladni zavod, GLOBUS, Zagreb, 1994..		15					
Improving the safety of fresh fruit and vegetables, Woodhead Publishing Limited, 2005. (Prof. personal issue)		1					
Handbook of Fruits and Fruit Processing (Y.H. Hui Ed.) Blackwell, 2006.		1					
Handbook of Vegetables & Vegetable Processing, Wiley-Blackwell (N. K. Sinha Ed., Y.H. Hui Admin. Ed.), 2011.		1					

Nanotechnology in the food, beverage and nutraceutical industries, Woodhead Publishing, 2012. (Prof. personal issue)	1	
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
Procedures, and processes for conducting activities related to monitoring, assurance and improving the quality of studies. The above mentioned will be conducted following the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Quality monitoring can be carried out dependent on course specifics.		

GENERAL INFORMATION		
<b>Course lecturer</b>	J. Babić, PhD, full prof. // D. Šubarić, PhD, full prof. Đ. Ačkar, PhD, assoc. prof.	
<b>Course title</b>	<b>Achievements in technology of carbohydrates</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	6
	<b>Number of curricular units – hours (L+P+S)</b>	20 (14+3+3)
COURSE DESCRIPTION		
<b>Course objectives</b>		
Students will gain new knowledges in the chemistry and technology of sugar and starch, hydrocolloids, fibre, and production of starch hydrolysates and modified starches. Novel technological solutions in carbohydrate technology. Product quality and application of carbohydrates in food and non-food industries.		
<b>Course requirements</b>		
No requirements for subject enrolment.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- to describe chemical properties of starch and sugar</li> <li>- to describe the production and applications of resistant starch</li> <li>- to describe the production and applications of edible films and coatings</li> <li>- to describe properties and applications of hydrocolloids and fibre in food production</li> <li>- to adapt and apply procedures for production of starch hydrolysates and modified starches</li> </ul>		
<b>Course content</b>		
<p>Starch industry – presence and future. Raw materials in starch production. Physicochemical properties of starch. Achievements in starch production from maize, wheat and potato. Achievements in technology of starch hydrolysates. Modified starches – production and applications. Polyols. Quality control of starch and starch-based products. Edible films and coatings – production and applications. Resistant starch – production and applications. Hydrocolloids in food industry, functional properties in food matrices and changes during production and storage. Biodegradable polymers.</p> <p>Novel procedures in sugar technology. Sugar colour as one of the quality markers – procedures for reduction and control of white sugar colour. Prospects of more efficient utilization of sugar industry by-products (cossettes, molasses...).</p> <p>Seminars: starch modification and application of modified starches in production of specific food products.</p>		



Practice: preparation of acetylated starches with different degrees of substitution. Analyses of the properties of the produced starches. Isolation of pectin from sugar beet cossettes. Analyses of properties.							
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input checked="" type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork		<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input checked="" type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____			
<b>Comments</b>							
<b>Students' liabilities</b>							
Active participation in classes, finished laboratory practice, written paper and oral exam.							
<b>Student activity and performance monitoring</b>							
Attendance	0.4	Participation	0.4	Seminar paper	1	Experimental work	0.4
Exam/written	3.8	Exam/oral		Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Record keeping of class attendance, grading of activities in distance learning, grading of written paper and oral exam.							
<b>Compulsory reading</b>							
<p>van Beynum GMA i Roels JA: Starch Conversion Technology, Marcel Dekker INC, New York and Basel, 1985. Kearsley MW i Dziedzic SZ: Handbook of Starch Hydrolysis Products and their Derivates, Blackie Academic and Personal, London, Glasgow, Weinheim, New York, Tokyo, Melbourne, Madras, 1995.</p> <p>van der Poel PW, Schiweck H, Schwartz T: Sugar Technology, Beet And Cane Sugar Manufacture, Verlag Dr. Albert Bartens KG-Berlin, Berlin, Deutchshland, 1998.</p> <p>Park K-H: Carbohydrate Active Enzymes, Structure, Function and Applications, CRC Press, Boca Raton, SAD, 2008.</p> <p>BeMiller J i Whistler R: Starch, Chemistry &amp; Technology, 3rd Ed. Academic Press, Burlington, SAD, 2009.</p> <p>Cui S: Food Carbohydrates: Chemistry, Physical Properties and Application, CRC Press, Boca Raton, SAD, 2005. Dostupno na: <a href="https://ttnngmai.files.wordpress.com/2012/09/foodcarbohydrates.pdf">https://ttnngmai.files.wordpress.com/2012/09/foodcarbohydrates.pdf</a> [10. 2. 2015.]</p> <p>Krochta JM, Baldwin EA, Nisperos-Carriedo MO: Edible coatings and films to improve food quality, CRC Press, Boca Raton, SAD, 2002.</p> <p>Hull P: Glucose syrups technology and applications, Wiley-Blackwell, Chichester, United Kingdom, 2010.</p>							
<b>Recommended reading</b>							
Scientific and professional articles							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
Title		Number of items			Number of students		
Starch Conversion Technology		1					
Handbook of Starch Hydrolysis Products and their Derivates		1 (professor)					
Sugar Technology, Beet And Cane Sugar Manufacture		1 (professor)					
Carbohydrate Active Enzymes, Structure, Function and Applications		1 (professor)					
Starch, Chemistry & Technology, 3rd Ed		1					
Food Carbohydrates: Chemistry, Physical Properties and Application		1 (professor)			<a href="https://ttnngmai.files.wordpress.com/">https://ttnngmai.files.wordpress.com/</a>		

	2012/09/foodcarbohydrates.pdf	
Edible coatings and films to improve food quality	1	
Glucose syrups technology and applications	1 (professor)	
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
<p>Procedures of specific activities related to monitoring, assurance and improvement of quality of the study will be conducted according to the valid Manual for monitoring and assurance of quality of higher education at Faculty of Food Technology Osijek.</p> <p>Course lecturer can conduct additional procedures of quality monitoring in regard to specificities of the subject.</p>		

GENERAL INFORMATION		
<b>Course lecturer</b>	A. Pichler, PhD, assoc. prof.	
<b>Course title</b>	<b>Advancements in wine technology</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	6
	<b>Number of curricular units – hours (L+P+S)</b>	20 (15+0+5)
COURSE DESCRIPTION		
<b>Course objectives</b>		
Students will gain knowledge about the latest achievements in winemaking, the chemical composition of must and wine and the procedures about wine stabilization.		
<b>Course requirements</b>		
There are no requirements.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- specify the types and varieties of vines, describe the basics of viticulture</li> <li>- describe the chemical composition of must and wine</li> <li>- explain the achievements in production process of white and red</li> <li>- compare the modern process equipment in the wineries and the implementation of wine production process</li> <li>- specify and describe the modern processes of wine stability</li> </ul>		
<b>Course content</b>		
<p>Actual lawful regulations on the wine production and wine – growing area in the Republic of Croatia. Modern trends of processing grapes in must. Modern procedures in the fermentation of must. Advancements in the technology production of white, red and rose wines. Modern trends of stabilization and filtration of wine. Parameters of quality of wine. Advancements in wine quality control. Modern trends wine consumption in consideration of wine type and characteristics.</p> <p>Seminar: preparation of seminar in consultation with professors.</p>		
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning	<input checked="" type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input checked="" type="checkbox"/> mentorship



		<input type="checkbox"/> fieldwork		<input type="checkbox"/> other _____			
<b>Comments</b>							
<b>Students' liabilities</b>							
Participation on lectures (or distance learning), seminar prepared and oral exam passed.							
<b>Student activity and performance monitoring</b>							
Attendance	0.5	Participation	0.5	Seminar paper	2	Experimental work	
Exam/written		Exam/oral	3	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Student will be evaluated through preparation of seminar and success at exam.							
<b>Compulsory reading</b>							
Riberean – Gayon P, Glories Y, Maujean A, Dubourdieu D: Handbook of Enology, Volume II: The Chemistry of Wine Stabilization and Treatments, Wiley, 2001.							
Riberean – Gayon P, Dubourdieu D, Doneche B, Lonvaud A: Handbook of Enology, Volume I: The Microbiology of Wine and Vinifications, Wiley, 2001.							
Maletić E, Karoglan Kantić J, Pejić I: Vinova loza, ampelografija, ekologija, oplemenjivanje, Sveučilište u Zagrebu, Školska knjiga, Zagreb 2008.							
Zoričić M: Podrumarstvo, Nakladni Zavod Globus, Zagreb 1996.							
Požderović A: Tehnologija vina, Prehrambeno-tehnološki fakultet Osijek, Predavanja, 2015.							
<b>Recommended reading</b>							
Boulton RB, Singleton VL, Bisson LF, Kulkarni RI: Principles and Practices of Winemaking, The Chapman – Hall Enology Library, 1995.							
Hadjburg JJ: Winning with Quality the FP2 Story, New York, 1991.							
Fugelsang KC: Wine Microbiology, The Chapman – Hall Enology Library, 1997.							
Zoecklein BW, Fugelsang KC, Gump BH, Nury FS: Wine Analysis and Production, The Chapman – Hall Enology Library, 1995.							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
		<i>Title</i>		<i>Number of items</i>		<i>Number of students</i>	
		Handbook of Enology, Volume II: The Chemistry of Wine Stabilization and Treatments, Wiley, 2001.		1			
		Handbook of Enology, Volume I: The Microbiology of Wine and Vinifications, Wiley, 2001.		1			
		Vinova loza, ampelografija, ekologija, oplemenjivanje, Sveučilište u Zagrebu, Školska knjiga, Zagreb 2008		1			
		Podrumarstvo, Nakladni Zavod Globus, Zagreb 1996.		1			
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>							
Procedures, and processes for conducting certain activities related to monitoring, assurance and improving the quality of studies will be conducted in accordance with the applicable Manual for monitoring and quality assurance of higher education in the Faculty of Food Technology Osijek.							
Course lecturer can carry out other ways of monitoring the quality depending on the specifics of the course.							

GENERAL INFORMATION		
<b>Course lecturer</b>	D. Koceva Komlenić, PhD, full prof. // M. Jukić, PhD, assoc. prof.	
<b>Course title</b>	<b>Advances in technology of flour production and processing</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	6
	<b>Number of curricular units – hours (L+P+S)</b>	20 (15 + 0 + 5)
COURSE DESCRIPTION		
<b>Course objectives</b>		
The aim is to introduce students to modern technologies and problems of grain processing and enable them to apply the acquired knowledge in production facilities as a requirement for standardization and quality improvement of production technology of cereal-based products, as well as application of the latest technological achievements in the production and individual research in developing new products.		
<b>Course requirements</b>		
There are no requirements for enrolment in course.		
<b>Expected learning outcomes</b>		
After completing the course, students will be able to: - describe the importance of each component in the evaluation of technological quality of grain - explain the biochemical and physicochemical changes during the production of flour-based products - apply the knowledge in the production plant - to adapt technologies and formulations in order to improve production - create new flour-based products		
<b>Course content</b>		
<p><i>Lectures.</i> Process and application value of cereals. Chemical composition and importance of the individual components in the evaluation of technological quality of grain. Modern technologies in storage and milling. Methods of evaluating the quality of grain and flour. Advances in production processes of bakery products, biscuits and pasta. Improvers for flour-based products. Use of freezing process in the production of bakery products and pasta. The technology of microwaves in bakery production. Quality evaluation of the final flour-based products.</p> <p><i>Seminars.</i> Improving technological and nutritional quality of bread, biscuits and pasta using various substituents and supplements.</p>		
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input checked="" type="checkbox"/> distance learning <input type="checkbox"/> fieldwork	<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input checked="" type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____
<b>Comments</b>		
<b>Students' liabilities</b>		
Course attendance, writing a seminar paper and taking the oral exam.		
<b>Student activity and performance monitoring</b>		

Attendance	0.5	Participation	0.5	Seminar paper	2	Experimental work	
Exam/written		Exam/oral	3	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							

**Grading and student performance evaluation during the course and at the final exam**

Keeping records of attendance and evaluation of student activities during course, seminar paper and oral exam.

**Compulsory reading**

Reed CR: *Managing stored grain*. American Association of Cereal Chemists, St. Paul, Minnesota, 2006.  
Pomeranz Y: *Wheat: Chemistry and Technology*. Volumen I i II. American Association of Cereal Chemists, St. Paul, Minnesota, 1988.  
Matz SA: *Bakery Technology: Packaging, Nutrition, Product Development, Quality Assurance*. Elsevier Science Publishers, Essex, U.K., 1989  
Kulp K, Lorenz K, Brümmer J: *Frozen and Refrigerated Doughs and Batters*, American Association of Cereal Chemists, St. Paul, Minnesota, 1995.  
Fabriano G, Lintas C: *Durum Wheat: Chemistry and Technology*. American Association of Cereal Chemists, St. Paul, Minnesota, 1988..

**Recommended reading**

Posner ES, Hibbs AN: *Wheat Flour Milling*. American Association of Cereal Chemists, Inc. St. Paul, Minnesota, U.S.D., 1997.  
Kruger JE, Matsuo RB: *Pasta and Noodle Technology*, American Association of Cereal Chemists, St. Paul, Minnesota, 1996.  
Lásztity R: *Cereal Chemistry*, Akadémiai Kiado, Budapest, Hungary, 1999.  
Sluimer P: *Principles of Breadmaking Functionality of Raw Materials and Process Steps*, American Association of Cereal Chemists, St. Paul, Minnesota, 2005.

**Number of items of compulsory reading with respect to the number of students attending the course**

Title	Number of items	Number of students
Managing stored grain	1	
Wheat: Chemistry and Technology. Volumen I i II., 1988	1	
Bakery Technology: Packaging, Nutrition, Product Development, Quality Assurance	1	
Frozen and Refrigerated Doughs and Batters	1	
Durum Wheat: Chemistry and Technology	1	

**Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)**

Procedures of conducting certain activities related to monitoring, ensuring and improving the quality of study will be carried out in accordance with the current Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek.  
Course lecturer may also implement other ways of monitoring the quality depending on the specifics of the course.

**GENERAL INFORMATION**

<b>Course lecturer</b>	J. Hardi, PhD, full prof. // V. Slačanac, PhD, full prof. M. Lučan, PhD, asist. prof.
<b>Course title</b>	<b>Advances in dairy processing</b>
<b>Study programme</b>	Food Technology and Nutrition
<b>Majoring</b>	Food Technology

<b>Course status</b>	elective						
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>						
<b>Credits and curricular formats</b>	<b>ECTS</b>					6	
	<b>Number of curricular units – hours (L+P+S)</b>					20 (15+0+5)	
<b>COURSE DESCRIPTION</b>							
<b>Course objectives</b>							
<p>To present to students problems related to traditional and old technologies of milk processing. Introduce students to the possibilities of minimal milk processing in the production of various dairy products and in practice. Indicate the importance of new technological operations and processes for the maximum preservation of the original milk constituents. Provide technical and technological solutions for the production of dairy products with the same and standardized quality throughout the year, regardless of the impact of the variation in composition and quality of fresh raw milk.</p>							
<b>Course requirements</b>							
No enrolment requirements.							
<b>Expected learning outcomes</b>							
<ul style="list-style-type: none"> <li>- propose and develop methods and operations that will generate the optimum result with minimal processing of fresh raw milk</li> <li>- integrate processes, design and recommend the correct sequence of operations for a new approach to production</li> <li>- support and recommend HACCP criteria and new principles, especially in the production of long-ripened cheeses</li> </ul>							
<b>Course content</b>							
<p>Identifying and defining individual and collective difficulties in milk processing processes. Taxative treatment of certain negative effects of old and insufficient or inadequate processes in dairy industry. Mechanisms of possible degradative changes during processing, and ways to eliminate them with new approaches in technology. Indication of the causes of the occurrence of negative phenomena in the treated substrate due to inappropriate thermal or mechanical treatment or the duration of certain stages of the process. Demonstration of new solutions for achieving superior and consistent quality of dairy products. Display links to other food technologies that have imposed new requirements on dairy technology semis, used as enhancers.</p>							
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork			<input checked="" type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____			
	<b>Comments</b>						
<b>Students' liabilities</b>							
Attending and participating in a discussion during a class, or consulting with a subject teacher drafting a seminar assignment. Oral exam with discussion of seminar work.							
<b>Student activity and performance monitoring</b>							
Attendance	0.5	Participation	0.5	Seminar paper	2.5	Experimental work	
Exam/written		Exam/oral	2.5	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Attendance, class activity, oral examination and / or seminar work.							
<b>Compulsory reading</b>							

<p>Tratnik Lj: Mlijeko-tehnologija, biokemija i mikrobiologija. Hrvatska mljekarska udruga. Zagreb, 1998.          Tratnik Lj, Božanić R: Mlijeko i mliječni proizvodi. Hrvatska mljekarska udruga. Zagreb, 2012.          Duraković S: Prehrambena mikrobiologija. Medicinska naklada. Zagreb, 1991.          Tamime AY, Robinson RK: Yoghurt-Science and Technology. CRS Press. Boca Raton, Boston, New York, Washington, 2000.</p>		
<b>Recommended reading</b>		
Selection according to the specifics of the seminar assignment of each student from the faculty library or books in the teacher's office.		
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>		
<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
Procedures, and processes for conducting activities related to monitoring, assurance and improving the quality of studies. The above mentioned will be conducted following the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Quality monitoring can be carried out dependent on course specifics.		

