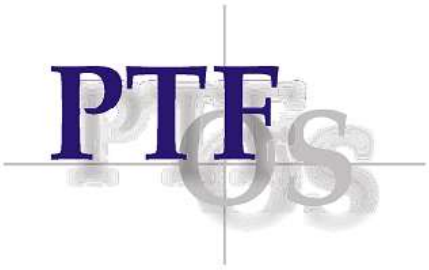
JOSIP JURAJ STROSSMAYERA UNIVERSITY OF OSIJEKU
FACULTY OF FOOD TECHNOLOGY OSIJEK

EFFECTIVE CURRICULUM
FOR THE ACADEMIC YEAR 2024/2025



UNIVERSITY UNDERGRADUATE STUDY PROGRAMME:

FOOD TECHNOLOGY

Osijek, June 2024

1st year of studies, academic year 2024/2025

SEMESTER	COURSE CODE	COURSE TITLE	L	S	LA	ECTS	COURSE LECTURER	COURSE ASSOCIATES
I	187660	General and Inorganic Chemistry	2	2	1	5.5	prof. dr. sc. M. Molnar	dr. sc. M. Komar M. Jakovljević, mag. nutr.
I	187661	Analytical Chemistry	2	0	1	3.5	prof. dr. sc. M. Molnar	M. Jakovljević, mag. nutr. dr. sc. M. Komar
I	94744	Mathematics I	3		2	6.5	doc. dr. sc. Lj. Primorac Gajčić	doc. dr. sc. S. Miodragović
I	20187	Technical Physics	3	1	1	6	doc. dr. sc. M. Poje - Sovilj	I. Štibi, prof. I. Miklavčić, prof.
I	94745	Biology	3		2	6.5	izv. prof. dr. sc. T. Marček	
I	94748 94749	English Language I German Language I	1		1	1	mr. sc. L. Budić izv. prof. dr. sc. A. Šarić	
I	74377	Physical Training and Health Education I			2	1	M. Oršolić, mag. cin.	
		SUBTOTAL:	**14**	**3**	**10**	**30**		
		TOTAL:	**27**					

SEMESTER	COURSE CODE	COURSE TITLE	L	S	LA	ECTS	COURSE LECTURER	COURSE ASSOCIATES
II	88256	General Microbiology	3		2	6	doc. dr. sc. T. Kovač	doc. dr. sc. M. Stjepanović
II	94750	Mathematics II	2		2	6	izv. prof. dr. sc. T. Marošević	
II	74379	Engineering Thermodynamics	3	1	1	6.5	prof. dr. sc. S. Budžaki	M. Ostojčić, mag. ing.
II	94752	Machine Elements	2		2	4.5	prof. dr. sc. D. Velić doc. dr. sc. K. Aladić	
II	85415	Ecology	2	1		3	prof. dr. sc. M. Habuda-Stanić	doc. dr. sc. M. Stjepanović
II	177710	Informatics	1		2	2	prof. dr. sc. J. Lukinac Čačić	
II	94748 94749	English Language I German Language I	1		1	1	mr. sc. L. Budić izv. prof. dr. sc. A. Šarić	
II	74377	Physical Training and Health Education I			2	1	M. Oršolić, mag. cin.	
		SUBTOTAL:	**15**	**2**	**11**	**30**		
		TOTAL:	**28**					