GENERAL INFORMATION		
<b>Course lecturer</b>	D. Kovačević, PhD, full prof. // Ž. Cvetnić, PhD, full prof. Krešimir Mastanjević, PhD, assoc. prof.	
<b>Course title</b>	<b>Meat and fish technology achievements</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	6
	<b>Number of curricular units – hours (L+P+S)</b>	20 (15 + 0 + 5)
COURSE DESCRIPTION		
<b>Course objectives</b>		
Higher consumer requests for nutritional and healthy food require application of the latest technological advances in the processing, preservation and packaging of meat and fish products and the application of the latest concepts of animal health surveillance. Students will become familiar with the new preservation methods, technological processes and equipment, nutritive, nutritional, functional and market trends in the production of meat and fish products.		
<b>Course requirements</b>		
There are no requirements for course enrolment.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- To argue the pros and cons of the latest achievements in the field of conservation and packaging methods and their application in meat and fish industry</li> <li>- Specify and describe nutritive, nutritional, functional and marketing trends in the production of meat and fish products</li> <li>- Analyse and recommend technological advances, new production lines and equipment for the production of meat and fish products</li> </ul>		

<ul style="list-style-type: none"> <li>- To analyse the strengths, weaknesses, opportunities and threats (S.W.O.T. analysis) when creating new meat or fish products</li> <li>- Description of the latest concepts health-veterinary inspection in meat industry and fish processing industry</li> <li>- Develop technical balance sheet for the production of new meat and fish products</li> <li>- Define (in accordance with the legal provisions) area of quality and safety of meat and fish</li> </ul>							
<b>Course content</b>							
<p>Achievements in meat and fish preservation methods. Trends in the production of meat and fish products. The world's and European most significant producers of meat industry equipment, technological improvements, new machines and new production lines. Achievements in meat and fish packaging technology. The current regulations in the field of quality and safety of meat and meat products. The latest concept of health-veterinary inspection in meat industry and fish processing industry.</p> <p>Seminar: Technological balance sheet and S.W.O.T. analysis of new meat and fish products.</p>							
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork			<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____		
<b>Comments</b>							
<b>Students' liabilities</b>							
Students will be evaluated through participation in teaching (consultation), through the seminar paper and success on the final (oral) exam.							
<b>Student activity and performance monitoring</b>							
Attendance	0.5	Participation	0.5	Seminar paper	2	Experimental work	
Exam/written		Exam/oral	3	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Students will be evaluated through participation in teaching (consultation), through the seminar paper and success on the final (oral) exam.							
<b>Compulsory reading</b>							
<p>Kovačević D: Kemija i tehnologija mesa i ribe, PTF Osijek, 2001.</p> <p>Kovačević D: Tehnologija kulena i drugih fermentiranih kobasica, PTF Osijek, 2014.</p> <p>Pearson AM, Dutson T: Production processing of healthy meat, poultry and fish products, Blackie Academic &amp; Professional, 1997.</p> <p>Pearson AM, Dutson TR: HACCP in Meat, Poultry and Fish Processing, C.H.I.P.S. 2001.</p> <p>Toldrá F: Handbook of Meat Processing. Wiley-Blackwell, 2001.</p> <p>Toldrá F: Research Advances in the Quality of Meat and Meat Products, Research, 2002.</p>							
<b>Recommended reading</b>							
<p>Kerry J, Kerry J, Ledward D: Meat Processing: Improving Quality, C.H.I.P.S., 2002.</p> <p>Toldrá F, Hui YH, Astiasaran I, Nip WK, Sebranek JG, Silveira ETF, Stahnke LH, Talon R: Handbook of fermented meat and poultry, Blackwell publishing, 2007.</p> <p>Hall GM: Fish Processing technology, 2nd ed., C.H.I.P.S., 1997.</p>							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
<i>Title</i>		<i>Number of items</i>		<i>Number of students</i>			
Kemija i tehnologija mesa i ribe		50					
Tehnologija kulena i drugih fermentiranih kobasica		100					
Production processing of healthy meat, poultry and fish products		1					
HACCP in Meat, Poultry and Fish Processing		1					



Handbook of Meat Processing	1	
Research Advances in the Quality of Meat and Meat Products	1	
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
Procedures, and processes for conducting activities related to monitoring, assurance and improving the quality of studies. The above mentioned will be conducted following the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Quality monitoring can be carried out dependent on course specifics.		

GENERAL INFORMATION		
<b>Course lecturer</b>	D. Kovačević, PhD, full prof. // Krešimir Mastanjević, PhD, assoc. prof.	
<b>Course title</b>	<b>Technology of indigenous meat products</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	6
	<b>Number of curricular units – hours (L+P+S)</b>	20 (15+0+5)
COURSE DESCRIPTION		
<b>Course objectives</b>		
<p>Better education on nutritive and protective food properties and higher economic power of EU consumers has affected the demand of traditional and ecologically grown food (organic food). This is why Croatian indigenous meat products, especially the ones offered as a Croatian touristic attraction, could become significant export brand.</p> <p>Students will get to know the technologies and problems in production of IMP and will learn how to: a) apply the newest technological achievements as preconditions of quality standardization and technology improvements, b) recognize common technological mistakes, c) project a mini plant for IMP production.</p>		
<b>Course requirements</b>		
There are no requirements for course enrolment.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- describe IMP in Croatia</li> <li>- describe the additives and preservation methods used in IMP technology</li> <li>- describe production technologies of IMP</li> <li>- analyse the industrial technology specifications of IMP production</li> <li>- rate the quality of IMP using sensory analysis</li> <li>- analyse technological mistakes in IMP production</li> <li>- develop a technological project for mini IMP production plant</li> </ul>		
<b>Course content</b>		
Types of IMP in Croatia and EU, the marketing behind them and their protection. The specific preservation methods in the IMP technology. Basic raw materials and additional components for IMP production. Production technologies of indigenous dry sausages and dry-cured meat products (kulen, pršut, pancetta and others). Basic differences and specifics of industrial and traditional way of IMP production. Quality and safety of IMP. Application of starter cultures in IMP production.		

Seminar: Sensory evaluation of each IMP with technological mistake analysis and development of technological mini plant for IMP production.							
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork			<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____		
<b>Comments</b>							
<b>Students' liabilities</b>							
Students will be evaluated through participation in teaching (consultation), through the seminar paper and success on the final (oral) exam.							
<b>Student activity and performance monitoring</b>							
Attendance	0.5	Participation	0.5	Seminar paper	2	Experimental work	
Exam/written		Exam/oral	3	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Students will be evaluated through participation in teaching (consultation), through the seminar paper and success on the final (oral) exam.							
<b>Compulsory reading</b>							
Kovačević D: Kemija i tehnologija mesa i ribe, PTF Osijek, 2001. Kovačević D: Tehnologija kulena i drugih fermentiranih kobasica, PTF Osijek, 2014. Toldrá F, Hui YH, Astiasaran I, Nip WK, Sebranek JG, Silveira ETF, Stahnke LH, Talon R: Handbook of fermented meat and poultry, Blackwell publishing, 2007. Toldra F: Handbook of Meat Processing, Wiley-Blackwell, 2010. Toldrá F: Dry-Cured Meat Products, Food & Nutrition Press, 2002.							
<b>Recommended reading</b>							
Kovačević D: Sirovine prehrambene industrije (meso i riba), PTF Osijek, 2004. Vuković KI: Osnove tehnologije mesa. IV. izdanje. Veterinarska komora Srbije, 2012. Kovačević D, Mastanjević K: Tehnologija proizvodnje konjske salame, Poduzetnički centar Pakrac d.o.o., 2013.							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
		<i>Title</i>		<i>Number of items</i>		<i>Number of students</i>	
		Kemija i tehnologija mesa i ribe		50			
		Handbook of fermented meat and poultry		1			
		Handbook of Meat Processing		1			
		Dry-Cured Meat Products		1			
		Tehnologija kulena i drugih fermentiranih kobasica		100			
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>							
Procedures, and processes for conducting activities related to monitoring, assurance and improving the quality of studies. The above mentioned will be conducted following the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Quality monitoring can be carried out dependent on course specifics.							



GENERAL INFORMATION		
<b>Course lecturer</b>	V. Krstanović, PhD, full prof. // N. Velić, PhD, assoc. prof. Kristina Mastanjević, PhD, asist. prof.	
<b>Course title</b>	<b>Malting and brewing technology: selected chapters</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	6
	<b>Number of curricular units – hours (L+P+S)</b>	20 (15+0+5)
COURSE DESCRIPTION		
<b>Course objectives</b>		
Students will be introduced to new process solutions regarding malt and beer production, as well as new trends and efforts to widen the customer base concerning different beer styles and beer-like products.		
<b>Course requirements</b>		
No enrolment requirements.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- To gain insight into latest technological solutions in malting and brewing</li> <li>- To evaluate the suitability of different technological solutions that aim to widen the customer base for different beer styles and beer-like products</li> <li>- To monitor, manage and improve the existing malting and brewing production process by implementation of new process solutions</li> </ul>		
<b>Course content</b>		
<p>Selected chapters in malting: 1) material and energy balance improvement using integrated (hybrid) biotechnological processes for malt production; 2) raw material diversification in producing malt for beer or other cereal based fermented beverages (specialty malts; malting cereals other than barley, wheat and legumes, primarily soya); 3) new process solutions regarding the use of beer adjuncts and cereal based products (syrup, extrudates, etc.) intended for brewing.</p> <p>Selected chapters in brewing: 1) new approach to production and marketing in multinational beer corporation breweries; 2) new approach to production and marketing in medium-sized independent breweries (to 400 000 hL); 3) new approach to production and marketing in small-sized breweries (up to 100 000 hL); 4) new technological solutions and marketing strategies for beer-based products that aim at attracting specific customer groups (e.g. obese, diabetic, etc.); 5) new solutions for beer finishing process (preservation of original flavour during the finishing process); 6) new technological solutions and marketing strategies for beer-like products that aim to widen the customer base: beer designed for women (light hoppy beers), beer for the young (beer cocktails), highly stabilized (colloidal stabilization) beers intended for hot-climate countries, etc.</p> <p>Seminar: literature review, equipment list and plan for production of malt, beer and beer-like products intended for target customers</p>		
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork	<input checked="" type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input checked="" type="checkbox"/> mentorship <input type="checkbox"/> other

<b>Comments</b>							
<b>Students' liabilities</b>							
Lectures and seminars attendance, seminar paper (accepted and presented).							
<b>Student activity and performance monitoring</b>							
Attendance	0.5	Participation	0.5	Seminar paper	2.5	Experimental work	
Exam/written		Exam/oral	2.5	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
The final grade is given on the basis of students' overall performance: attendance, activity during lectures, accepted and graded seminar paper and positively graded oral exam.							
<b>Compulsory reading</b>							
Kunze W: Technology of Maitng and Brewing, 2nd revised ed. VLB Berlin , Berlin, 1999. Marić V, Šantek B: Tehnologija piva, Veleučilište u Karlovcu, Karlovac, 2009.							
<b>Recommended reading</b>							
Bamfort CW: Brewing New Technologies. Woodhead Publishing Limited, Cambridge, England, 2006. Heinz Petersen: Pivara i njena oprema. Posl. zajed. ind. piva i slada Jug., Beograd, 1993. Leskošek-Čukalović I: Tehnologija piva I dio: Slad i neslađene sirovine. Polj. fakultet, Beograd, 2002. Schuster K, Weinfurtner, F, Narziss L: Tehnologija proizvodnja sladovine. Posl. zajed. ind. piva i slada Jug., Beograd, 1985. Schuster K, Weinfurtner, F, Narziss L: Tehnologija proizvodnja slada. Posl. zajed. ind. piva i slada Jug., Beograd, 1988.							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
		<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>			
		Tehnologija piva, 2009	3				
		Technology of Malting and Brewing, 1999.	1				
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>							
Procedures, and processes for conducting activities related to monitoring, assurance and improving the quality of studies. The above mentioned will be conducted following the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Quality monitoring can be carried out dependent on course specifics.							

GENERAL INFORMATION		
<b>Course lecturer</b>	L. Jakobek Barron, PhD, assoc. prof.	
<b>Course title</b>	<b>Novel food packaging materials</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	
	<b>Number of curricular units – hours (L+P+S)</b>	6 20 (15+0+5)

COURSE DESCRIPTION							
<b>Course objectives</b>							
To give basic knowledge about new packaging materials and to enable an application of acquired knowledge in selecting a new packaging material for packaging of certain foods							
<b>Course requirements</b>							
There are no requirements for the enrollment							
<b>Expected learning outcomes</b>							
<ul style="list-style-type: none"> <li>- explain new materials which can be used for food packaging</li> <li>- differentiate between traditional packaging materials and new, active and intelligent packaging materials</li> <li>- understand environmental acceptability of packaging</li> <li>- stand-alone discussion about the choice of a new packaging material for the food package</li> <li>- suggest a new packaging material for packaging of a certain food</li> </ul>							
<b>Course content</b>							
<p>Novel materials in food packaging. Active packaging based on oxygen, carbon dioxide, and water vapor scavenging. Specific packaging based on removing odors and preserving flavors. Antimicrobial packaging systems. Intelligent packaging. Nanotechnology in food packaging. Edible packaging based on proteins (of plant or animal origin), starch, non-starch polysaccharides, and lipids. Environmentally friendly packaging. The quality of the packaged food. Legislation.</p> <p>Seminars: proposal of a new packaging material for packaging foods (the proposal of the packaging material, an explanation of the active substance within the material and extra features of the active package, an explanation of the environmental acceptability of materials). Explanation of the quality preservation of food packaged in newer types of packaging.</p>							
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork			<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____		
<b>Comments</b>							
<b>Students' liabilities</b>							
<ul style="list-style-type: none"> <li>- active participation in lectures through the working assignment</li> <li>- writing the seminar paper</li> <li>- oral presentation of the working assignment and seminar paper</li> </ul>							
<b>Student activity and performance monitoring</b>							
Attendance	0.5	Participation	1.5	Seminar paper	2	Experimental work	
Exam/written		Exam/oral	2	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
A working assignment and seminar paper written and accepted, oral exam							
<b>Compulsory reading</b>							
Han JH: Innovations in food packaging. Elsevier science and technology books, 2005. Brody AL, Strupinsky ER, Kline LR: Active packaging for food applications, CRC Press, Boca Raton, London, New York, Washington D.C., 2001.							
<b>Recommended reading</b>							
Robertson GL: <i>Food Packaging-Principles and practice</i> . Marcel Dekker, New York, 1993. Vujković I, Galić K, Vereš M: <i>Ambalaža za pakiranje namirnica</i> . Tectus, Zagreb, 2007.							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							

<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>
Innovations in food packaging, 2005	1	
Active packaging for food applications, 2001	1	
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
Procedures, and processes for conducting activities related to monitoring, assurance and improving the quality of studies. The above mentioned will be conducted following the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Quality monitoring can be carried out dependent on course specifics.		

<b>GENERAL INFORMATION</b>		
<b>Course lecturer</b>	H. Pavlović, PhD, assoc. prof.	
<b>Course title</b>	<b>Food microbiology</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	6
	<b>Number of curricular units – hours (L+P+S)</b>	20 (15+0+5)
<b>COURSE DESCRIPTION</b>		
<b>Course objectives</b>		
Course goal is to explain basic microbiological concepts: habitat, taxonomy and microbial growth parameters. Additionally, to define intrinsic and extrinsic parameters of ingredients or food with direct impact of growth of selected microbial groups/species. Goal is to introduce microbial population of food groups to students. Comparison of different microbial counting methods or metabolites in food. To analyse food protection methods. To define safety and quality indicators, principles of food preservation and legislative. Foodborne etiology. .		
<b>Course requirements</b>		
No requirements.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- to analyse impact of habitat and parameters on microbial growth</li> <li>- to identify foodborne microorganisms depending of food groups</li> <li>- to compare methods of intrinsic and extrinsic parameters application in control of microbial growth in food</li> <li>- to predict spoilage microorganisms and spoilage mechanisms of selected food groups</li> <li>- to apply the most efficient methods of microbial/metabolic products counts in food depending of nutritional value and present microbial population</li> <li>- to implement modern methods in food safety maintenance</li> <li>- to recommend microbial indicators in microbiological food control</li> </ul>		
<b>Course content</b>		
Microbial habitat, taxonomy and growth parameters. Intrinsic and extrinsic parameter affecting microbial growth. Microbial population of selected food groups. Microbial/metabolic product count/determination in food. Preservation and prevention of food spoilage. Microbial safety and quality indicators, principles of food preservation, legislation. Foodborne intoxications/infections.		

<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures	<input type="checkbox"/> single-case research
	<input checked="" type="checkbox"/> seminars and workshops	<input type="checkbox"/> multimedia and network
	<input type="checkbox"/> practice	<input type="checkbox"/> laboratory practice
	<input type="checkbox"/> distance learning	<input type="checkbox"/> mentorship
	<input type="checkbox"/> fieldwork	<input type="checkbox"/> other
<b>Comments</b>		
<b>Students' liabilities</b>		
Successful accomplishment of the course in the form of seminar paper and oral exam.		
<b>Student activity and performance monitoring</b>		
Attendance	Participation	Seminar paper 1.8
Exam/written	Exam/oral 4.2	Essay
Project	Continuous knowledge check	Presentation
Portfolio		Practical work
<b>Grading and student performance evaluation during the course and at the final exam</b>		
Grading includes the quality of the seminar work and, ultimately, and, the most important, oral exam.		
<b>Compulsory reading</b>		
Duraković S i sur.: <i>Moderna mikrobiologija namirnica</i> -knjiga prva. Kugler, Zagreb, 2002. Duraković S, Delaš F, Duraković L: <i>Moderna mikrobiologija namirnica</i> -knjiga druga. Kugler, Zagreb, 2002.		
<b>Recommended reading</b>		
Jay JM, Loessner MJ, Golden DA: <i>Modern Food Microbiology</i> , Springer, 2005. <a href="http://books.google.hr/books/about/Modern_Food_Microbiology.html?id=C0sO1gNFWLAC&amp;redir_esc=y">http://books.google.hr/books/about/Modern_Food_Microbiology.html?id=C0sO1gNFWLAC&amp;redir_esc=y</a>		
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>		
	<i>Title</i>	<i>Number of items</i>
	Moderna mikrobiologija namirnica-knjiga prva	4
	Moderna mikrobiologija namirnica-knjiga druga	4
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
Procedures, and processes for conducting activities related to monitoring, assurance and improving the quality of studies. The above mentioned will be conducted following the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Quality monitoring can be carried out dependent on course specifics.		

GENERAL INFORMATION		
<b>Course lecturer</b>	B. Šarkanj, PhD, asist. prof.	
<b>Course title</b>	<b>Mycotoxigenology</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	6
	<b>Number of curricular units – hours (L+P+S)</b>	20 (15+0+5)

COURSE DESCRIPTION							
<b>Course objectives</b>							
Understanding biosynthesis, toxic effects and detection methods for mycotoxins.							
<b>Course requirements</b>							
No special requirements.							
<b>Expected learning outcomes</b>							
<ul style="list-style-type: none"> <li>- differentiate mycotoxigenic molds and their products</li> <li>- describe toxicological properties of mycotoxins</li> <li>- anticipate adverse effects depending on exposure</li> <li>- analyze mycotoxins in industrial and laboratory environment in accordance with relevant legislation and official analytical rules</li> <li>- design and implementation of new analytical methods</li> <li>- modulate <i>in vivo</i> production of mycotoxins</li> </ul>							
<b>Course content</b>							
Characteristics of mycotoxigenic molds, classification of mycotoxins including masked/modified forms, factors influencing mold growth and mycotoxin production, toxic effects of mycotoxins, legislation and official methods for analysis of mycotoxins, detection of mycotoxigenic molds (microbiological and molecular methods), sampling strategies for mycotoxin analysis, extraction and purification, chromatographic separation methods, immunochemical detection methods (ELISA), application of mass spectrometry in analysis of mycotoxins, biomarkers of exposure.							
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input checked="" type="checkbox"/> practice <input checked="" type="checkbox"/> distance learning <input checked="" type="checkbox"/> fieldwork			<input checked="" type="checkbox"/> single-case research <input checked="" type="checkbox"/> multimedia and network <input checked="" type="checkbox"/> laboratory practice <input checked="" type="checkbox"/> mentorship <input type="checkbox"/> other _____		
<b>Comments</b>							
<b>Students' liabilities</b>							
Seminars, individual assignments and lab work.							
<b>Student activity and performance monitoring</b>							
Attendance		Participation		Seminar paper	1	Experimental work	2
Exam/written		Exam/oral	2	Essay		Research	1
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Ability to perform independent research in the field will be assessed on the basis of written seminars, individual assignments, lab work, and oral examination.							
<b>Compulsory reading</b>							
De Saeger S: Determining mycotoxins and mycotoxigenic fungi in food and feed. Woodhead Publishing, 2011.							
Duraković S, Duraković L: Mikologija u biotehnologiji. Kugler, 2003.							
<b>Recommended reading</b>							
Barkai-Golan R, Paster N: Mycotoxins in fruits and vegetables. Academic Press, 2008.							
Duraković S, Duraković L: Specijalna mikrobiologija. Durieux, 2000.							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
Title				Number of items		Number of students	

Determining mycotoxins and mycotoxigenic fungi in food and feed	1	
Mikologija u biotehnologiji	5	
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
Procedures, and actions for conducting certain activities related to monitoring, security and improving the quality of studies will be conducted in accordance with the applicable Manual for monitoring and quality assurance of higher education of the Faculty of Food Technology Osijek. Course teacher can carry out other ways of monitoring the quality depending on the specifics of the course.		

GENERAL INFORMATION		
<b>Course lecturer</b>	Lj. Primorac, PhD, full prof.	
<b>Course title</b>	<b>Food quality and safety management</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	6
	<b>Number of curricular units – hours (L+P+S)</b>	20 (15+0+5)
COURSE DESCRIPTION		
<b>Course objectives</b>		
To provide students with an overview of key elements of food quality and safety management, with an emphasis on risk analysis and the food authenticity, and to develop critical thinking and communication skills.		
<b>Course requirements</b>		
No enrolment requirements.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- critically assess the idea of quality and achievements in the quality area</li> <li>- analyze and evaluate the application of various quality management tools</li> <li>- explain the risk assessment steps and risk management measures</li> <li>- propose activities for quality improvement</li> <li>- evaluate and recommend methods for testing authenticity of selected types of food</li> <li>- evaluate the role and application of the tools in ensuring safe food</li> </ul>		
<b>Course content</b>		
The development of the quality concept and quality philosophies. Quality management tools. Food quality. Food authenticity issues and methodologies. Food safety management tools. Risk analysis		
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork	<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other
<b>Comments</b>		



<b>Students' liabilities</b>							
Students are expected to actively participate in class, and to write and present seminar paper. The student chooses the topic at the start of lectures, prepares a seminar paper in the form of review paper and presents it (Power Point) to a group.							
<b>Student activity and performance monitoring</b>							
Attendance		Participation		Seminar paper	2.4	Experimental work	
Exam/written		Exam/oral	3.6	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
The student is evaluated through the seminar paper and oral exam. Seminar makes 40% of the total score.							
<b>Compulsory reading</b>							
<p>Scientific journals, regulations, standards</p> <p>Luning PA, Devlieghere F, VerheR (ed) Safety in the agri-food chain. Wageningen Academic Publishers, Wageningen, 2006.</p> <p>Juran, JM, Gryna FM: <i>Quality planning and analysis</i>; Mate, Zagreb, 1999.</p> <p>Amsden RT, Butler HE, Amsden DM: SPC Simplified, Practical steps to quality. Productivity Press, New York 1998.</p> <p>Lees M (ed): Food authenticity and traceability. Woodhead Publishing Limited, Cambridge 2003.</p> <p>Food Safety Risk Analysis PART I AnOverview and Framework Manual. FAO 2005. <a href="https://www.fsc.go.jp/sonota/foodsafety_riskanalysis.pdf">https://www.fsc.go.jp/sonota/foodsafety_riskanalysis.pdf</a> [16.1.2015.]</p>							
<b>Recommended reading</b>							
<p>Korthals M (ed): Before Dinner.Philosophy and Ethics of Food. Springer, Dordrecht 2004.</p> <p>Carrasco E, Valero A, Pérez-Rodríguez F, García-Gimeno RM, Zurera G: Food Safety Risk Management <a href="http://cdn.intechweb.org/pdfs/19861.pdf">http://cdn.intechweb.org/pdfs/19861.pdf</a>[16.1.2015.]</p> <p>Scientific journals, regulations, standards</p>							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
<i>Title</i>				<i>Number of items</i>		<i>Number of students</i>	
Safety in the agri-food chain, 2006				2			
Quality planning and analysis, 1999				1			
SPC Simplified, Practical steps to quality, 1998				1			
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>							
Procedures, and processes for conducting activities related to monitoring, assurance and improving the quality of studies. The above mentioned will be conducted following the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Quality monitoring can be carried out dependent on course specifics.							

GENERAL INFORMATION	
<b>Course lecturer</b>	Lj. Primorac, PhD, full prof.
<b>Course title</b>	<b>Application of sensory analysis in the food industry</b>
<b>Study programme</b>	Food Technology and Nutrition
<b>Majoring</b>	Food Technology
<b>Course status</b>	elective



<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>					
<b>Credits and curricular formats</b>	<b>ECTS</b>		6			
	<b>Number of curricular units – hours (L+P+S)</b>		20 (15+0+5)			
<b>COURSE DESCRIPTION</b>						
<b>Course objectives</b>						
Through this course student gains knowledge about the role of sensory analysis in food production, sensory methods and area of their application.						
<b>Course requirements</b>						
No enrolment requirements.						
<b>Expected learning outcomes</b>						
<ul style="list-style-type: none"> <li>- explain physiological basis of sensory perception</li> <li>- describe the different methods characteristics</li> <li>- choose the appropriate method for solving a specific problem</li> <li>- apply statistical methods in data analysis and interpret the results</li> <li>- according to the task panel, suggest principles of panel selection and training</li> </ul>						
<b>Course content</b>						
<p>Lectures: The sensory properties and general principles of sensation. Review of methods regarding to their application in the development, control and testing of durability (stability) of the product. The testing strategy and experiment design. The general principles of selection and training of panel members.</p> <p>Seminar: The student according to the interest chooses the topic of a seminar paper.</p> <p>Exercises: Selected tests for selection and training of panel members will be presented</p>						
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork	<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input checked="" type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____				
<b>Comments</b>						
<b>Students' liabilities</b>						
Students are expected to actively participate in class, argued debate, critical assess to problem. The student according to the interest chooses the topic of a seminar paper, prepares a seminar which solves a specific task, and present it to the group.						
<b>Student activity and performance monitoring</b>						
Attendance	Participation		Seminar paper	3	Experimental work	
Exam/written	Exam/oral	3	Essay		Research	
Project	Continuous knowledge check		Presentation		Practical work	
Portfolio						
<b>Grading and student performance evaluation during the course and at the final exam</b>						
The student is evaluated through the seminar paper and oral exam. Seminar makes 50% of the total score.						
<b>Compulsory reading</b>						
<p>Meilgaard M, Civille GV, Carr BT: Sensory Evaluation Techniques. CRC Press, London, 2004.</p> <p>Stone M H, Sidel JL: Sensory Evaluation Practices. AcademicPress, London, 2004.</p> <p>Lawless HT: Laboratory Exercises for Sensory Evaluation. Springer, 2013.</p> <p>Mandić ML, Perl A: Osnove senzorske procjene hrane. Prehrambeno-tehnološki fakultet, Osijek, 2006.</p> <p>Scientific journals</p>						

<b>Recommended reading</b>		
Moskowitz HR, Muñoz AM, Gacula MC: Viewpoints and controversies in sensory science and consumer product testing. Food and Nutrition Press, Inc. Trumbull, 2003.		
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>		
<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>
Sensory Evaluation Techniques	1	
Osnove senzorske procjene hrane	10	
Sensory Evaluation Practices	1	
Laboratory Exercises for Sensory Evaluation	1	
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
Procedures, and processes for conducting activities related to monitoring, assurance and improving the quality of studies. The above mentioned will be conducted following the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Quality monitoring can be carried out dependent on course specifics.		

GENERAL INFORMATION		
<b>Course lecturer</b>	M. Kopjar, PhD, full prof.	
<b>Course title</b>	<b>Development of new products in food industry</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	6
	<b>Number of curricular units – hours (L+P+S)</b>	20 (15+0+5)
COURSE DESCRIPTION		
<b>Course objectives</b>		
Students will gain knowledge about reasons (companies/industry) for development of new food products (sometimes new processes), or improvement of already existing products, their packaging, as well as about strategies, and factors that are influencing success of new products on the market.		
<b>Course requirements</b>		
There are no requirements.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- to formulate and define new food products</li> <li>- to formulate and define factors and processes, and recommend phases/steps in the product development process</li> <li>- creation (presentation) of new food product</li> </ul>		
<b>Course content</b>		
Importance of research and development of new food products. Definition of new products. Categories of new products. Importance of innovations and trends in the field of food processing. Basics of innovation process. Role of science, experience and methodology in development of new products. Phases (methodology) of development of new products. Factors that affect success of new product. Role and influence of management on development of new product.		

Seminar: preparation of seminar in consultation with professors.							
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input checked="" type="checkbox"/> distance learning <input type="checkbox"/> fieldwork			<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____		
<b>Comments</b>							
<b>Students' liabilities</b>							
Participation on lectures (or distance learning), conducting lab work, seminar prepared and oral exam passed.							
<b>Student activity and performance monitoring</b>							
Attendance	0.5	Participation	0.5	Seminar paper	3	Experimental work	
Exam/written		Exam/oral	3	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Student will be evaluated through participation at lectures (consultations), preparation of seminar and success at oral exam.							
<b>Compulsory reading</b>							
Moskowitz HR, Saguy IS, Straus T: An Integrated Approach to New Food Product Development, 2009, CRC Press							
<b>Recommended reading</b>							
Food Technology, Journal of Food Science and other journals.							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
Title				Number of items		Number of students	
An Integrated Approach to New Food Product Development, 2009, CRC Press				1			
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>							
Procedures, and processes for conducting certain activities related to monitoring, assurance and improving the quality of studies will be conducted in accordance with the applicable Manual for monitoring and quality assurance of higher education in the Faculty of Food Technology Osijek. Course lecturer can carry out other ways of monitoring the quality depending on the specifics of the course.							

## GENERAL INFORMATION

<b>Course lecturer</b>	D. Čačić Kenjerić, PhD, full prof. // L. Jakobek Barron, PhD, assoc. prof. I. Strelec, PhD, assoc. prof. J. Pleadin, PhD, assoc. prof.
<b>Course title</b>	<b>Instrumental methods of analysis</b>
<b>Study programme</b>	Food Technology and Nutrition
<b>Majoring</b>	Food Technology
<b>Course status</b>	elective
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>

<b>Credits and curricular formats</b>	<b>ECTS</b>		6		
	<b>Number of curricular units – hours (L+P+S)</b>		20 (10+0+10)		
<b>COURSE DESCRIPTION</b>					
<b>Course objectives</b>					
To give the basic knowledge about the chosen instrumental technique and to apply the acquired knowledge to establish a method for the analysis					
<b>Course requirements</b>					
There are no requirements for the enrollment					
<b>Expected learning outcomes</b>					
<ul style="list-style-type: none"> <li>- explain the chosen instrumental technique</li> <li>- differentiate advantages and disadvantages of the chosen instrumental technique in comparison to other techniques</li> <li>- explain the possibilities of the identification and quantification of chosen compounds</li> <li>- suggest the parameters of the method for the identification/quantification of the chosen compound</li> </ul>					
<b>Course content</b>					
<p>Review of instrumental methods of analysis. The selection of instrumental technique for the specific analysis - criteria and options. Electroanalytical methods. Conductometry. Potentiometry. Voltammetry. Zeta potential. Gas chromatography (GC). High performance liquid chromatography (HPLC). Fluid chromatography in supercritical conditions (SFC). Capillary electrochromatography (CEC). Electrophoresis. Visible (Vis), ultraviolet (UV) and infrared (IR, FTIR) spectroscopy. Atomic absorption spectroscopy (AAS). Mass spectrometry (MS). Nuclear magnetic resonance spectroscopy (NMR). Systems of the analysis (GC-MS, HPLC-MS, HPLC-FTIR, ...).</p> <p>Seminars: The proposal of the instrumental technique for the analysis of the selected compound (group of compounds) (the description of the technique, parameters of the method, expected result, the application of the methods for the analysis of certain samples).</p>					
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork	<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____			
<b>Comments</b>	Depending on the area of the work and interest, students can choose a technique from several offered techniques. This technique will be discussed in detail. The classes will be held by teachers who are best qualified for the chosen technique.				
<b>Students' liabilities</b>					
Students are expected to write a seminar paper and pass the exam by oral presentation of the seminar paper.					
<b>Student activity and performance monitoring</b>					
Attendance	Participation		Seminar paper	4	Experimental work
Exam/written	Exam/oral	2	Essay		Research
Project	Continuous knowledge check		Presentation		Practical work
Portfolio					
<b>Grading and student performance evaluation during the course and at the final exam</b>					
A seminar paper written and accepted, oral exam					
<b>Compulsory reading</b>					
<p>Westermeier R: Electrophoresis in Practice. Wiley-VHC, Weinheim, 2001.            Holme DJ and Peck H: Analytical Biochemistry, Longman, Essex, 1998.            Skoog DA, West DM, Holler FJ: Osnove analitičke kemije, Školska knjiga, Zagreb, 1999.            Piljac I: Elektroanalitičke metode, RMC, Zagreb, 1995.</p>					

<b>Recommended reading</b>		
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>		
<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>
Electrophoresis in Practice, 2001	1	
Analytical Biochemistry, 1998	1	
Osnove analitičke kemije, 1999	1	
Elektroanalitičke metode, 1995	2	
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
Procedures, and processes for conducting activities related to monitoring, assurance and improving the quality of studies. The above mentioned will be conducted following the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Quality monitoring can be carried out dependent on course specifics.		

GENERAL INFORMATION		
<b>Course lecturer</b>	A. Bucić-Kojić, PhD, assoc. prof. // M. Planinić, PhD, assoc. prof. S. Jokić, PhD, assoc. prof.	
<b>Course title</b>	<b>Modern extraction techniques in food engineering</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	6
	<b>Number of curricular units – hours (L+P+S)</b>	20 (15+0+5)
COURSE DESCRIPTION		
<b>Course objectives</b>		
Students will expand knowledge of modern extraction techniques and their potential application in the food, pharmaceutical and chemical technology.		
<b>Course requirements</b>		
No enrolment requirements.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- to describe and analyze the mechanisms of heat and mass transfer during the extraction process</li> <li>- to analyze the advantages and disadvantages of different advanced methods of extraction compared to conventional methods</li> <li>- independently propose and explain a suitable extraction method for a given process in the food, pharmaceutical and chemical industries</li> </ul>		
<b>Course content</b>		
The mechanisms of heat and mass transfer in the extraction process. Solvent extraction (water and organic solvents) at elevated pressure and temperature regime. Ultrasound-assisted extraction, microwave-assisted extraction, membrane-assisted solvent extraction and mixing-assisted extraction. Solid phase micro		

<p>extraction (SPME). Supercritical fluid extraction (SFE). Aqueous two-phase extraction in microchannels. Application of ionic liquid in different extraction processes. The application of these methods of extraction in the food, pharmaceutical and chemical industries. Review of conventional extraction methods and comparison to modern extraction techniques related to their advantages and disadvantages.</p>							
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork			<input checked="" type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____		
<b>Comments</b>							
<b>Students' liabilities</b>							
Lectures and seminars attendance, seminar paper and oral exam.							
<b>Student activity and performance monitoring</b>							
Attendance	0.5	Participation	0.5	Seminar paper	3	Experimental work	
Exam/written		Exam/oral	2	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
The final grade is given based on students' overall performance: attendance, activity during lectures, accepted and graded seminar paper and positively graded oral exam.							
<b>Compulsory reading</b>							
Mujić I: <i>Ekstrakcija i ekstraktori biljnih materijala</i> . Biotehnički fakultet, Bihać, 2006.							
<b>Recommended reading</b>							
<p>Jokić S, Vidović, S, Aladić K: <i>Supercritical Fluid Extraction of Edible Oils</i>. In <i>Supercritical Fluids: Fundamentals, Properties and Applications</i>. Nova Science Publishers, Inc., NY, USA, 2014.</p> <p>Taylor LT: <i>Supercritical fluid extraction</i>. John Wiley and Sons, Inc. New York, 1996.</p> <p>Turner C: <i>Modern Extraction Techniques</i>, American Chemistry Society, Washington, 2006.  <a href="http://pubs.acs.org/isbn/9780841239401">http://pubs.acs.org/isbn/9780841239401</a> [11. 2. 2015.]</p> <p>Scientific and professional articles</p>							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
<i>Title</i>				<i>Number of items</i>		<i>Number of students</i>	
Ekstrakcija i ekstraktori biljnih materijala				1			
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>							
Procedures, and processes for conducting activities related to monitoring, assurance and improving the quality of studies. The above mentioned will be conducted following the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Quality monitoring can be carried out dependent on course specifics.							

## GENERAL INFORMATION

<b>Course lecturer</b>	S. Tomas, PhD, full prof. // M. Bilić, PhD, full prof. M. Planinić, PhD, assoc. prof.
<b>Course title</b>	<b>Modelling the kinetics of special drying techniques in food process engineering</b>

<b>Study programme</b>	Food Technology and Nutrition						
<b>Majoring</b>	Food Technology						
<b>Course status</b>	elective						
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>						
<b>Credits and curricular formats</b>	<b>ECTS</b>		6				
	<b>Number of curricular units – hours (L+P+S)</b>		20 (10+0+10)				
<b>COURSE DESCRIPTION</b>							
<b>Course objectives</b>							
<p>The objective of the course is to acquaint students with the specific drying techniques created by combining basic drying methods and the various unit operations that take place with the transfer of heat and matter. Equally, students will be familiar with some of the modern drying rooms used in food process engineering, and how to optimize them. Students will be introduced to the basic mathematical methods of interpolation, function approximation and numerical integration, as well as their application in solving the problem of drying and the more effective implementation of scientific research work in this field.</p>							
<b>Course requirements</b>							
No enrolment requirements.							
<b>Expected learning outcomes</b>							
<ul style="list-style-type: none"> <li>- present mechanisms of heat and substance transfer during drying</li> <li>- classify advanced drying techniques with respect to the mechanisms of heat and substance transfer</li> <li>- argue for the advantages / disadvantages of some advanced drying techniques</li> <li>- propose modeling and optimization methods for different drying methods</li> <li>- propose a suitable drying method for the given drying process in food engineering</li> </ul>							
<b>Course content</b>							
<p>Mathematical modeling of drying kinetics and process optimization: Production of aerogels by drying; Contact-adsorption drying; Drying by inert particles; Filtration and drying combinations; Pulsed warming drying; Superheated steam drying; Radio frequency and microwave drying; Induction heating drying; Carver-Greenfield Process; Spray drying; Ultrasound-assisted drying; and drying in: Pulsating-fluidizing and mechanical-fluidizing dryers; Gas jet air dryers; Gas jet air dryers; Pneumatic circular dryer; Swirl Dryer; Vibration fluidization dryer; Rotary dryers; Spiral driers for materials; Venturi dryer; Contact drying mixer; Combined infrared convection dryer; Microwave-convection dryer.</p>							
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork	<input checked="" type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____					
<b>Comments</b>							
<b>Students' liabilities</b>							
Pohađanje nastave, samostalna izrada seminarskog rada na zadanu temu, polaganje usmenog ispita.							
<b>Student activity and performance monitoring</b>							
Attendance	0.5	Participation	0.5	Seminar paper	3	Experimental work	
Exam/written		Exam/oral	2	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
The final grade includes evaluation of the activities during the class, seminar work and its presentation, and evaluation of the final (oral) exam.							