2nd year of studies, academic year 2024/2025

SEMESTER	COURSE CODE	COURSE TITLE	L	S	LA	ECTS	COURSE LECTURER	COURSE ASSOCIATES
III	88254	Physical Chemistry	3		2	6	prof. dr. sc. L. Jakobek Barron	doc. dr. sc. I. Tomac dr. sc. P. Matić
III	187662	Fundamentals of Technology f Milk Processing	2		2	4	izv. prof. dr. sc. M. Lučan Čolić	M. Antunović, mag. ing.
III	187663	Fundamentals of Technology of Carbohydrates	2		2	4	prof. dr. sc. D. Šubarić prof. dr. sc. J. Babić prof. dr. sc. Đ. Ačkar izv. prof. dr. sc. A. Jozinović	
III	88259	Food Microbiology	3		2	6	prof. dr. sc. H. Pavlović	
III	85057	Organic Chemistry	3	1		6	prof. dr. sc. D. Gašo-Sokač doc. dr. sc. V. Bušić	
III	85353	Organic Chemistry Practicum			3	3	prof. dr. sc. D. Gašo-Sokač doc. dr. sc. V. Bušić	
III	88257 88258	English Language II German Language II	1		1	1	mr. sc. L. Budić izv. prof. dr. sc. A. Šarić	
III	79477	Physical Training and Health Education II			2	1	M. Oršolić, mag. cin.	
		SUBTOTAL:	**14**	**1**	**14**	**31**		
		TOTAL:	**29**					

SEMESTER	COURSE CODE	COURSE TITLE	L	S	LA	ECTS	COURSE LECTURER	COURSE ASSOCIATES
IV	190906	Nutrition Science	2		1	4	prof. dr. sc. D. Čačić Kenjerić	L. Šoher, mag. nutr.
IV	79476	Biochemistry	4		2	6.5	prof. dr. sc. I. Strelec	
IV	88262	Water Technology and Wastewater Treatmentehnologija vode i obrada otpadnih voda	2		2	4	prof. dr. sc. M. Habuda-Stanić	doc. dr. sc. M. Stjepanović
IV	79479	Package and Food Packing	2		1	3	prof. dr. sc. L. Jakobek Barron	dr. sc. P. Matić
IV	79480	Transfer Phenomena	4		2	6.5	prof. dr. sc. M. Planinić prof. dr. sc. A. Bucić-Kojić	dr. sc. G. Šelo
IV	79481	Higiee and Sanitation	2	1	1	3	prof. dr. sc. Đ. Ačkar prof. dr. sc. D. Šubarić prof. dr. sc. J. Babić izv. prof. dr. sc. A. Jozinović	
IV	88257 88258	English Language II German Language II	1		1	1	mr. sc. L. Budić izv. prof. dr. sc. A. Šarić	
IV	79477	Physical Training and Health Education II			2	1	M. Oršolić, mag. cin.	
		SUBTOTAL:	**18**	**1**	**11**	**29**		
		TOTAL:	**30**					

3rd year of studies, academic year 2024/2025

SEMESTER	COURSE CODE	COURSE TITLE	L	S	LA	ECTS	COURSE LECTURER	COURSE ASSOCIATES
V	35433	Processes in Food Industry	3	1	2	7	prof. dr. sc. A. Pichler	dr. sc. I. Ivić
V	35435	Food Chemistry	3		1	5	prof. dr. sc. M. Kopjar	
V	187668	Food Quality Control	3		3	7	prof. dr. sc. I. Flanjak	doc. dr. sc. B. Bilić Rajs
V	35436	Process Measurements and Control	3		1	5	izv. prof. dr. sc. F. Čačić Kenjerić	
V	66871	Economics of Food Processing Industry	2	1		5	prof. dr. sc. D. Kovačević	
SUBTOTAL:			**14**	**2**	**7**	**29**		
TOTAL:			**23**					

SEMESTER	COURSE CODE	COURSE TITLE	L	S	LA	ECTS	COURSE LECTURER	COURSE ASSOCIATES
VI	187664	Fundamentals of Cereal Technology	2		2	4.5	prof. dr. sc. D. Koceva Komlenić prof. dr. sc. M. Jukić	
VI	187665	Fundamentals of Fruit and Vegetable Processing	2		2	4.5	prof. dr. sc. N. Nedić Tiban	
VI	187666	Fundamentals of Technology of Wines and Oils	2		2	4.5	prof. dr. sc. T. Moslavac prof. dr. sc. A. Pichler	dr. sc. I. Ivić
VI	187667	Fundamentals of Technology of Meat and Fish	2		2	4.5	prof. dr. sc. D. Kovačević prof. dr. sc. K. Mastanjević	
VI	***1442***	Elective Course I	2		2	3		
VI		Elective Course II	2	1	1	3		
VI	143776	Practical Training			8	4		
VI	63415	Final Thesis		4		3		
SUBTOTAL:			**13 (12)**	**5**	**17 (19)**	**31**		
TOTAL:			**35 (36)**					