<b>Compulsory reading</b>		
Kudra T, Mujumdar AS: <i>Advanced drying technologies</i> . Marcel Dekker, Inc., New York, 2002.		
<b>Recommended reading</b>		
Ibarz A, Barbarosa-Cánovas GV: <i>Unit Operations in Food Engineering</i> . Boca Raton, CRC Press LLC, 2003. Irudayaraj J: <i>Food Processing Operations Modelling. Design and Analysis</i> . Marcel Dekker, Inc., New York, 2001. Mujumdar AS: <i>Handbook of Industrial Drying</i> . Vol. 1 and 2, 2nd Ed., Marcel Dekker, Inc., New York, 1995 Welti-Chanes J, Vélez-Ruiz JF, Barbarosa-Cánovas GV: <i>Transport Phenomena in Food Processing</i> . Boca Raton, CRC Press LLC, 2003.		
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>		
<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>
Advanced drying technologies, 2002.	1	
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
Procedures, and processes for conducting activities related to monitoring, assurance and improving the quality of studies. The above mentioned will be conducted following the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Quality monitoring can be carried out dependent on course specifics.		

GENERAL INFORMATION		
<b>Course lecturer</b>	D. Magdić, PhD, full prof.	
<b>Course title</b>	<b>Non-destructive methods of processes and food analysis</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	6
	<b>Number of curricular units – hours (L+P+S)</b>	20 (15+0+5)
COURSE DESCRIPTION		
<b>Course objectives</b>		
Students will gain the knowledge learning on examples of the technological processes and food materials and their suitability for the application not the destructive method. Students will be familiar with international organizations and standards for non-destructive methods of analysis and different non-destructive and statistical methods of analysis of technological processes, food materials and food.		
<b>Course requirements</b>		
No course requirements.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- to become familiar with the origin and development of non-destructive methods of analysis,</li> <li>- to define the basic properties of food that allows the application of non-destructive methods,</li> <li>- through examples learn to apply some non-destructive and statistical methods,</li> <li>- to analyze the possible application of measuring equipment and software to carry out destructive measurements and</li> </ul>		

- to become familiar with international organizations and standards for non-destructive and statistical methods.							
<b>Course content</b>							
Theoretical basis and application of methods; The tree of methods; The standards for non-destructive methods of analysis; Non-destructive and statistical methods in food technology and nutrition; The properties of foods; Example 1. Application in technology of production and processing of fruits and vegetables; Example 2. Application in technology of production and processing of flour; Example 3 Statistical methods of analysis of inter laboratory calibration results (ISO standards) ; Internet links and Glossary ; International organizations for non-destructive analysis methods. SEMINAR: Preparation of literature, list of equipment and plan for non-destructive methods of analysis.							
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork			<input checked="" type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input checked="" type="checkbox"/> mentorship <input type="checkbox"/> other		
<b>Comments</b>							
<b>Students' liabilities</b>							
Preparing a seminar paper.							
<b>Student activity and performance monitoring</b>							
Attendance	0.5	Participation		Seminar paper	3	Experimental work	
Exam/written		Exam/oral	2.5	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
The rating of the seminar paper and oral exam score.							
<b>Compulsory reading</b>							
Lelas V: <i>Prehrambeno–tehnološko inženjerstvo 1, Fizička svojstva hrane</i> . Sveučilište u Zagrebu, Golden marketing, Tehnička knjiga, Zagreb,2006 Novinc Ž; Halep A: <i>Tehnička dijagnostika i monitoring u industriji</i> . Kigen, Zagreb, 2010.							
<b>Recommended reading</b>							
Inženjerski priručnik <i>IP1 - Temelji inženjerskih znanja</i> . Školska knjiga Zagreb, 1996. Kulišić P, Lopac V: <i>Elektromagnetske pojave i struktura tvari</i> . Školska knjiga Zagreb, 2003. Piljac I: <i>Senzori fizikalnih veličina i elektroanalitičke metode</i> . Media Print, Zagreb, 2010. Scientific papers							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
		<i>Title</i>		<i>Number of items</i>		<i>Number of students</i>	
		Prehrambeno–tehnološko inženjerstvo 1, Fizička svojstva hrane, 2006		5			
		Tehnička dijagnostika i monitoring u industriji, 2010		2			
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>							
Procedures and processes for conducting certain activities related to monitoring, security and improving the quality of studies will be conducted in accordance with the applicable Manual for monitoring and quality assurance of higher education in the Faculty of Food Technology Osijek. Course teacher can carry out other ways of monitoring the quality depending on the specifics of the case.							

GENERAL INFORMATION							
<b>Course lecturer</b>	D. Gašo-Sokač, PhD, assoc. prof.						
<b>Course title</b>	<b>Natural organic compounds</b>						
<b>Study programme</b>	Food Technology and Nutrition						
<b>Majoring</b>	Food Technology						
<b>Course status</b>	elective						
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>						
<b>Credits and curricular formats</b>	<b>ECTS</b>					6	
	<b>Number of curricular units – hours (L+P+S)</b>					20 (15+0+5)	
COURSE DESCRIPTION							
<b>Course objectives</b>							
Disseminate knowledge about natural organic compounds with particular emphasis on those of use in the food industry (carbohydrates, terpenes, polyphenols, alkaloids) and their isolation and identification. Prepare a foundation for applying the acquired knowledge in a research context.							
<b>Course requirements</b>							
No enrolment requirements.							
<b>Expected learning outcomes</b>							
<ul style="list-style-type: none"> <li>- distinguish and group natural organic compounds</li> <li>- explain and select procedures for the isolation of natural compounds</li> <li>- explain modern isolation and identification procedures</li> <li>- apply the lessons learned in solving the problems of isolation and identification of natural compounds</li> <li>- propose and apply the best method of isolating the appropriate compound</li> <li>- apply acquired knowledge in new situations in a multidisciplinary context related to the field of study</li> </ul>							
<b>Course content</b>							
Prevalence and division of natural compounds. Biogenesis, action and application of natural compounds. Carbohydrates. Glycosides. Terpenes. Monoterpenes. Sesquiterpenes. Diterpenes. Tetraterpeni. General pathways of biogenesis. Steroids. Phytosterols. Polyphenols. Alkaloids. Classical procedures for extracting and determining the structure of natural compounds. Areas of Modern Bioorganic Chemistry. More recent examples of isolation and characterization of natural compounds.							
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input checked="" type="checkbox"/> distance learning <input type="checkbox"/> fieldwork		<input checked="" type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____				
<b>Comments</b>							
<b>Students' liabilities</b>							
Independent work assignment on the topic of natural organic compounds and modern methods of isolation and seminar paper.							
<b>Student activity and performance monitoring</b>							
Attendance		Participation		Seminar paper	3	Experimental work	
Exam/written		Exam/oral		Essay	3	Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							

Based on the written seminar papers, completed individual assignments from the written exam, the competence for research work in the subject area will be evaluated		
<b>Compulsory reading</b>		
El-Demerdash: <i>Natural Products Chemistry: Isolation and Structure Elucidation of Natural Products from Some Medicinally Important Plant Species</i> , LAP LAMBERT Academic Publishing, 2011 Richard J. P. Cannell: <i>Natural Products Isolation</i> . Glaxo Wellcome Research & Development Stevenage, Herts, UK., 1998.		
<b>Recommended reading</b>		
Sampietro DA, Catalan CAC, Vattuone MA: <i>Isolation, identification and characterization of allelochemicals/natural products</i> , Science Publishers, 2009 Pine HS: <i>Organska kemija</i> (prijevod: I. Bregovec i V. Rapić), Školska knjiga, Zagreb, 1994 Noller CR: <i>Kemija organskih spojeva</i> , Tehnička knjiga, Zagreb, 1967		
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>		
<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>
Natural Products Chemistry: Isolation and Structure Elucidation of Natural Products from Some Medicinally Important Plant Species, LAP LAMBERT Academic Publishing, 2011.	1	
Natural Products Isolation	1	
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
Procedures, and processes for conducting activities related to monitoring, assurance and improving the quality of studies. The above mentioned will be conducted following the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Quality monitoring can be carried out dependent on course specifics.		

GENERAL INFORMATION		
<b>Course lecturer</b>	M. Habuda-Stanić, PhD, assoc. prof.	
<b>Course title</b>	<b>Emerging water treatment technologies</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	6
	<b>Number of curricular units – hours (L+P+S)</b>	20 (10+5+5)
COURSE DESCRIPTION		
<b>Course objectives</b>		
Expand knowledge on the possibilities and applications of modern water treatment technologies, investigate and identify the problems of particular water treatment processes, propose possible solutions in a research context.		
<b>Course requirements</b>		

No enrolment requirements.							
<b>Expected learning outcomes</b>							
<ul style="list-style-type: none"> <li>- classify modern water treatment technologies</li> <li>- identify the problems of particular water treatment technologies</li> <li>- choose and explain the reasons for applying a particular water treatment technology</li> <li>- critically evaluate and choose the modification of conventional and / or modern water treatment technology in order to achieve the desired quality of treated water</li> <li>- select and justify the selected water treatment technology according to the input and desired output water quality parameters</li> </ul>							
<b>Course content</b>							
Chemistry and water division. Factors in the choice of water treatment technology. Membrane filtration - division of membrane processes and types of membranes; plant design (calculation of flux, membrane permeability, required pressure and energy consumption); desalination processes, production of water for the needs of the food industry (partial softening of water by nanofiltration, removal of organic matter in the production of drinking water); problems and disadvantages of membrane filtration. Advanced oxidation processes of water treatment - division, mechanism of action and application of homogeneous and heterogeneous advanced oxidation processes (photocatalytic reactions, ozone application, application of combination of ozone, UV and hydrogen peroxide); problems and disadvantages of advanced oxidation processes. Nanotechnology in water treatment - nanomaterials and nanoparticles in water treatment (division, characteristics and methods of application), water disinfection by nanotechnology, removal of organic compounds, removal of heavy metals; nanoparticle regeneration, problems and disadvantages of nanotechnology. Modifications of conventional methods by applying certain aspects of modern water treatment technologies.							
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input checked="" type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork			<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____		
<b>Comments</b>							
<b>Students' liabilities</b>							
Seminar work, and lab work.							
<b>Student activity and performance monitoring</b>							
Attendance	0.5	Participation		Seminar paper	1.5	Experimental work	
Exam/written		Exam/oral	2	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Based on the written seminar work, the experimental work performed and the oral exam, the competence for research work in the subject area will be assessed.							
<b>Compulsory reading</b>							
Dey T: Nanotechnology for Water Purification. Brown Walker Press, Boca Raton, Florida, USA, 2012. Kemmer FN: Nalkov priručnik za vodu, Drugo izdanje, Građevinska knjiga, Beograd, 2005. Sincero AP, Sincero GA: Physical-chemical treatment of water and wastewater, IWA-CRC Press, Washington D.C. 2003. American Water Works Association: Water Quality and Treatment, McGraw-Hill, Inc., New York, 1999.							
<b>Recommended reading</b>							
Gulić I: <i>Kondicioniranje vode</i> , HSGI, Zagreb, 2003. Tedeschi S: <i>Zaštita voda</i> . HDGI, Zagreb, 1997.							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
Title		Number of items		Number of students			

Nanotechnology for Water Purification (PDF)		
Nalkov priručnik za vodu	1	
Physical-chemical treatment of water and wastewater	1	
Water Quality and Treatment	1	
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
Procedures, and processes for conducting activities related to monitoring, assurance and improving the quality of studies. The above mentioned will be conducted following the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Quality monitoring can be carried out dependent on course specifics.		

GENERAL INFORMATION		
<b>Course lecturer</b>	M. Tišma, PhD, assoc. prof. // N. Velić, PhD, assoc. prof.	
<b>Course title</b>	<b>Waste management in food industry</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	6
	<b>Number of curricular units – hours (L+P+S)</b>	20 (10+0+10)
COURSE DESCRIPTION		
<b>Course objectives</b>		
Students will be introduced to proper management of waste generated during food production processes with special emphasis on waste reuse (utilization) and environmental protection.		
<b>Course requirements</b>		
No enrolment requirements.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- to identify and compare different waste management systems</li> <li>- to interpret and compare national and international waste management legislation and regulations</li> <li>- to classify food waste materials and analyse the places of generation and costs of removal, treatment, reuse, recycle and disposal</li> <li>- to differentiate and explain treatment methods of food industry waste</li> <li>- to suggest the appropriate treatment methods and waste management systems based on the available data on production process (case study)</li> </ul>		
<b>Course content</b>		
<p>Waste management systems (ISO 14000 and ISO 14040). Overview of national and EU legislation and regulation concerning the management of food industry waste products. Classification of food industry waste. Composition analysis of generated waste. Cost analysis: removal, treatment, reuse, recycle and disposal of waste. Control systems for waste disposal. Waste minimization.</p> <p>Food industry solid waste treatment. Biological solid waste treatment methods – status and trends. Case study. Wastewater treatment methods for food industry. Biological wastewater treatment. Overview of advanced biological wastewater treatment processes and new monitoring methods. Waste gas treatment methods.</p> <p>Seminars: Examples of process optimization by using unconventional and conventional methods of energy optimization.</p>		

<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures	<input checked="" type="checkbox"/> single-case research					
	<input checked="" type="checkbox"/> seminars and workshops	<input type="checkbox"/> multimedia and network					
	<input type="checkbox"/> practice	<input type="checkbox"/> laboratory practice					
	<input type="checkbox"/> distance learning	<input type="checkbox"/> mentorship					
	<input type="checkbox"/> fieldwork	<input type="checkbox"/> other _____					
<b>Comments</b>							
<b>Students' liabilities</b>							
Participation on lectures (or distance learning), conducting lab work, seminar prepared and oral exam passed.							
<b>Student activity and performance monitoring</b>							
Attendance	0.5	Participation	0.5	Seminar paper	2.5	Experimental work	
Exam/written		Exam/oral	2.5	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Student will be evaluated through participation at lectures (consultations), preparation of seminar and success at oral exam.							
<b>Compulsory reading</b>							
Cheremisnoff, NP: Handbook of solid waste management and waste minimization technologies. Butterworth Heinemann, Amsterdam; Boston, 2003. Tušar B: Pročišćavanje otpadnih voda, Kigen, Geotehnički fakultet, Zagreb, 2009.							
<b>Recommended reading</b>							
Tišma M, Velić N, Zelić B: From waste to value-added products - solid state fermentation by white-rot fungi. In Biotechnology. Studium Press LLC, New Delhi, 2014.							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
<i>Title</i>				<i>Number of items</i>		<i>Number of students</i>	
Handbook of solid waste management and waste minimization technologies, 2003.				1			
Pročišćavanje otpadnih voda, 2009.				1			
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>							
Procedures, and processes for conducting activities related to monitoring, assurance and improving the quality of studies. The above mentioned will be conducted following the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Quality monitoring can be carried out dependent on course specifics.							

GENERAL INFORMATION	
<b>Course lecturer</b>	D. Velić, PhD, full prof. // S. Jokić, PhD, assoc. prof. J. Lukinac Čačić, PhD, asist. prof.
<b>Course title</b>	<b>Food process design and optimisation</b>
<b>Study programme</b>	Food Technology and Nutrition
<b>Majoring</b>	Food Technology
<b>Course status</b>	elective
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>



<b>Credits and curricular formats</b>	<b>ECTS</b>		6				
	<b>Number of curricular units – hours (L+P+S)</b>		20 (10+5+5)				
<b>COURSE DESCRIPTION</b>							
<b>Course objectives</b>							
To increase students' output knowledge, skills and competences in the field of food industry processes design and optimisation.							
<b>Course requirements</b>							
There are no enrolment requirements.							
<b>Expected learning outcomes</b>							
<ul style="list-style-type: none"> <li>- Analyse different optimisation methods (NLP, NLP, RSM, ANN).</li> <li>- Data analysis and interpretation.</li> <li>- Interpret data from different types of samples using statistical tools.</li> <li>- Draw process diagrams and food facilities layouts using computer software (CAD).</li> <li>- Analyse and optimize the heat exchanger network.</li> <li>- Individual/independent upgrade of the knowledge acquired during the course.</li> <li>- Apply the acquired knowledge for experiments and process optimisation design.</li> <li>- Apply different computer software for food processes modelling, simulation, optimisation and control.</li> </ul>							
<b>Course content</b>							
Optimisation theoretical basics and methods. Technological processes and process equipment modelling. Comparison of computer simulations and experiments. Computational <i>fluid dynamics</i> (CFD). Modern methods of technological processes optimisation. Application of response surface methodology and neural network for modelling and optimisation in food engineering. Design of experiments (DOE), multiple regression analysis (Regression Analysis) and variance analysis (Analysis of Variance, ANOVA). Factorial design of experiments (factorial design), central composite design (Central-Composites), Box-Behnken's method, Taguchi method. Practical applications of neural networks. Artificial intelligence and neural networks. Genetic algorithm principles and methods. Food industry design, technology and innovation. New processes and technologies development. <i>Food processing plant design and layout. Food process flowsheets. Food process simulation. Minimise capital and operating costs. Thermo-economic analysis. Energy integration and heat exchanger network. Pinch design methodology and heat exchanger network optimisation. Food process safe practices.</i>							
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures	<input checked="" type="checkbox"/> seminars and workshops	<input checked="" type="checkbox"/> single-case research	<input checked="" type="checkbox"/> multimedia and network			
	<input checked="" type="checkbox"/> practice	<input checked="" type="checkbox"/> distance learning	<input checked="" type="checkbox"/> laboratory practice	<input checked="" type="checkbox"/> mentorship			
	<input type="checkbox"/> fieldwork		<input type="checkbox"/> other				
<b>Comments</b>							
<b>Students' liabilities</b>							
Class attendance and completion of students' obligations regarding the course.							
<b>Student activity and performance monitoring</b>							
Attendance	0.5	Participation	0.5	Seminar paper	1.5	Experimental work	
Exam/written	0.5	Exam/oral	3	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Written and oral examination through partial exams during the semester, study work and the assessment of student exercises.							
<b>Compulsory reading</b>							