Elective Courses *1442*

SEMESTER	COURSE CODE	COURSE TITLE	L	S	LA	ECTS	COURSE LECTURER	COURSE ASSOCIATES
VI	135767	Food Toxicology	2	1	1	3	prof. dr. sc. T. Klapec	
VI	85354	Functional Food and Supplements	2	1	1	3	prof. dr. sc. D. Čačić Kenjerić	prof. dr. sc. I. Banjari M. Cvijetić Stokanović, dipl. ing.
VI	85355	Basics of Biotechnology	2		2	3	prof. dr. sc. N. Velić	prof. dr. sc. V. Krstanović
VI	85356	Traditional Biotechnology	2		2	3	izv.prof. dr. sc. Kristina Mastanjević	prof. dr. sc. V. Krstanović

* One of elective courses student can choose from any study at University

Course description and learning outcomes of courses at the under graduate university study
Food Technology

Course title	**General and Inorganic Chemistry**		
Course code	187660	**Course status**	Compulsory
Study programme	Food Technology		
Semester	I		
Course lecturer	Maja Molnar, PhD, prof.		
Course associates	Mario Komar, PhD Martina Jakovljević, mag. nutr.		
Course content	Lectures: Measurements in chemistry, units of measure. Mixtures, chemical compounds and elements. The states of the matter (gases, liquids and solids). Gas laws. Periodic system. Electronic and quantum atom structure. Chemical bonds and molecule structure, intermolecular forces, complex compounds. Solutions and their characteristics. Types of chemical reactions adn their kinetics. Homogenous and heterogenous chemical equilibrium. Buffer, hydrolisis and ion-product constant. Basic hydrogen characteristics, noble gases, halogenic elements, nytrogen group, alcaline and alcaline earth metals. Labs: Basic laboratory operations and equipment. Laboratory precautions measures. Measurements of mass, volume and density, laboratory dishes and pipeting. Separations of heterogeneous and homogeneous mixtures. Dinamic chemical equilibrium. Hydrolisis. Amphoteric characteristics. Solubility in dependence on the temperature, solute and solvent structure. Amonium production and henrys law. Complex compounds.		
General and specific knowledge acquired in course (objective)	Student preparation for science courses as well as specific courses on general and inorganic chemistry. Except for theoretical knowledge a student comes to master chemistry calculations, and through laboratory practice acquires autonomy and skill within laboratory frame work.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	2	2	1
(total)	30	30	15
Examination method	There is both written and/or oral examination. Exam preconditions: completed labs, class attendance, written stoichiometry exam.		
Credits	5.5	**Language**	Croatian
Compulsory reading	1. I. Filipović, S. Lipanović, Opća i anorganska kemija , Školska knjiga, Zagreb, 1991. 2. M. Sikirica,Stehiometrija, Školska knjiga ,Zagreb, 1991. 3. B. Mayer, B. Bach-Dragutinović, Vježbe iz opće i anorganske kemije, Školska knjiga, Zagreb, 1988. 4. M. Molnar, Praktikum iz opće kemije		
Recommended reading	1. R. Chang, General chemistry, The essential concepts, McGraw Hill, 2006. 2. F. A. Cotton, G. Wilkinson, Basic Inorganic Chemistry, A Wiley-Interscience Publ. New York, 2000. 3. R. Kellner, J.M. Mermet, M. Otto, M. Valcarcel, Analytical Chemistry, John Wiley&Sons. Inc. ,New York, 2004.		