<p>Ahmed J, Rahman MS: <i>Handbook of Food Process Design</i>. Vol.1 and 2, John Wiley &amp; Sons, 2012.          Bilić M, Velić D: <i>Optimizacija i projektiranje industrijskih procesa</i>, interna skripta. Prehrambeno tehnološki fakultet Osijek, 2007.          Erdogdu F: <i>Optimisation in Food Engineering</i>. CRC Press, 2008.          Leenaerts DMW, van Bokhoven W M G: <i>Piecewise Linear Modeling and Analysis</i>. Kluwer Academic Publishers, Boston, 1998.          Maroulis ZB, Saravacos GD: <i>Food Process Design</i>. Marcel Dekker, 2003.          Seider WD, Seader JD, Lewin DR: <i>Proces Design Principles Synthesis, Analysis and Evaluation of Process Flowsheets</i>. J. Wiley &amp; Sons, 2000.          Smith R: <i>Chemical Process Design</i>. McGraw Hill, 1995.          Šef F, Olujić Ž: <i>Projektiranje procesnih postrojenja</i>. SKTH/ Kemija u industriji, 1988.          Woods DR: <i>Process Design and Engineering Practice</i>. Prentice Hall, 1994.</p>		
<b>Recommended reading</b>		
<p>Inženjerski priručnik IP1 - Temelji inženjerskih znanja, Školska knjiga Zagreb, 1996.          Jokić S, Horvat G, Aladić K: <i>Chapter: Design of SFE system using a holistic approach - problems and challenges</i>. In book: <i>Supercritical Fluid Extraction: Technology, Applications and Limitations</i>. Nova Science Publishers, Inc., NY, USA, 2014          Scientific and professional journals</p>		
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>		
<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>
Handbook of Food Process Design	1	
Optimizacija i projektiranje industrijskih procesa	10	
Optimisation in Food Engineering	1	
Piecewise Linear Modeling and Analysis	1	
Food Process Design	1	
Proces Design Principles Synthesis, Analysis and Evaluation of Process Flowsheets	1	
Chemical Process Design	1	
Projektiranje procesnih postrojenja	10	
Process Design and Engineering Practice	1	
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
<p>Procedures for conducting certain activities related to monitoring, security and improving the quality of studies will be conducted in accordance with the applicable Manual for monitoring and quality assurance of higher education in the Faculty of Food Technology Osijek.          Course teacher can carry out other ways of monitoring the quality depending on the study specifics</p>		

GENERAL INFORMATION		
<b>Course lecturer</b>	D. Velić, PhD, full prof.	
<b>Course title</b>	<b>Organic food production and processing</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	6
	<b>Number of curricular units – hours (L+P+S)</b>	20 (15+0+5)
COURSE DESCRIPTION		

<b>Course objectives</b>							
To increase students' output knowledge, skills and competences in the field of organic food production and processing							
<b>Course requirements</b>							
There are no enrolment requirements							
<b>Expected learning outcomes</b>							
<ul style="list-style-type: none"> <li>- Analyse and compare the objectives and principles of organic farming and food processing</li> <li>- Explain, compare and differentiate the stages of organic food production and processing</li> <li>- Compare and apply the acquired knowledge in the field of organic farming and production</li> <li>- Explain the legal issues related to organic production and processing</li> <li>- Update previously acquired knowledge</li> </ul>							
<b>Course content</b>							
Organic food scientific body of knowledge review. Organic agriculture and processing basics. Organic production and processing developmental trends. Organic food and health. Nutritional value and quality of organic food. Eco-products and food safety. Organic production and the environment. European and Croatian regulation (legislation) regarding the organic food production and processing. Organic food processing - requirements and regulations. Certification and labeling of organic products. Storage and packaging. Organic food marketing.							
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input checked="" type="checkbox"/> distance learning <input type="checkbox"/> fieldwork			<input checked="" type="checkbox"/> single-case research <input checked="" type="checkbox"/> multimedia and network <input checked="" type="checkbox"/> laboratory practice <input checked="" type="checkbox"/> mentorship <input type="checkbox"/> other _____		
<b>Comments</b>							
<b>Students' liabilities</b>							
Class attendance and completion of students' obligations regarding the course.							
<b>Student activity and performance monitoring</b>							
Attendance	0.5	Participation		Seminar paper	2.0	Experimental work	
Exam/written		Exam/oral	3.5	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Oral examination and essay (presentation) evaluation.							
<b>Compulsory reading</b>							
<p>Cooper J, Leifert C: <i>Handbook of organic food quality and safety</i>. Woodhead Publishing Limited, Cambridge, UK, 2007.</p> <p>Michelsenm J, Hamm U, Wynen E, Roth E: <i>The European Market for Organic Products: Growth and Development. Organic farming in Europe: Economics and Policy</i>. Vol. 7, University of Hohenheim, Stuttgart, Germany, 1999.</p> <p>Newton J: <i>Profitable Organic Farming</i>. 2<sup>nd</sup> ed., Blackwell Publishing, UK, 2004.</p> <p>Wright S, McCrea D: <i>Handbook of Organic Food Processing and Production</i>. 2<sup>nd</sup> ed., Blackwell Publishing, 2000.</p> <p>Znaor D: <i>Ekološka poljoprivreda</i>. Nakladni zavod Globus, Zagreb 1996.</p>							
<b>Recommended reading</b>							
<p>Azam Ali S, Judge E, Fellows P, Battcock M: <i>Small-Scale Food Processing - A directory of equipment and methods</i>. 2<sup>nd</sup> ed., ITDG Publishing 2003.</p> <p>Maroulis Z B, Saravacos G D: <i>Food Process Design</i>. Marcel Dekker, 2003.</p> <p>Ordinance on Organic Production (NN, No. 86/13).</p>							

<p>Commission Implementing Regulation (EU) No. 203/2012 European Organic Regulations (EC) No 834/2007, 889/2008 and 1235/2008 Council Regulation (EC) No. 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No. 2092/91 The study "The market for organic fruits, vegetables and herbs" Biopa - GTZ, Osijek, 2007. (Velić et al.) Scientific and professional journals</p>		
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>		
<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>
Handbook of organic food quality and safety	1	
Handbook of Organic Food Processing and Production	1	
Profitable Organic Farming	2	
The European Market for Organic Products: Growth and Development.	2	
Ekološka poljoprivreda	2	
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
<p>Procedures for conducting certain activities related to monitoring, security and improving the quality of studies will be conducting in accordance with the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Course teacher can carry out other ways of monitoring the quality depending on the study specifics.</p>		

GENERAL INFORMATION		
<b>Course lecturer</b>	D. Šubarić, PhD, full prof. // J. Babić, PhD, full prof. Đ. Ačkar, PhD, assoc. prof.	
<b>Course title</b>	<b>Achievements in technology of confectionary products</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	4
	<b>Number of curricular units – hours (L+P+S)</b>	15 (12+0+3)
COURSE DESCRIPTION		
<b>Course objectives</b>		
Students will improve knowledges regarding production of confectionary and similar products, raw material properties and additives used in production of confectionary products. Novel technologies in production. Special attention will be payed to product quality and quality preservation.		
<b>Course requirements</b>		
No requirements for subject enrolment.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- to describe novel procedures and processes in production of confectionary and snack products</li> <li>- to explain application of additives in chocolate production</li> <li>- to link stability and shelf life of confectionary products with the migration of water, alcohol and fat through chocolate and confectionary products</li> </ul>		
<b>Course content</b>		

<p>Achievements in technology of cocoa based products. Properties of cocoa butter, definition and properties of fat replacements. Additives in production of confectionary products (emulsifiers, food colouring, flavours, ...). Flavour formation during chocolate production. Rheological properties of chocolate. Stability and shelf life of confectionary products. Migration of water, alcohol and fat through chocolate and chocolate coated products, additives and methods for the prevention. Achievements in technology of bonbons. Achievements in technology of snack products. Confectionary product packaging. Quality control of confectionary products. Extrusion in production of snack and confectionary products. Seminars: chemistry and formation of flavour in chocolate; sensory evaluation of confectionary products; analytical methods in evaluation of confectionary products.</p>							
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input checked="" type="checkbox"/> distance learning <input type="checkbox"/> fieldwork		<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input checked="" type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____			
<b>Comments</b>							
<b>Students' liabilities</b>							
<b>Student activity and performance monitoring</b>							
Attendance	0.4	Participation	0.4	Seminar paper	1.2	Experimental work	
Exam/written		Exam/oral	2	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Record keeping of class attendance, grading of activities in distance learning, grading of written paper and oral exam.							
<b>Compulsory reading</b>							
Minifie BW: Chocolate, Cocoa, and Confectionery. AVI Book, New York, 1989. Beckett ST: Industrial Chocolate Manufacture and Use. Blackwell Science Ltd., London, 1999. Baltes W: Lebensmittelchemie. Springer Verlag, Berlin, Heidelberg, New York, 2000. Moscicki L: Extrusion-cooking techniques – applications, theory and sustainability. Wiley-VCH, 2011. Dostupno na: <a href="http://www.lamolina.edu.pe/.../Extrusion%20Cooking%20Techniques[1].pdf">www.lamolina.edu.pe/.../Extrusion%20Cooking%20Techniques[1].pdf</a> [10. 2. 2015.] Afoakwa EO: Chocolate science and technology. Wiley-Blackwell, 2010. Dostupno na: <a href="http://digilib.mercubuana.ac.id/.../Isi1338853815011.pdf">digilib.mercubuana.ac.id/.../Isi1338853815011.pdf</a> [10. 2. 2015.]							
<b>Recommended reading</b>							
Scientific and professional articles							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
<i>Title</i>		<i>Number of items</i>			<i>Number of students</i>		
Chocolate, Cocoa, and Confectionery		1					
Industrial Chocolate Manufacture and Use		1					
Lebensmittelchemie		1					
Extrusion-cooking techniques – applications, theory and sustainability		1 (profesor) <a href="http://www.lamolina.edu.pe/.../Extrusion%20Cooking%20Techniques[1].pdf">www.lamolina.edu.pe/.../Extrusion%20Cooking%20Techniques[1].pdf</a>					
Chocolate science and technology		1 (profesor) <a href="http://digilib.mercubuana.ac.id/.../Isi1338853815011.pdf">digilib.mercubuana.ac.id/.../Isi1338853815011.pdf</a>					
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>							

Procedures of specific activities related to monitoring, assurance and improvement of quality of the study will be conducted according to the valid Manual for monitoring and assurance of quality of higher education at Faculty of Food Technology Osijek. Course lecturer can conduct additional procedures of quality monitoring in regard to specificities of the subject.

GENERAL INFORMATION		
<b>Course lecturer</b>	B. Miličević, PhD, full prof.	
<b>Course title</b>	<b>Generic procedures in alcoholic beverages technology</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	4
	<b>Number of curricular units – hours (L+P+S)</b>	15 (8+0+7)
COURSE DESCRIPTION		
<b>Course objectives</b>		
<p>The aim of the course is to provide students with the knowledge necessary for the planning, preparation and management of generic-production processes of generic alcoholic beverages, as well as the acquisition of basic skills necessary for research in the field. The lectures cover all aspects of the production of these products, from raw material quality, specific production regulations to quality control and production conditions, environmental protection and other elements necessary to produce a quality and consumer safe product.</p>		
<b>Course requirements</b>		
No enrolment requirements.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- to describe current European and international legislation in production of generic alcoholic beverages</li> <li>- to independently plan, prepare and run production processes of generic alcoholic beverages</li> <li>- to independently manage the development and research process in this area</li> </ul>		
<b>Course content</b>		
<p>Trends in world production and consumption of generic alcoholic beverages, (type: RTD and RTC). Legislation in the production of generic alcoholic beverages. Raw materials in the production of RTD and RTC products. Technological processes of production of RTD and RTC products (schematic descriptions of batch and continuous production processes). Material and energy calculations. Introduction to basics of sensory, chemical and physical quality testing. Introduction to environmental procedures for disposal of waste material.</p>		
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input checked="" type="checkbox"/> distance learning <input type="checkbox"/> fieldwork	<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input checked="" type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____
<b>Comments</b>		
<b>Students' liabilities</b>		
Active participation in classes, written seminar paper and passed oral exam.		



<b>Student activity and performance monitoring</b>							
Attendance	0.25	Participation	0.25	Seminar paper	1.5	Experimental work	
Exam/written		Exam/oral	2	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Record keeping of class attendance, grading of activities in distance learning and oral exam.							
<b>Compulsory reading</b>							
<p>Marić V: Biotehnologija i sirovine. Stručna i poslovna knjiga d.o.o., Zagreb, 2000.            Buglass AJ: Handbook of alcoholic Beverages. Wiley Ltd., Chichester, UK, 2011.            Moore V: How to drink. Granta books, London, UK, 2010.            AOAC: Official Methods of analysis. Association of Official Chemists, Arlington, VA, USA, 2000.</p>							
<b>Recommended reading</b>							
<p>Rose LM: Distillation design in practice. Elsevier Applied Science, Amsterdam, 1985.            Betina V: Bioactive secondary metabolites of microorganisms, Elsevier, Amsterdam 1994.            Reed G i Nagodawithana TW: Yeast technology. Academic press, New York, SAD, 1991.            Rehmand HJ i Reed G: Biotechnology, Vol. 3, (vol.ed. H.Dellweg), Verlag Chemie, Weinheim, 1985.</p>							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
		Title	Number of items	Number of students			
		Biotehnologija i sirovine	5				
		Handbook of alcoholic Beverages	1 (professor)				
		How to drink	1 (professor)				
		Official Methods of analysis	1				
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>							
<p>Procedures of specific activities related to monitoring, assurance and improvement of quality of the study will be conducted according to the valid Manual for monitoring and assurance of quality of higher education at Faculty of Food Technology Osijek.            Course lecturer can conduct additional procedures of quality monitoring in regard to specificities of the subject.</p>							

<b>GENERAL INFORMATION</b>		
<b>Course lecturer</b>	D. Koceva Komlenić, PhD, full prof. // M. Jukić, PhD, assoc. prof.	
<b>Course title</b>	<b>Technology of functional cereal-based products</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	
		4
	<b>Number of curricular units – hours (L+P+S)</b>	15 (10+0+5)
<b>COURSE DESCRIPTION</b>		
<b>Course objectives</b>		



To acquaint the student with the importance of the use of cereals in the production of bread, biscuits and pasta, describe the recipes and technologies and legal regulations in the production of functional products based on cereals.							
<b>Course requirements</b>							
No enrolment requirements.							
<b>Expected learning outcomes</b>							
After completing the course students will be able to:							
<ul style="list-style-type: none"> <li>- establish the importance of the use of cereals in the production of bread, biscuits and pasta</li> <li>- use different technological procedures for the production of functional products based on cereals</li> <li>- adapt existing recipes and applied technologies to new insights into functional cereal-based products</li> <li>- apply legislation in the labeling of new products</li> </ul>							
<b>Course content</b>							
Lectures: Cereals and non-bread cereals in the production of bread, biscuits and pasta. Micronutrients in cereal-based products. Enrichment of cereal-based products with vitamins, minerals, omega-3 fatty acids. Addition of soy, naut and other legumes in the production of bread, biscuits and pasta. Food fiber in cereal-based products. Achievements in the production processes of functional bakery, biscuit and pastry functional products							
Seminars: Regulation and labeling of functional cereal-based products.							
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input checked="" type="checkbox"/> distance learning <input type="checkbox"/> fieldwork			<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____		
<b>Comments</b>							
<b>Students' liabilities</b>							
Attending classes, preparing a seminar paper and taking an oral exam.							
<b>Student activity and performance monitoring</b>							
Attendance	0.5	Participation	0.5	Seminar paper		Experimental work	
Exam/written		Exam/oral	3	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Keeping attendance records and evaluating classroom activities and oral examinations.							
<b>Compulsory reading</b>							
Hame RJ, Hosenay RC: <i>Interactions: The keys to Cereal Quality</i> , American Association of Cereal Chemists, St. Paul, Minnesota, 1998.							
Bushuk W: <i>Rye: Production, Chemistry and Technology</i> . American Association of Cereal Chemists, St. Paul, Minnesota, 2001.							
Robert BF, Elwood FC (ed.): <i>Breakfast cereals, and how they are made</i> . 2nd ed. American Association of Cereal Chemists, Inc., St. Paul, 2000							
<b>Recommended reading</b>							
Hamaker BR: <i>Technology of functional cereal products</i> . Woodhead publishing Limited, cambridge, England, 2008.							
Sluimer P: <i>Principles of Breadmaking Functionality of Raw Materials and Process Steps</i> , American Association of Cereal Chemists, St. Paul, Minnesota, 2005.							
Kruger JE, Matsuo RB: <i>Pasta and Noodle Technology</i> , American Association of Cereal Chemists, St. Paul, Minnesota, 1996.							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							

<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>
Interactions: The keys to Cereal Quality	1	
Rye: Production, Chemistry and Technology, 2001	1	
Breakfast cereals, and how they are made, 2000	1	
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
Procedures, and processes for conducting activities related to monitoring, assurance and improving the quality of studies. The above mentioned will be conducted following the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Quality monitoring can be carried out dependent on course specifics.		

<b>GENERAL INFORMATION</b>		
<b>Course lecturer</b>	N. Nedić Tiban, PhD, full prof.	
<b>Course title</b>	<b>Minimally processed fruits and vegetables</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	4
	<b>Number of curricular units – hours (L+P+S)</b>	15 (10+0+5)
<b>COURSE DESCRIPTION</b>		
<b>Course objectives</b>		
Students will gain knowledge about minimally processed and refrigerated fruits and vegetables, the products due to the minimal number of operations (taking place at ambient or low temperature) that have the most similar characteristics (chemical, physical, nutritional, organoleptic) to raw material (fresh fruits and vegetables), which is also of good quality and (microbiologically) safe for consumers, and has a longer shelf life than fresh raw materials. The specifics in relation to other types of fruits and vegetables.		
<b>Course requirements</b>		
No enrolment requirements.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- to describe the procedures / methods / principles of minimum production of processed fruits and vegetables</li> <li>- to predict the primary hazards to human health in the production of this product group</li> <li>- to recommend new and evolving technologies that enable obtaining high quality products</li> </ul>		
<b>Course content</b>		
The basics approach in the field of minimally processed fruits and vegetables. The main factors of deterioration minimally processed fruits and vegetables. Microbiological spoilage (pathogenic microflora) in/on minimally processed fruits and vegetables. Physico-chemical aspects of product stability. The techniques and methods of preservation. Chemicals for sanitation and disinfection. The means and methods for control of product safety. Development of technologies for minimally processed fruits and vegetables. The legal aspect (legislation) for minimally processed fruits and vegetables. Seminar: seminar work in consultation with the course lecturer.		
<b>Instructional methods</b>	<input type="checkbox"/> lectures <input type="checkbox"/> seminars and workshops <input type="checkbox"/> practice	<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice

		<input type="checkbox"/> distance learning	<input type="checkbox"/> mentorship
		<input type="checkbox"/> fieldwork	<input type="checkbox"/> other _____
<b>Comments</b>			
<b>Students' liabilities</b>			
Lectures and seminars attendance (and/or distance learning), seminar in paper (written essay) and passed oral exam.			
<b>Student activity and performance monitoring</b>			
Attendance	0.5	Participation	0.5
Exam/written		Exam/oral	2.5
Project		Continuous knowledge check	
Portfolio			
Seminar paper	2.5	Experimental work	
Essay		Research	
Presentation		Practical work	
<b>Grading and student performance evaluation during the course and at the final exam</b>			
Written and accepted seminar and positively evaluated the success at the final (oral) exam.			
<b>Compulsory reading</b>			
Connor JM: Food processing: an industrial power house in transition, 1988			
Jongen W: Improving the safety of fresh fruit and vegetables, WoodheadPublishingLimited, 2005. (Prof. personal issue)			
Barta J, Cano MP, Gusek T, Sidhu JS, Sinha N: Handbook of Fruits and Fruit Processing (Y.H. Hui Ed.) Blackwell, 2006.			
Sapers, Solomon EB, Matthews KR: The Produce Contamination Problem: Causes and Solutions, Elsevier, 2009. (Prof. personal issue)			
Evranzuz EÖ, Siddiq M, Ahmed J: Handbook of Vegetables & Vegetable Processing, Wiley-Blackwell (N. K. Sinha Ed., Y.H. Hui Admin. Ed.), 2011.			
Wallace CA, Sperber WH, Mortimore SE: Food Safety for the 21st Century, Wiley-Blackwell, 2011.(Prof. personal issue)			
<b>Recommended reading</b>			
Scientific and professional journals.			
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>			
<i>Title</i>		<i>Number of items</i>	<i>Number of students</i>
Improving the safety of fresh fruit and vegetables, Woodhead PublishingLimited, 2005. (Prof. personal issue)		1	
Handbook of Fruits and Fruit Processing (Y.H. Hui Ed.) Blackwell, 2006.		1	
The Produce Contamination Problem: Causes and Solutions, Elsevier, 2009. (Prof. personal issue)		1	
Handbook of Vegetables & Vegetable Processing, Wiley-Blackwell (N. K. Sinha Ed., Y.H. Hui Admin. Ed.), 2011.		1	
Food Safety for the 21st Century, Wiley-Blackwell, 2011.(Prof. personal issue)		1	
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>			
Procedures, and processes for conducting activities related to monitoring, assurance and improving the quality of studies. The above mentioned will be conducted following the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Quality monitoring can be carried out dependent on course specifics.			

GENERAL INFORMATION							
<b>Course lecturer</b>	D. Šubarić, PhD, full prof. // J. Babić, PhD, full prof. Đ. Ačkar, PhD, assoc. prof.						
<b>Course title</b>	<b>Food additives</b>						
<b>Study programme</b>	Food Technology and Nutrition						
<b>Majoring</b>	Food Technology						
<b>Course status</b>	elective						
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>						
<b>Credits and curricular formats</b>	<b>ECTS</b>					4	
	<b>Number of curricular units – hours (L+P+S)</b>					15 (12+0+3)	
COURSE DESCRIPTION							
<b>Course objectives</b>							
The aim of the course is to improve knowledge about additives in food production, their impact on the product quality and consumers' health. Special focus will be on interactions of food components with additives and legislation regarding the application of additives in food production.							
<b>Course requirements</b>							
No requirements for subject enrolment.							
<b>Expected learning outcomes</b>							
<ul style="list-style-type: none"> <li>- to describe current European and international legislation regarding additives in food production</li> <li>- to classify additives in specific categories</li> <li>- to analyse possible interactions of additives with food components and additive applications in the production</li> </ul>							
<b>Course content</b>							
Additives in food production. Legislation regarding additive applications in food production (in the country and worldwide). Classification and physicochemical properties of specific categories of food additives (preservatives, stabilizers, emulsifiers, thickening agents, gelling agents, colours, flavours, antioxidants, sweeteners, flavour enhancers, acids and acidity regulators, enzymes, ...). Interactions with food components. Perspectives in additive applications in food production. Seminars: additives in the production of specific products							
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input checked="" type="checkbox"/> distance learning <input type="checkbox"/> fieldwork		<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input checked="" type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____				
<b>Comments</b>							
<b>Students' liabilities</b>							
Active participation in classes, written paper and oral exam.							
<b>Student activity and performance monitoring</b>							
Attendance	0.4	Participation	0.4	Seminar paper	1.2	Experimental work	
Exam/written	2	Exam/oral		Essay		Research	

<i>Project</i>		<i>Continuous knowledge check</i>		<i>Presentation</i>		<i>Practical work</i>	
<i>Portfolio</i>							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Record keeping of class attendance, grading of activities in distance learning, grading of written paper and oral exam.							
<b>Compulsory reading</b>							
<p>Baltes W: Lebensmittelchemie. Springer Verlag, Berlin, Heidelberg, New York, 2000.  Fennema OR: Food Chemistry. Marcel Dekker, Inc., New York, Basel, Hong Kong, 1996.  AOAC: Food Additives (Collection of Analytical Methods for Food Additives), AOAC International, Arlington, USA, 1993.  Food Additives in the European Union (<a href="http://ec.europa.eu/food/food/fAEF/additives/eu_rules_en.htm">http://ec.europa.eu/food/food/fAEF/additives/eu_rules_en.htm</a>).  Pravilnici, www.nn.hr  Branen AL, Davidson PM, Salminen S, Thorngate JH III.: Food additives, 2nd Ed. Marcel-Dekker, New York, SAD, 2001. Dostupno na:  ariefm.lecture.ub.ac.id/.../A._Larry_Branen_P._Michael_Davidson_Sepp... [10. 2. 2015.]</p>							
<b>Recommended reading</b>							
Scientific and professional articles							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
<i>Title</i>		<i>Number of items</i>			<i>Number of students</i>		
Lebensmittelchemie, 2000.		1					
Food Chemistry, 1996		1					
Food Additives, 2001.		1					
Legislation		www.nn.hr					
Food additives, 2nd Ed., 2001.		1 (profesor) ariefm.lecture.ub.ac.id/.../A._Larry Branen_P._Michael_Davidson_Sepp...					
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>							
Procedures of specific activities related to monitoring, assurance and improvement of quality of the study will be conducted according to the valid Manual for monitoring and assurance of quality of higher education at Faculty of Food Technology Osijek. Course lecturer can conduct additional procedures of quality monitoring in regard to specificities of the subject.							

## GENERAL INFORMATION

<b>Course lecturer</b>	S. Budžaki, PhD, assoc. prof.	
<b>Course title</b>	<b>The energy efficiency of the process of the food industry</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Food Technology	
<b>Course status</b>	elective	
<b>Year</b>		
<b>Credits and curricular formats</b>	<b>ECTS</b>	4
	<b>Number of curricular units – hours (L+P+S)</b>	15 (10+0+5)

## COURSE DESCRIPTION

<b>Course objectives</b>							
Upgrade of specific knowledge in the field of thermotechnics in order to rationalize energy consumptions in the processes of the food industry.							
<b>Course requirements</b>							
There are no requirements for enrollment.							
<b>Expected learning outcomes</b>							
<ul style="list-style-type: none"> <li>- Identify and analyze the places where the waste heat is used in power plant of food industry</li> <li>- Describe the possibility of using non-conventional energy sources in combination with conventional ways of rationalization</li> <li>- Describe the environmental aspects of rationalization of energy consumptions</li> <li>- Apply acquired knowledge to solve problems / tasks of rationalizing energy consumptions in the processes of the food industry</li> </ul>							
<b>Course content</b>							
<p>Lectures: Energy in the industry. Energy in food production. Improving the efficiency of cooling stations. Cooling towers. The use of waste heat in power plants and food processing industry. Ecological and energy impact of recirculation of condensate. Possibilities of application of heat pumps. The possibility of using non-conventional energy sources in low-temperature processes in combination with conventional ways of rationalization (solar energy, wind energy, biogas, etc.). Application of recuperative and regenerative heat exchangers for use of waste air heat in low-temperature industrial processes (convective dryer, etc.). Cogeneration plants. Environmental aspects of the rationalization of energy consumptions.</p> <p>Seminar: Examples of process optimization by using unconventional and conventional methods of energy optimization.</p>							
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork			<input checked="" type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____		
<b>Comments</b>							
<b>Students' liabilities</b>							
Seminar paper and oral exam							
<b>Student activity and performance monitoring</b>							
Attendance		Participation		Seminar paper	2	Experimental work	
Exam/written		Exam/oral	2	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Exam/oral (50%) and seminar paper (50%)							
<b>Compulsory reading</b>							
Beer E: <i>Priručnik za dimenzioniranje uređaja kemijske procesne inustrije</i> , Kemija u industriji, Zagreb, 1994. Irudayaraj J: <i>Food Processing, Operations Modelling, Design and Analysis</i> . Marcel Dekker, Inc., 2001. Požar H: <i>Osnove energetike I</i> . Školska knjiga, Zagreb, 1992.							
<b>Recommended reading</b>							
Brennan JG: <i>Food Processing Handbook</i> :Wiley-VCH Verlag GmbH&Co.KgaA, 2006 Dincer I: <i>Refrigeration Systems and Applications</i> . John Wiley&Sons, 2003. Gerardi MH: <i>The Microbiology of Anaerobic Digester</i> :John Wiley&Sons, Inc.2003 Nuns EJ: <i>Biogas from waste &amp; waste water treatment</i> . Lior, USA Inc., 2001. Sorensen B: <i>Renewable energy</i> . Academic press, 2004. Stoecker WF: <i>Industrial Refrigeration Handbook</i> . McGraw-Hill Professional, 1998.							

<b>Number of items of compulsory reading with respect to the number of students attending the course</b>		
<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>
<i>Food Processing, Operations Modelling, Design and Analysis, 2001</i>	1	
<i>Osnove energetike I, 1992</i>	1	
<i>Priručnik za dimenzioniranje uređaja kemijske procesne inustrije, 1994</i>	5	
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
Procedures, and processes for conducting activities related to monitoring, assurance and improving the quality of studies. The above mentioned will be conducted following the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Quality monitoring can be carried out dependent on course specifics.		

<b>GENERAL INFORMATION</b>		
<b>Course lecturer</b>	D. Čačić Kenjerić, PhD, full prof.	
<b>Course title</b>	<b>Functional foods</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Nutrition	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	6
	<b>Number of curricular units – hours (L+P+S)</b>	20 (10+0+10)
<b>COURSE DESCRIPTION</b>		
<b>Course objectives</b>		
To introduce students to the role of functional foods its bioactive compounds and its consumption in selected functions enhancement and lowering the risk of diseases. To indicate future possibilities of functional food development (plant origin, animal origin, sweets, spreads). To introduce students with dietary and health claims and their regulation.		
<b>Course requirements</b>		
None defined.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- to explain the role and possibilities of selected functional food types and their bioactive compounds</li> <li>- to recommend foods and food compounds with the potential of lowering the disease risk and enhancing positive body functions</li> </ul>		
<b>Course content</b>		
Functional compounds (antioxidants, vitamins and minerals, dietary fibers, fatty acids, phytosterols, etc.). Plant based functional foods, animal based functional foods, functional sweets, and functional spreads. Functional foods and health (obesity, GIT, cardiovascular system, carcinoma, bones, etc.). Functional foods and legal frame.		
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning	<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship



		<input type="checkbox"/> fieldwork	<input type="checkbox"/> other _____				
<b>Comments</b>							
<b>Students' liabilities</b>							
To prepare seminar. To approach the exam.							
<b>Student activity and performance monitoring</b>							
Attendance		Participation		Seminar paper	3	Experimental work	
Exam/written		Exam/oral	3	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Student's achievements will be evaluated through the seminar preparation and exam.							
<b>Compulsory reading</b>							
Chadwick R, Henson S, Moseley B i sur.: Functional Foods, Springer-Verlag, Berlin, 2003. Webb GP: Dietary Supplements and Functional Foods, Blackwell Publishing Ltd, 2006.							
<b>Recommended reading</b>							
Scientific papers.							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
Title			Number of items		Number of students		
Functional Foods, 2003			1				
Dietary Supplements and Functional Foods, 2006			1				
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>							
Procedures for monitoring and improvements of study programme will be applied in accordance with Guidelines for monitoring and assurance of quality at the Faculty of Food Technology Osijek. Additional measurements and activities may be applied if required by lecturer due to course nature.							

GENERAL INFORMATION		
<b>Course lecturer</b>	M. Jašić, PhD, full prof. // D. Čačić Kenjerić, PhD, full prof. I. Banjari, PhD, assoc. prof.	
<b>Course title</b>	<b>Dietary supplements</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Nutrition	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	
	6	
	<b>Number of curricular units – hours (L+P+S)</b>	20 (10+0+10)
COURSE DESCRIPTION		
<b>Course objectives</b>		

<p>The object of the course is to define and group nutritional supplements and present them. Furthermore, the aim is to present, differentiate and substantiate the justified and unjustified reasons for consuming dietary supplements. The aim is also to present the statements that are a frequent element of the declaration of each dietary supplement and to point out the regularities and irregularities in their use.</p>							
<p><b>Course requirements</b></p>							
<p>No enrolment requirements.</p>							
<p><b>Expected learning outcomes</b></p>							
<ul style="list-style-type: none"> <li>- classify dietary supplements</li> <li>- recommend and present your selected dietary supplement</li> <li>- evaluate the need to take your chosen dietary supplement</li> <li>- evaluate the role of dietary supplements in the planning of personal and social nutrition, as well as the need to take them</li> </ul>							
<p><b>Course content</b></p>							
<p>Definition of dietary supplements, legislation, standardization. Chemistry of dietary supplements. Active substance and excipients. Forms of dietary supplements. Health claims. Sources of active substances in the manufacture of food supplements. Essential nutrients: amino and fatty acids, vitamins and minerals. Non-essential active substances of phytochemicals and other ingredients. Food supplements of plant and animal origin. Food supplements based on bee products, mushrooms and algae. Nutrition supplements and their impact on individual systems in the human body. Nutrition supplements for athletes. Other nutritional supplements.</p>							
<p><b>Instructional methods</b></p>		<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork			<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____		
		<p><b>Comments</b></p>					
<p><b>Students' liabilities</b></p>							
<p>Sudjelovanje na predavanjima (ili učenje na daljinu), napisan seminarski rad i položeni usmeni ispit.</p>							
<p><b>Student activity and performance monitoring</b></p>							
Attendance	0.5	Participation	1	Seminar paper	2	Experimental work	
Exam/written		Exam/oral	2.5	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<p><b>Grading and student performance evaluation during the course and at the final exam</b></p>							
<p>Student će biti vrednovan kroz sudjelovanje u nastavi (konzultacijama), izradu seminara i uspjeh na završnom (usmenom) ispitu.</p>							
<p><b>Compulsory reading</b></p>							
<p>Guide to Nutritional Supplements, Ed. B.Caballero, AP, 2009. <a href="http://file.zums.ac.ir/ebook/337-Guide%20to%20Nutritional%20Supplements-Benjamin%20Caballero%20Benjamin%20Caballero-0123751098-Academic%20Pr.pdf">http://file.zums.ac.ir/ebook/337-Guide%20to%20Nutritional%20Supplements-Benjamin%20Caballero%20Benjamin%20Caballero-0123751098-Academic%20Pr.pdf</a></p>							
<p><b>Recommended reading</b></p>							
<p>Dietary Supplements and Functional Foods, G.P. Webb, Blackwell Publishing, 2006. Vodič kroz vitamine, minerale i dodatke prehrani, M. Ashwell, Mozaik knjiga Zagreb, 2009.</p>							
<p><b>Number of items of compulsory reading with respect to the number of students attending the course</b></p>							
Title				Number of items		Number of students	
Guide to Nutritional Supplements				web			
<p><b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b></p>							

Procedures, and processes for conducting activities related to monitoring, assurance and improving the quality of studies. The above mentioned will be conducted following the applicable Manual for monitoring and quality assurance of higher education at the Faculty of Food Technology Osijek. Quality monitoring can be carried out dependent on course specifics.

GENERAL INFORMATION		
<b>Course lecturer</b>	I. Banjari, PhD, assoc. prof.	
<b>Course title</b>	<b>Phytonutrition</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Nutrition	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	6
	<b>Number of curricular units – hours (L+P+S)</b>	20 (15+0+5)
COURSE DESCRIPTION		
<b>Course objectives</b>		
<p>On the basis of presented information students will understand the field of phytonutrition and its related fields, and be able to differentiate the term phytonutrition from terms phytotherapy and phytopharmacy. Also, students will understand the role of different herbal species in clinical trials, with understanding of active compounds related with the activity of those species. Students will understand the concept of clinical intervention trials that aim to investigate the effect of specific herbal species on out-front planned outcomes (e.g. the influence on glycaemia in diabetics). Students will be familiarized with the ethical aspects related with such trials, and will be able to analyse those aspects.</p>		
<b>Course requirements</b>		
None.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- to define and explain the terms phytotherapy, phytopharmacy and phytonutrition</li> <li>- to group herba species according to their active components, geographical distribution and importance according to their use in medicine and clinical studies</li> <li>- to explain active compounds of herbal species and their influence on specific diseases/conditions</li> <li>- to analyse protocol set-up for a clinical intervention trial which aims to assess the potential of a certain herbal species</li> <li>- to explain and argument basic set-ups related with the ethical aspects of a clinical intervention trial</li> <li>- to explain the influence of several herbal species on some specific diseases/conditions (e.g. diabetes, cardiovascular diseases, hypertension, etc.)</li> </ul>		
<b>Course content</b>		
<p>Defining phytonutrition, phytopharmacy and phytonutrition. Systematics of medically important species. Medically important compounds in lower and higher plants. Plant organs as sources of active components. Geographical distribution of medically important plants. Introduction with the importance of studying different herbal species in the sphere of clinical trials. Introduction with active compounds of herbal species that have shown positive influence on certain diseases/conditions. Introduction with the set-up of a clinical intervention trial, that aim to analyse the potential of herbal species on risk factors for certain diseases/conditions (e.g. chia seeds, goji berry, Konjac glucomannan, Ginseng, Ginkgo, mistletoe). Ethical aspects of clinical intervention trials that use herbal species. Herbal species according to proven effects on risk factors for certain diseases/conditions (cardiovascular diseases, carcinoma, dementia, diabetes, obesity, hypertension, etc.). Overview of the latest scientific studies in the field of phytonutrition.</p>		

<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures	<input type="checkbox"/> single-case research
	<input checked="" type="checkbox"/> seminars and workshops	<input type="checkbox"/> multimedia and network
	<input type="checkbox"/> practice	<input type="checkbox"/> laboratory practice
	<input type="checkbox"/> distance learning	<input type="checkbox"/> mentorship
	<input type="checkbox"/> fieldwork	<input type="checkbox"/> other
<b>Comments</b>		
<b>Students' liabilities</b>		
Students will be asked to select the theme of their personal interest which will they have to present in a form of a seminar paper. Students will be encouraged on active participation in the lectures, with the possibility to customize the lectures according to their specific interests.		
<b>Student activity and performance monitoring</b>		
Attendance	Participation	Seminar paper 1.5
Exam/written 1.8	Exam/oral 2.7	Essay
Project	Continuous knowledge check	Presentation
Portfolio		Research
		Practical work
<b>Grading and student performance evaluation during the course and at the final exam</b>		
Grading includes preparation of a seminar paper on a theme based on the student's personal interests (1.5 ECTS), than the written exam (1.8 ECTS), and finally the oral exam which has the highest impact on the student's final grade (2.7 ECTS), that assess student's active and creative approach towards problems related with the field of phytonutrition.		
<b>Compulsory reading</b>		
Subrahmanyam NS: <i>Modern Plant Taxonomy</i> . Jangpura, New Delhi, 1995. Hark L, Morrison G: <i>Medical Nutrition and Disease: A Case-Based Approach, 4th Edition</i> . John Wiley & Sons Ltd., 2009. <a href="http://books.google.hr/books?id=0dttY8r92icC&amp;hl=hr&amp;source=gbs_navlinks_s">http://books.google.hr/books?id=0dttY8r92icC&amp;hl=hr&amp;source=gbs_navlinks_s</a> Balch PA: <i>Prescription for Nutritional Healing, 4th Edition</i> . AVERY, Penguin Group (USA) Inc., New York, 2006. Winston & Kuhn's <i>Herbal Therapy and Supplements: A Scientific and Traditional Approach</i> . Wolters Kluwer/Lippincott Williams & Wilkins Health, Philadelphia, 2008.		
<b>Recommended reading</b>		
Lewis WH: <i>Medical Botany: Plants Affecting Human Health</i> . John Wiley and Sons, 2003. Hoffmann D: <i>Medical Herbalism: The Science and Practice of Herbal Medicine</i> . Healing Arts Press, 2003. Ramawat KG, Mérillon J-M: <i>Natural Products: Phytochemistry, Botany and Metabolism of Alkaloids, Phenolics and Terpenes</i> . Springer Link, 2013.		
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>		
<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>
Modern Plant Taxonomy	1	
Medical Nutrition and Disease	1	
Prescription for Nutritional Healing	1	
Herbal Therapy and Supplements	1	
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
Certain procedures, i.e. actions related with the follow-up, assurance and quality improvement of the study programme will be implemented according to the Manual on follow-up and quality assurance in higher education at the Faculty of Food Technology Osijek in effect. Course lecturer can conduct other forms of quality assessment depending on the course specificities.		