Course title	**Analytical Chemistry**		
Course code	187661	**Course status**	Compulsory
Study programme	Food Technology		
Semester	I		
Course lecturer	Maja Molnar, PhD, prof.		
Course associates	Mario Komar, PhD Martina Jakovljević, mag. nutr.		
Course content	**Lectures:** Introduction, overview of analytical methods. Errors in chemical analysis and statistical dana analysis. Preparation and analysis of real samples. Sample disolving and metods of reducing interferences. Qualitative methods of analysis. Gravimetric methods of analysis. Activity and activiti coefficients, ionic strength of solution. Titrimetric methods of analysis, general terms. Acid-base equilibrium and neutralisation. Oxidation/reduction reactions and titration. Heterogeneous equilibrium and equilibrium among solids and their ion sin solution. Precipitation titration. Spectroscopic analytical methods. Chromatographic analytical methods. **Laboratory excercises:** Preparation of standard solutions. Gravimetric determination of nickel. Determination of chloride by Mohr method. Neutralization titration: determination of sodium hydroxide. Complexometric titration of zinc. Determination of iron by Zimmermann-Reinhardt. Iodometric determination of copper. Potentiometric determination of acetylsalicylic acid. Colorimetric determination of copper.		
General and specific knowledge acquired in course (objective)	Gaining knowledge on analytical chemistry and its application. Preparation of students for future courses based on analytical chemistry principles. Through the laboratory excercises student gains experience in individual work and practical skills needed fot he experimental work.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	2	0	1
(total)	30	0	15
Examination method	Written and oral exam. Prerequisite for the exam are class attendance and completed laboratory excercises.		
Credits	3.5	**Language**	Croatian
Compulsory reading	1. D. A. Skoog, D.M. West, F.J. Holler, Osnove analitičke kemije, Školska knjiga, Zagreb, 1999. 2. Nj. Radić, L. Kukoč Modun, Uvod u analitičku kemiju, Školska knjiga, zagreb, 2016. 3. M. Sikirica,Stehiometrija, Školska knjiga ,Zagreb, 1991. 4. Z. Šoljić, Računanje u analitičkoj kemiji, FKIT, Zagreb, 1998. 5. J. Klenkar, Praktikum iz analitičke kemije		
Recommended reading	1. R. Kellner, J.M. Mermet, M. Otto, M. Valcarcel, Analytical Chemistry, John Wiley&Sons. Inc., New York, 2004.		

Course title	**Mathematics I**		
Course code	94744	**Course status**	Compulsory
Study programme	Food Technology		
Semester	I		
Course lecturer	Ljiljana Primorac Gajčić, PhD, assistant prof.		
Course associates	Suzana Miodragović, PhD, assistant prof.		
Course content	Introduction: Sets. Natural and integers numbers. The principle of mathematical induction. Rational and real numbers. Supremum and infimum of a set. Absolute value function. Complex numbers. Functions: Definition of function, representation and basic properties of function. Composition of functions and inverse function. Elementary functions. Definition of sequence and concept of limit of sequence. Some special sequences. Limit of function. Conntinuous functions. Differential calculus: Derivative of function. Differentation rules and derivatives of elementary functions. Differentation of an implicit function. Higher derivatives. Differentials. Theorems on derivative. L'Hospital's rule. Applications of the derivatives (tangent and normal, increase and decrease of a function, local extrema, convexity and concavity of a graph, points of inflection, sketching the graph of a function, curvature of a curve). Partial derivatives. Local extrema of function of several variables.		
General and specific knowledge acquired in course (objective)	Introduce students to the basic ideas and methods of differential calculus which serves as a basis for other courses. The basic items will be dealt with in an informal way and their usage and application will be illustrated. The practical work will enable students to master suitable techniques and to solve concrete problems.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	3		2
(total)	45		30
Examination method	Both lectures and labs are compulsory. The exam consists of written and oral exam and it is taken after the lectures and labs are finished. During the course tests will be given that can replace written and oral exam.		
Credits	6.5	**Language**	Croatian
Compulsory reading	1. D. Jukić, R. Scitovski, Matematika I, Prehrambeno tehnološki fakultet, Odjel za matematiku, Osijek 2000. 2. B. P. Demidović, Zadaci i riješeni primjeri iz više matematike s primjenom na tehničke nauke, Tehnička knjiga, Zagreb, 1986.		
Recommended reading	1. M. Crnjac, D. Jukić, R. Scitovski, Matematika, Osijek, 1994. 2. J. Pečarić i dr., Matematika za tehnološke fakultete, Zagreb, 1994. 3. S. Kurepa, Matematička analiza 1 i 2, Tehnička knjiga, Zagreb, 1972. 4. V. Devide i dr., Riješeni zadaci iz više matematike, Školska knjiga, Zagreb, 1979.		