GENERAL INFORMATION		
<b>Course lecturer</b>	I. Banjari, PhD, assoc. prof.	
<b>Course title</b>	<b>Nutrition from the aspect of public health</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Nutrition	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	6
	<b>Number of curricular units – hours (L+P+S)</b>	20 (15+0+5)
COURSE DESCRIPTION		
<b>Course objectives</b>		
<p>On the basis of presented information students will understand problematics out of public health significance closely related with the diet, i.e. dietary and lifestyle habits. Also, students will learn how to use all relevant national and international publications and guidelines to shape and set scientific studies, for scientific and professional manuscript preparation, and for public presentations. Also, students will understand the importance of this problematic from the aspect of governing intervention strategies on national levels that aim to provide solution for a problem within the field.</p>		
<b>Course requirements</b>		
None.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- to define and explain aspects included in the public health, with the special emphasis on nutrition</li> <li>- to define critical points from the aspect of nutrition and impact on public health</li> <li>- to differentiate dietary recommendations for specific population groups</li> <li>- to explain the influence of other aspects (e.g. socio-economic) on public health</li> <li>- to explain the influence of certain factors on governing recommendations and guidelines on national levels and their importance for the whole population</li> <li>- to differentiate and explain different forms of education for specific population groups</li> <li>- to analyse the position of Croatia and follow-up methods used in public health sector</li> <li>- to analyse intervention strategies around the globe which are related towards some of the most significant public health problems related with the nutrition</li> </ul>		
<b>Course content</b>		
<p>Aspects covered by the public health (besides nutrition includes environment, infectious diseases, non-communicable diseases, food safety, etc.). Critical points from the aspect of nutrition and relation with the public health. Interpretation of recommendations on macro and micronutrient intakes, with the special emphasis on problems among different population groups. Current dietary recommendations (national, European, global) and related controversies. Problematics of household, socio-economic status and insecurity. The influence of critical points on economic aspect, i.e. public spending for public health service. Factors related with the governing of recommendations and guidelines on national level in the field of public health. Implementation and means of conduction of education based on the risk factors related with nutrition from the public health aspect. The position of Croatia and means of follow-up strategies in public health sector related with the nutrition. Intervention strategies conducted on national levels aimed at some of the most significant public health problems related with the nutrition (e.g. deficiency diseases like iron deficiency anaemia).</p>		
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures <input type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork	<input checked="" type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____

<b>Comments</b>			
<b>Students' liabilities</b>			
Students will be given an individual task in a form of a project, and they will have to present possible solution or solutions (so called scenarios) on the given problem out of public health significance, related with the nutrition. The project will consolidate all aspects covered in the lectures with the additional individual engagement in the narrow field of the given problem.			
<b>Student activity and performance monitoring</b>			
Attendance	Participation	Seminar paper	Experimental work
Exam/written	Exam/oral	Essay	Research
Project	Continuous knowledge check	Presentation	Practical work
Portfolio			
<b>Grading and student performance evaluation during the course and at the final exam</b>			
Grading includes presentation of the project (1.8 ECTS), than the written exam (1.8 ECTS), and finally the oral exam which has the highest impact on the student's final grade (2.4 ECTS), that assess student's active and creative approach towards problems related with the field of nutrition from the aspect of public health.			
<b>Compulsory reading</b>			
World Health Organization: <i>Publications by the Public health, environmental and social determinants of health (PHE) department</i> . WHO, Geneva <a href="http://www.who.int/phe/health_topics/en/">http://www.who.int/phe/health_topics/en/</a> Croatian Institute of Public Health: <i>Croatia Health Service Yearbook</i> . CIPH, Zagreb <a href="http://hzjz.hr/?cat=20">http://hzjz.hr/?cat=20</a> Institute of Public Health „dr. Andrija Štampar“: <i>Health statistics</i> . IPH, Zagreb <a href="http://www.stampar.hr/ZdravstvenaStatistika">http://www.stampar.hr/ZdravstvenaStatistika</a> Croatian Bureau of Statistics: <i>Statistical yearbook</i> . DZS, Zagreb <a href="http://www.dzs.hr/">http://www.dzs.hr/</a> Institute of Medicine: <i>Dietary Reference Intakes: Applications in Dietary Planning</i> . IOM, Washington, 2006. <a href="http://www.iom.edu/Reports.aspx">http://www.iom.edu/Reports.aspx</a> Institute of Medicine: <i>The Healthcare Imperative: Lowering Costs and Improving Outcomes - Workshop Series Summary</i> . IOM, Washington, 2011. <a href="http://www.iom.edu/Reports.aspx">http://www.iom.edu/Reports.aspx</a> Hawkes C, Blouin C, Henson S, Drager N, Dubé L: <i>Trade, food, diet, and health: perspectives and policy options</i> . Blackwell Publishing, 2010.			
<b>Recommended reading</b>			
All available scientific papers and publications of different national and international institutions.			
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>			
	<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>
All compulsory reading		web	
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>			
Certain procedures, i.e. actions related with the follow-up, assurance and quality improvement of the study programme will be implemented according to the Manual on follow-up and quality assurance in higher education at the Faculty of Food Technology Osijek in effect. Course lecturer can conduct other forms of quality assessment depending on the course specificities.			

GENERAL INFORMATION	
<b>Course lecturer</b>	M. Miškulin, PhD, full prof. // D. Čačić Kenjerić, PhD, full prof.
<b>Course title</b>	<b>Nutritional epidemiology</b>
<b>Study programme</b>	Food Technology and Nutrition
<b>Majoring</b>	Nutrition



<b>Course status</b>	elective		
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>		
<b>Credits and curricular formats</b>	<b>ECTS</b>		6
	<b>Number of curricular units – hours (L+P+S)</b>		20 (15+0+5)
<b>COURSE DESCRIPTION</b>			
<b>Course objectives</b>			
To introduce students with principles of various study designs used in diet and disease research.			
<b>Course requirements</b>			
None defined.			
<b>Expected learning outcomes</b>			
<ul style="list-style-type: none"> <li>- to estimate fitness for purpose of the selected study type</li> <li>- to select adequate study design for the selected research problem</li> <li>- to correlate studied diet and lifestyle factors with health status of the studied population</li> </ul>			
<b>Course content</b>			
Principles of nutritional epidemiology. Study types in nutritional epidemiology: descriptive studies, correlation studies, observational studies, experimental studies. Food and nutrients intake and their relationship with diseases.			
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork	<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____	
<b>Comments</b>			
<b>Students' liabilities</b>			
To prepare seminar. To approach the exam.			
<b>Student activity and performance monitoring</b>			
Attendance	Participation	3	Experimental work
Exam/written	Exam/oral	3	Research
Project	Continuous knowledge check		Practical work
Portfolio			
<b>Grading and student performance evaluation during the course and at the final exam</b>			
Student's achievements will be evaluated through the seminar preparation and exam.			
<b>Compulsory reading</b>			
Willet W: Nutritional Epidemiology. Oxford University Press, New York, 1998.			
<b>Recommended reading</b>			
Scientific papers.			
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>			
Title	Number of items	Number of students	
Nutritional Epidemiology, 1998.	1		
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>			



Procedures for monitoring and improvements of study programme will be applied in accordance with Guidelines for monitoring and assurance of quality at the Faculty of Food Technology Osijek. Additional measurements and activities may be applied if required by lecturer due to course nature.

GENERAL INFORMATION							
<b>Course lecturer</b>		D. Čačić Kenjerić, PhD, full prof.					
<b>Course title</b>		<b>Dietary assessment and nutritional status</b>					
<b>Study programme</b>		Food Technology and Nutrition					
<b>Majoring</b>		Nutrition					
<b>Course status</b>		elective					
<b>Year</b>		1 <sup>st</sup> or 2 <sup>nd</sup>					
<b>Credits and curricular formats</b>		<b>ECTS</b>			6		
		<b>Number of curricular units – hours (L+P+S)</b>			20 (10+5+5)		
COURSE DESCRIPTION							
<b>Course objectives</b>							
To acquire methodology used for estimation of dietary habits and nourishment status in various types of dietetic studies.							
<b>Course requirements</b>							
None defined.							
<b>Expected learning outcomes</b>							
<ul style="list-style-type: none"> <li>- to select the most appropriate method for dietary assessment in selected specific population</li> <li>- to apply selected dietary assessment method for data collection</li> <li>- to select the most appropriate method for nourishment status assessment in selected specific population</li> <li>- to apply selected nourishment status method for data collection</li> <li>- to validate selected methods</li> </ul>							
<b>Course content</b>							
Approaches used in nutritional assessment. Dietetic methods (24-hour recall, food record, food frequency questionnaires, duplicate food collections). Biochemical indicators of dietary intake. Anthropometric measurements in nutritional status assessment. Validation of used dietary assessment methods. Surrogate sources of dietary information.							
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork			<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____		
<b>Comments</b>							
<b>Students' liabilities</b>							
To prepare seminar. To approach the exam.							
<b>Student activity and performance monitoring</b>							
Attendance		Participation		Seminar paper	3	Experimental work	
Exam/written		Exam/oral	3	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	

Portfolio						
<b>Grading and student performance evaluation during the course and at the final exam</b>						
Students achievements will be evaluated through the seminar preparation and exam.						
<b>Compulsory reading</b>						
Senta A, Pucarín-Cvetković J, Doko Jelinić J: Kvantitativni modeli namirnica i obroka, Medicinska naklada, Zagreb, 2004. Willet W: Nutritional Epidemiology, Oxford University Press, New York, 1998. WHO: Physical status: The use and interpretation of anthropometry, WHO, Geneva, 1995. <a href="http://whqlibdoc.who.int/trs/WHO_TRS_854.pdf?ua=1">http://whqlibdoc.who.int/trs/WHO_TRS_854.pdf?ua=1</a> .						
<b>Recommended reading</b>						
-						
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>						
		<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>		
		Kvantitativni modeli namirnica i obroka	5			
		Nutritional Epidemiology	1			
		The use and interpretation of anthropometry	web			
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>						
Procedures for monitoring and improvements of study programme will be applied in accordance with Guidelines for monitoring and assurance of quality at the Faculty of Food Technology Osijek. Additional measurements and activities may be applied if required by lecturer due to course nature.						

GENERAL INFORMATION		
<b>Course lecturer</b>	T. Klapac, PhD, full prof. // I. Banjari, PhD, assoc. prof.	
<b>Course title</b>	<b>Alternative nutrition</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Nutrition	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	4
	<b>Number of curricular units – hours (L+P+S)</b>	15 (10+0+5)
COURSE DESCRIPTION		
<b>Course objectives</b>		
Understanding the key aspects of alternative approaches to nutrition.		
<b>Course requirements</b>		
No requirements.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- analyze specific types of nutrition</li> <li>- describe physiological effects of particular dietary practices</li> </ul>		

- counsel on the risk of nutritional deficits							
<b>Course content</b>							
Classification, rules, frequency, and physiological effects of alternative dietary regimes (vegetarianism, veganism, macrobiotics, etc.), pseudoscientific trends in nutrition (detox diets, blood type diet, raw foodism, gluten free diet, holistic diet, etc.).							
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures	<input checked="" type="checkbox"/> seminars and workshops	<input type="checkbox"/> practice	<input checked="" type="checkbox"/> distance learning	<input type="checkbox"/> fieldwork	<input checked="" type="checkbox"/> single-case research <input checked="" type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input checked="" type="checkbox"/> mentorship <input type="checkbox"/> other _____
<b>Comments</b>							
<b>Students' liabilities</b>							
Seminars and individual assignments.							
<b>Student activity and performance monitoring</b>							
Attendance		Participation		Seminar paper	1	Experimental work	
Exam/written		Exam/oral	2	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	1
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Ability to perform independent research in the field will be assessed on the basis of written seminars, individual assignments, and oral examination.							
<b>Compulsory reading</b>							
Relevant research papers.							
<b>Recommended reading</b>							
-							
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>							
Procedures, and actions for conducting certain activities related to monitoring, security and improving the quality of studies will be conducted in accordance with the applicable Manual for monitoring and quality assurance of higher education of the Faculty of Food Technology Osijek. Course teacher can carry out other ways of monitoring the quality depending on the specifics of the course.							

GENERAL INFORMATION	
<b>Course lecturer</b>	B. Šarkanj, PhD, asist. prof.
<b>Course title</b>	<b>Nutritional aspects of food preparation</b>
<b>Study programme</b>	Food Technology and Nutrition
<b>Majoring</b>	Nutrition
<b>Course status</b>	elective
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>
<b>Credits and curricular formats</b>	<b>ECTS</b>
	4

		<b>Number of curricular units – hours (L+P+S)</b>	15 (10+0+5)				
<b>COURSE DESCRIPTION</b>							
<b>Course objectives</b>							
Understanding the impact of processing on the nutritional value of food and the theoretical foundations of food preparation procedures that can help improve and/or maintain nutritional value.							
<b>Course requirements</b>							
No special requirements.							
<b>Expected learning outcomes</b>							
<ul style="list-style-type: none"> <li>- describe the positive and negative impacts of food processing</li> <li>- modulate the processing and preparation conditions of food in order to improve or maintain nutritional value</li> </ul>							
<b>Course content</b>							
<p>Positive nutritional changes during food preparation: increased digestibility of protein, inactivation and/or removal of anti-nutrients (avidin, phytates, tannins, oxalates, protease inhibitors, etc.), improved organoleptic properties by formation of aromatic substances, reducing the content of pesticide residues, nitrates, increased shelf life, release or generation of protective substances, etc.</p> <p>Negative changes during food preparation: formation of Maillard reaction products (HAA, AGE, ALE, furan, acrylamide, etc.), PAHs, products of auto-oxidation and thermal treatment of lipids, chloropropanols, amino acid derivatives, etc.</p> <p>Procedures which induce positive changes, reduce losses during preparation and prevent formation of adverse by-products.</p>							
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input checked="" type="checkbox"/> distance learning <input type="checkbox"/> fieldwork	<input checked="" type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input checked="" type="checkbox"/> mentorship <input type="checkbox"/> other _____				
<b>Comments</b>							
<b>Students' liabilities</b>							
Seminars, individual assignments and lab work.							
<b>Student activity and performance monitoring</b>							
Attendance		Participation		Seminar paper	0.5	Experimental work	
Exam/written		Exam/oral	3	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Ability to perform independent research in the field will be assessed on the basis of written seminars, individual assignments, lab work, and oral examination.							
<b>Compulsory reading</b>							
Klapec T, Šarkanj B: Opasnosti vezane uz hranu, Kemijske i fizikalne opasnosti. PTF, Osijek, 2014.							
<b>Recommended reading</b>							
Relevant scientific papers Stadler RH, Lineback DR (ur.): Process-induced food toxicants. Occurrence, formation, mitigation and health risks. Wiley, 2009.							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
Title		Number of items		Number of students			

Opasnosti vezane uz hranu, Kemijske i fizikalne opasnosti (PDF)		
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
Procedures, and actions for conducting certain activities related to monitoring, security and improving the quality of studies will be conducted in accordance with the applicable Manual for monitoring and quality assurance of higher education of the Faculty of Food Technology Osijek. Course teacher can carry out other ways of monitoring the quality depending on the specifics of the course.		

GENERAL INFORMATION		
<b>Course lecturer</b>	T. Klapac, PhD, full prof. // I. Strelec, PhD, assoc. prof. D. Čačić Kenjerić, PhD, full prof.	
<b>Course title</b>	<b>Weight reduction diets and prevention of obesity</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Nutrition	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	4
	<b>Number of curricular units – hours (L+P+S)</b>	15 (15+0+0)
COURSE DESCRIPTION		
<b>Course objectives</b>		
Familiarization with approaches to reduce body weight and strategies of obesity prevention as well as biochemical and physiological effects of popular diets.		
<b>Course requirements</b>		
No requirements.		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- define effective approaches for prevention of obesity</li> <li>- analyze weight reduction diets</li> <li>- explain risks of unscientific diets</li> <li>- formulate effective and innocuous weight reduction diets</li> </ul>		
<b>Course content</b>		
Classification of weight reduction diets, overview of dietary regime and evidence of efficacy. Food, dietary supplements, weight loss and weight maintenance products – efficacy and toxicological risks. Environmental factors which affect food intake (food visibility, package and portion size, size, shape and color of serving containers and cutlery, temperature in the room, lighting, socializing, distractions, stockpiles, etc.). Thermic effect of food. Nutrient mimetics and compensation of energy intake. Physiological changes linked with reduction diets.		
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures <input type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input checked="" type="checkbox"/> distance learning <input type="checkbox"/> fieldwork	<input checked="" type="checkbox"/> single-case research <input checked="" type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input checked="" type="checkbox"/> mentorship <input type="checkbox"/> other
<b>Comments</b>		

<b>Students' liabilities</b>							
Individual assignments.							
<b>Student activity and performance monitoring</b>							
Attendance		Participation		Seminar paper		Experimental work	
Exam/written		Exam/oral	2.5	Essay		Research	1.5
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Ability to perform independent research in the field will be assessed on the basis of individual assignments, and oral examination.							
<b>Compulsory reading</b>							
Review articles.							
<b>Recommended reading</b>							
-							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
Title			Number of items		Number of students		
-							
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>							
Procedures, and actions for conducting certain activities related to monitoring, security and improving the quality of studies will be conducted in accordance with the applicable Manual for monitoring and quality assurance of higher education of the Faculty of Food Technology Osijek. Course teacher can carry out other ways of monitoring the quality depending on the specifics of the course.							

GENERAL INFORMATION		
<b>Course lecturer</b>	D. Čačić Kenjerić, PhD, full prof.	
<b>Course title</b>	<b>Nutrition and sport</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Nutrition	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	
	<b>Number of curricular units – hours (L+P+S)</b>	4 15 (5+0+10)
COURSE DESCRIPTION		
<b>Course objectives</b>		
To introduce student to sports nutrition with the special accent on energy and fluid requirements.		
<b>Course requirements</b>		
None defined.		

<b>Expected learning outcomes</b>							
<ul style="list-style-type: none"> <li>- to define energy requirements of athletes</li> <li>- to define nutrient requirement in athletes</li> <li>- to estimate energy and nutrient requirements in dependence on the sport type</li> <li>- to estimate fluid requirements</li> <li>- to select the most appropriate approach for hydration and energy maintenance during the training and competition</li> <li>- to select the most appropriate approach for rehydration and energy restore after the training or competition</li> </ul>							
<b>Course content</b>							
Basic principles of sports nutrition. Energy requirement in sport. Macronutrients and sport. Minerals and vitamins in athlete's diet. Dehydration and rehydration. Loss and restore of electrolytes. Eating disorders in athletes.							
<b>Instructional methods</b>		<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> practice <input type="checkbox"/> distance learning <input type="checkbox"/> fieldwork			<input type="checkbox"/> single-case research <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory practice <input type="checkbox"/> mentorship <input type="checkbox"/> other _____		
<b>Comments</b>							
<b>Students' liabilities</b>							
To prepare seminar. To approach the exam.							
<b>Student activity and performance monitoring</b>							
Attendance		Participation		Seminar paper	3	Experimental work	
Exam/written		Exam/oral	3	Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Student's achievements will be evaluated through the seminar preparation and exam.							
<b>Compulsory reading</b>							
Fink H, Mikesky AE, Burgoon LA: Practical Applications in Sports Nutrition, Jones & Bartlett Learning, 2012.							
<b>Recommended reading</b>							
Dunford M, Doyle JA: Nutrition for sport and exercise, CENGAGE Learning, Stamford (USA), 2012.							
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>							
Title				Number of items		Number of students	
Practical Applications in Sports Nutrition, 2012.				1			
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>							
Procedures for monitoring and improvements of study programme will be applied in accordance with Guidelines for monitoring and assurance of quality at the Faculty of Food Technology Osijek. Additional measurements and activities may be applied if required by lecturer due to course nature.							



GENERAL INFORMATION							
<b>Course lecturer</b>	T. Klačec, PhD, full prof.						
<b>Course title</b>	<b>Food – drug interactions</b>						
<b>Study programme</b>	Food Technology and Nutrition						
<b>Majoring</b>	Nutrition						
<b>Course status</b>	elective						
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>						
<b>Credits and curricular formats</b>	<b>ECTS</b>					4	
	<b>Number of curricular units – hours (L+P+S)</b>					15 (10+0+5)	
COURSE DESCRIPTION							
<b>Course objectives</b>							
Understanding the potential of adverse or desirable interactions between drugs and food components, as well as means of their prevention or stimulation.							
<b>Course requirements</b>							
No requirements.							
<b>Expected learning outcomes</b>							
<ul style="list-style-type: none"> <li>- analyze physiological effects of drugs and nutrients</li> <li>- explain effects of drugs on nutritional status and vice versa</li> <li>- counsel patients on food – drug interactions</li> </ul>							
<b>Course content</b>							
The influence of food components on absorption, distribution, metabolism, excretion, and efficacy of drugs (inhibition or induction of transport proteins, binding to plasma proteins, induction or inhibition of biotransformation enzymes, modulation of acid-base equilibrium, potentiation or reduction of drug effects, etc.). The influence of nutritional status on drug efficacy (caloric and protein malnutrition, nutrient deficits, obesity, etc.). The influence of drugs on nutritional status (indirect consequences of drug side effects in the gastrointestinal tract, appetite suppressants, antibiotics, etc.). Counselling aimed at prevention of unwanted interactions or dietary alterations to promote synergistic effect of drugs and food.							
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures	<input checked="" type="checkbox"/> seminars and workshops	<input type="checkbox"/> practice	<input checked="" type="checkbox"/> distance learning	<input type="checkbox"/> fieldwork	<input checked="" type="checkbox"/> single-case research	<input checked="" type="checkbox"/> multimedia and network
						<input type="checkbox"/> laboratory practice	<input checked="" type="checkbox"/> mentorship
						<input type="checkbox"/> other _____	
<b>Comments</b>							
<b>Students' liabilities</b>							
Individual assignments.							
<b>Student activity and performance monitoring</b>							
Attendance		Participation		Seminar paper		Experimental work	
Exam/written		Exam/oral	2.5	Essay		Research	1.5
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Ability to perform independent research in the field will be assessed on the basis of individual assignments, and oral examination.							

<b>Compulsory reading</b>		
McCabe BJ, Wolfe JJ, Frankel EH (ur.): Handbook of food-drug interactions. CRC Press, 2003.		
<b>Recommended reading</b>		
Relevant research papers. Boullata JI, Armenti VT (ur.): Handbook of drug-nutrient interactions. Humana Press, 2010.		
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>		
<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>
Handbook of food-drug interactions (PDF)		
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
Procedures, and actions for conducting certain activities related to monitoring, security and improving the quality of studies will be conducted in accordance with the applicable Manual for monitoring and quality assurance of higher education of the Faculty of Food Technology Osijek. Course teacher can carry out other ways of monitoring the quality depending on the specifics of the course.		

GENERAL INFORMATION		
<b>Course lecturer</b>	B. Šarkanj, PhD, asist. prof. // S. Džijan, PhD, asist. prof.	
<b>Course title</b>	<b>Biochemical analytics in nutritional research</b>	
<b>Study programme</b>	Food Technology and Nutrition	
<b>Majoring</b>	Nutrition	
<b>Course status</b>	elective	
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>	
<b>Credits and curricular formats</b>	<b>ECTS</b>	4
	<b>Number of curricular units – hours (L+P+S)</b>	15 (10+3+2)
COURSE DESCRIPTION		
<b>Course objectives</b>		
Introduction and implementation of new biochemical analytical methods in nutritional research.		
<b>Course requirements</b>		
<b>No special requirements</b>		
<b>Expected learning outcomes</b>		
<ul style="list-style-type: none"> <li>- distinguish the most important biochemical analytical methods in nutritional research</li> <li>- choose the method according to the properties of the analyte</li> <li>- apply extraction methods according to the properties of the analyte</li> <li>- measurement of the enzyme kinetics</li> <li>- use of immunochemical techniques</li> <li>- use of electrophoresis</li> <li>- distinguish and apply different types of polymerase chain reaction</li> </ul>		
<b>Course content</b>		
Basic principles of work with biological samples in nutritional research. Extraction and enrichment of the target group of molecules. Basic biochemical analysis. Immunoassays analysis. Electrophoretic analysis methods. Polymerase chain reaction.		

<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input checked="" type="checkbox"/> practice <input checked="" type="checkbox"/> distance learning <input checked="" type="checkbox"/> fieldwork	<input checked="" type="checkbox"/> single-case research <input checked="" type="checkbox"/> multimedia and network <input checked="" type="checkbox"/> laboratory practice <input checked="" type="checkbox"/> mentorship <input type="checkbox"/> other			
<b>Comments</b>					
<b>Students' liabilities</b>					
Seminars, individual assignments and lab work.					
<b>Student activity and performance monitoring</b>					
Attendance	Participation	Seminar paper	0.5	Experimental work	1.5
Exam/written	Exam/oral	2	Essay	Research	
Project	Continuous knowledge check		Presentation	Practical work	
Portfolio					
<b>Grading and student performance evaluation during the course and at the final exam</b>					
Based on the written seminar work, conducted individual assignments, experimental work and the oral examination, the ability the ability to do science investigation in the field will be assessed					
<b>Compulsory reading</b>					
Bartlett JMS, Stirling D: PCR protocols, Humana Press, 2003. Crowther RJ: The ELISA guidebook, Humana Press, 2009.					
<b>Recommended reading</b>					
Aboul-Enein HY: Analytical and preparative separation methods of biomacromolecules, Marcel Dekker, 1999. Nollet LML, Toldra F: Advances in food diagnostics, Blackwell Publishing, 2007. Saunders GC, Parkes HC: Analytical molecular biology, Quality and validation, Royal Society of Chemistry, 1999.					
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>					
Title		Number of items	Number of students		
PCR protocols (PDF)		-			
The ELISA guidebook (PDF)		-			
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>					
Procedures, and actions for conducting certain activities related to monitoring, security and improving the quality of studies will be conducted in accordance with the applicable Manual for monitoring and quality assurance of higher education of the Faculty of Food Technology Osijek. Course teacher can carry out other ways of monitoring the quality depending on the specifics of the course.					

## GENERAL INFORMATION

<b>Course lecturer</b>	T. Klapac, PhD, full prof.
<b>Course title</b>	<b>Selected topics in food toxicology</b>
<b>Study programme</b>	Food Technology and Nutrition
<b>Majoring</b>	Nutrition
<b>Course status</b>	elective
<b>Year</b>	1 <sup>st</sup> or 2 <sup>nd</sup>

<b>Credits and curricular formats</b>	<b>ECTS</b>		4				
	<b>Number of curricular units – hours (L+P+S)</b>		15 (10+0+5)				
<b>COURSE DESCRIPTION</b>							
<b>Course objectives</b>							
Students will become familiar with occurrence of selected toxicants, their mechanisms of action, adverse effects, methods of analysis in food and/or physiological materials, and means of preventing food contamination and/or damage to the organism.							
<b>Course requirements</b>							
No special requirements.							
<b>Expected learning outcomes</b>							
<ul style="list-style-type: none"> <li>- describe occurrence of selected toxicants in food</li> <li>- describe toxicant's mechanisms of action</li> <li>- anticipate adverse effects depending on the circumstances of exposure</li> <li>- choose the most appropriate analytical methods</li> <li>- formulate effective measures to reduce contamination of food and/or damage to the organism</li> </ul>							
<b>Course content</b>							
Food sources, methods of analysis, absorption, distribution, metabolism, excretion, mechanisms of action, toxic effects, measures to prevent contamination and/or adverse effects to the organism for selected toxicants in food.							
<b>Instructional methods</b>	<input checked="" type="checkbox"/> lectures	<input checked="" type="checkbox"/> seminars and workshops	<input checked="" type="checkbox"/> single-case research	<input checked="" type="checkbox"/> multimedia and network			
	<input type="checkbox"/> practice	<input checked="" type="checkbox"/> distance learning	<input checked="" type="checkbox"/> laboratory practice	<input checked="" type="checkbox"/> mentorship			
	<input checked="" type="checkbox"/> fieldwork		<input type="checkbox"/> other _____				
<b>Comments</b>							
<b>Students' liabilities</b>							
Seminars, individual assignments and lab work.							
<b>Student activity and performance monitoring</b>							
Attendance		Participation		Seminar paper		Experimental work	
Exam/written		Exam/oral		Essay		Research	
Project		Continuous knowledge check		Presentation		Practical work	
Portfolio							
<b>Grading and student performance evaluation during the course and at the final exam</b>							
Ability to perform independent research in the field will be assessed on the basis of written seminars, individual assignments, lab work, and oral examination.							
<b>Compulsory reading</b>							
Klapec T: Osnove toksikologije s toksikologijom hrane. PTF, 2016.							
<b>Recommended reading</b>							
Berg JM, Tymoczko JL, Stryer L, Gatto Jr GJ: Biochemistry. WH Freeman & Co., 2012.							
Boelsterli UA: Mechanistic toxicology: The molecular basis of how chemicals disrupt biological targets. Informa Healthcare, 2007.							
Hodgson E (ur.): A textbook of modern toxicology. John Wiley and Sons, 2004.							
Klaassen CD (ur.): Cassarett and Doull's toxicology, A basic science of poisons. McGraw-Hill Professional, 2007.							
Omaye ST: Food and nutritional toxicology. CRC Press, 2004.							
Timbrell JA: Principles of biochemical toxicology. Informa Healthcare, 2009.							

Wallace Hayes A (ur.): Principles and methods of toxicology. Taylor & Francis, 2001.		
<b>Number of items of compulsory reading with respect to the number of students attending the course</b>		
<i>Title</i>	<i>Number of items</i>	<i>Number of students</i>
Osnove toksikologije s toksikologijom hrane (PDF)		
<b>Quality control modes assuring desired output (acquisition of knowledge, skills and competencies)</b>		
Procedures, and actions for conducting certain activities related to monitoring, security and improving the quality of studies will be conducted in accordance with the applicable Manual for monitoring and quality assurance of higher education of the Faculty of Food Technology Osijek. Course teacher can carry out other ways of monitoring the quality depending on the specifics of the course.		

#### 4.2. Struktura studija, ritam studiranja te uvjete za upis studenata u sljedeći semestar ili trimestar i uvjeti za upis pojedinog predmeta ili skupine predmeta

The organization and implementation of the postgraduate university study is described in detail in the *Rules for the Implementation of Postgraduate University Studies*.

The postgraduate university study is organized as a three-year study (6 terms).

The curriculum of the doctoral study includes as follows:

- Curricular activities (minimum 50 ECTS credits);
- Extracurricular activities (Table 4.2.2) (minimum 60 ECTS credits);
- Registration and defence of doctoral theses (20 ECTS credits);
- Scientific research under supervision and with assistance of a supervisor or co-supervisor, which is to result in preparation and defence of a doctoral thesis (50 ECTS credits).

Postgraduate doctoral study "Food Technology and Nutrition" offers two majors:

1. Food Technology
2. Nutrition

The curriculum of both majors of postgraduate doctoral study "Food Technology and Nutrition" consists of two groups of courses:

- compulsory (required) and
- elective.

The classes are scheduled for the first two years of the study whereat the students are required to obtain at least 50 ECTS credits on the grounds of curricular activities and exams.

First year students are obliged to obtain not less than 20 and not more than 30 ECTS credits as well as to take up at least two compulsory courses.

Second year students shall attend the rest of the compulsory and/or elective courses.

The rest of the necessary ECTS credits (minimum 130 ECTS credits) can be obtained through compulsory and elective activities, defence of the doctoral thesis topic and preparation and defence of the doctoral thesis.

The deadline for full-time study completion is five years and the deadline for part-time study completion is ten years. Pursuant to a decision of the Expert Board of the study provider, the deadline for study completion can be extended on justified grounds by another two years.

Table 4.2.1. Students' liabilities per year

	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year
<b>Curricular activities</b>	<ul style="list-style-type: none"> <li>obtain min. 20 - max. 30 ECTS credits from compulsory and elective courses</li> <li>take up min. 2 compulsory courses</li> </ul>	<ul style="list-style-type: none"> <li>enrol in compulsory and/or elective courses (min. 20 - max. 30 ECTS credits)</li> </ul>	-
	obtain min. 50 ECTS credits on the ground of attending required and elective courses.		
<b>Extracurricular activities</b>	Bodovi iz izvannastavnih aktivnosti (Tablica 4.2.2.)		

The postgraduate university study is organized as a three-year study (Table 4.2.1.). Based on curricular activities (lectures, seminars and practices), the students shall obtain 50 ECTS credits and the rest of the necessary credits (130 ECTS credits) through extracurricular activities, registration and defence of the doctoral thesis (Table 4.2.2.).

First year student shall enrol in at least two required courses.

First year students are obliged to obtain not less than 20 and not more than 30 ECTS credits from required and elective courses.

Second year students shall attend the rest of the compulsory and/or elective courses.

The requirements for advancement to a subsequent year refer to completed liabilities in the current year of the study.

There are no requirements for enrolling and attending a particular course within the postgraduate study.

Registration and defence of the topic of the doctoral thesis (positive report of the Board for Evaluation of the Topic of the Doctoral Thesis) imply 20 ECTS credits.

Preparation and defence of the doctoral thesis entails 50 ECTS credits.

Table 4.2.2. Rating of student extracurricular activities

Redni br.	Aktivnost	Bodovi
1.	Trips abroad (months, days)	7
2.	Scientific papers belonging to category a1	15
3.	Scientific papers belonging to category a2	7
4.	Scientific papers belonging to category a3	4
5.	Scientific papers reviewed and published in the collection of works from a scientific meeting	2
6.	Science book and monograph	15
7.	Chapter in a book or monograph	10
8.	Lecture at an international scientific meeting	5
9.	Lecture at a domestic scientific meeting	3
10.	Participation in international scientific meetings	2

Redni br.	Aktivnost	Bodovi
11.	Participation in international scientific meetings	2
12.	Work on projects	5
13.	Awards*	1-5

\*Awards: international 5 ECTS, national 4 ECTS, organizations 3 ECTS, university 2 ECTS, faculty 1 ECTS.

Note: Until the defence of the doctoral thesis, the candidate shall obtain at least 30 ECTS credits on the grounds of publishing scientific papers belonging to categories a1, a2 and a3, out of which at least one paper shall be classified as a1\* (\*requirements for appointment in the field of biotechnical sciences).

#### 4.3. Courses that the student can choose from other study programs

Students who have selected courses from other study programs or postgraduate university studies (up to a maximum of 10 ECTS credits from the elective course group) will be scored after analyzing the credit system of the respective postgraduate study, or after examining the workload of the students related to that course.

#### 4.4. Study completed

The study is completed by fulfilling all prescribed conditions according to the study program, ie by obtaining at least 180 ECTS credits and by public defense of the doctoral dissertation.

The procedure for applying for, evaluating and defending a doctoral dissertation is defined in the Rules for the Performance of Postgraduate University Studies in Food Technology and Nutrition and the Rulebook on Postgraduate Studies at the Josip Juraj Strossmayer University of Osijek..

#### 4.5. Conditions for continuation of discontinued studies

In accordance with the Rulebook on Postgraduate Studies at the Josip Juraj Strossmayer University of Osijek:

- A student who has lost the status of a postgraduate student due to interruption of study may continue his / her studies if more than three years have elapsed since the day of study interruption and that the study program has not been significantly changed (more than 20%) by the one who enrolled.
- The application for the continuation of the study program shall be submitted to the Postgraduate Study Committee with the appropriate documentation prescribed by the study holder.
- The decision on the approval of continuation of the terminated study is made by the Postgraduate Study Committee, which contains the approval of the continuation of studies, recognition of exams with grades and ECTS credits during the study, and tuition fees determined according to the amount determined for the generation of students with whom the student continues his studies.



## **5. CONDITIONS OF STUDY CONDUCT**

### **5.1. Location of study programme**

Osijek, F. Kuhača 18 i 20; Trg Sv. Trojstva 3

### **5.2. Spatial facilities for teaching**

The existing premises and equipment of the Faculty of Food Technology of the Josip Juraj Strossmayer University of Osijek will be used for the study.

The partner institution's equipment and facilities outside the higher education system will also be used.