Course title	**Technical physics**		
Course code	20187	**Course status**	Compulsory
Study programme	Food Technology		
Semester	I		
Course lecturer	Marina Poje-Sovilj, PhD, assist. prof.		
Course associates	Ivana Štibi, MSc Igor Miklavčić, MSc		
Course content	Lectures: Introduction and system of units. Vectors. Motion in one dimension. Motion in two dimensions. Newton`s law of motion. Applications of Newton`s laws of physics. Newton`s law of universal gravitation. Work, energy and power. Conservation of energy. Momentum and the motion of systems. Momentum conservation law. Collisions. Static equilibrium of a rigid body. Torque about fixed axis. Rotation and translation. Rotational kinetic energy. Moment of inertia. Angular momentum. Rotational dynamics. Rotational work for a rigid object. Conservation of angular momentum. Oscillations. Solids and fluids. Temperature and heat transfer. Kinetic theory of gases. First and second law of thermodynamics. Coulomb`s law and electric field. Gauss law. Electric potential. Capacitance. Properties of insulators. Current and resistance. Energy and current. Batteries and currents in electrolytes. Magnetic field. Sources of magnetic fields. Faraday`s law and induction. Magnetic fields in matter. Electromagnetic oscillations and AC circuits. Waves. Sound. Electromagnetic waves. Geometrical optics. Wave optics, interference, diffraction and polarization. Basic elements of relativity. Quantization of electromagnetic radiation and interaction with matter (photo effect). Elements of quantum physics of atoms and molecules. Lasers. New types of microscopes, atomic force microscope (AFM), scanning probe microscope (SPM). Some information in the field of new materials. Labs: General laboratory procedures. Experimental errors and data analysis. Measurements of length and time, mass, volume and density. Simple harmonic motion, mathematical pendulum, physical pendulum. Rotation of a rigid body about a fixed axis, moment of inertia. Mechanics of fluids, determination of surface tension, viscosity measurement with the falling-ball. Sound waves, determination of the velocity of sound using Kundt`s tube. Heat and thermodynamics, determination of specific heat capacity of solids, heat capacity of gases. Determination of resistance of different conductors by Wheatstone bridge ciruit, determination of the temperature coefficient of resistance. Geometric optics, determination of focus length of lenses. Physical optics, diffraction of light at a diffraction grating, measurement of wavelengths of light. Introduction to quantum physics, photoelectric effect.		
General and specific knowledge acquired in course (objective)	Fundamental knowledge in physics connected with classical technologies.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	3	1	1
(total)	45	15	15
Examination method	Cntinuous evaluation through the semester (2 partial exams).		
Credits	6	**Jezik**	hrvatski
Compulsory reading	N.Cindro, Fizika I, II, «Školska knjiga», Zagreb, 2000.		
Recommended reading	Frederick J. Keller, Edward W. Gettys, Malcolm J. Scove, PHYSICS, Mc Graw-Hill		

Course title	**Biology**		
Course code	94745	**Course status**	Compulsory
Study programme	Food Technology		
Semester	I		
Course lecturer	Tihana Marček, PhD, assoc. prof.		
Course associates			
Course content	**Lectures**: Chemical origin of life, from atom to macromolecules. Common features of plants and animals. Taxonomy and chemical composition of cell. Physical qualities of living matter, diffusion osmosis, turgor, plasmolysis, pinocytosis. Photosynthesis. Eucariotes. Genes and function of cell. Heredity and variability. Anatomy of plants: leading and basic tissues. Vegetative and generative organs of plants. Histology of animals: epithelial, binding, supportive, muscular, nervous tissues. Animal information and regulation systems: endocrine, nervous, immune. Metabolic and transport systems: digestive, respiratory, circulatory, reproduction, excretion, skeletal, muscular, dermal. **Excercises**: Microscope structure and microscoping technics. Prokaryote and eukaryote cell organisation. Ergastic formation in cell of plants. Physiological reactions in the cell. Anatomy of plants tissues and organs. Histological structure of animals tissues. Structure of animals information, regulation, metabolic and transport systems.		
General and specific knowledge acquired in course (objective)	Origin and evolution of life from atom to macromolecules, their structure, functions, their relation to surroundings and rules of their impact on single physiological processes and their impact through these processes on single organs, actually on the systems in whole. The aim of the course is for students to understand natural processes, especially the ones that can be controlled or changed, and the ones that influence plant and animal performances. To find new and better approach, actually methods that can be successfully used in food production or in prediction of ambient impact on changes in population.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	3		2
(total)	45		30
Examination method	Oral, or 4 writte evaluation durig semesteer		
Credits	6.5	**Jezik**	Croatian
Compulsory reading	T. Bačić: Morfologija i anatomija bilja. Pedagoški fakultet, Osijek 2003. L.C. Yunqueira, J. Carneiro, R.O. Kelley. Osnove histologije. Školska knjiga, Zagreb, 1999. B. Durst-Živković. Praktikum histologije. Školska knjiga, Zagreb, 1998. Cooper MG, Hausman RE: Stanica-molekularni pristup; 5. izdanje. Medicinska naklada Zagreb, 2010. Murray RK, Bender DA, Botham KM, Kennelly PJ, Rodwell VW, Weil PA: Harperova ilustrirana biokemija; 28. izdanje. Medicinska naklada Zagreb, 2011. Nikolić T: Sistemska botanika - raznolikost i evolucija biljnog svijeta. Sveučilište u Zagrebu, Alfa, 2013. Nikolić T: Praktikum iz sistemske botanike - raznolikost i evolucija biljnog svijeta. Sveučilište u Zagrebu, Alfa, 2013. Nikolić T: Morfologija biljaka-razvoj, građa i uloga biljnih tkiva, organa i organskih sustava. Sveučilište u Zagrebu, Alfa, 2017. Pevalek-Kozlina B: Fiziologija bilja. Profil International Zagreb, 2003.		
Recommended reading	D. Denffer, H. Ziegler: Botanika morfologija i fiziologija. Školska knjiga Zagreb 1991. S. Jelaska: Kultura biljnih stanica i tkiva. Školska knjiga , Zagreb 1995. T. Švob i sur.: Osnove opće i humane genetike. Školska knjiga, Zagreb 1991. Guyton AC, Hall JE: Medicinska fiziologija. 10. izdanje. Medicinska naklada Zagreb, 2003.		

Course title	**English Language I**		
Course code	94748	**Course status**	Compulsory
Study programme	Food Technology		
Semester	I + II		
Course lecturer	Lahorka Budić, MSc Antonija Šarić, PhD, assoc. prof.		
Course associates			
Course content	Students are gradually introduced to less complicated texts and specific lexis in the field of food technology related with their professional courses. The topics they deal with include: the atomic structure, physical and chemical changes, solutions and acids, equipment in a chemical laboratory, risks and protection in a lab, organic chemistry, ecology and green house effect. Students are trained to look for primary and secondary information and rhetorical functions of utterances, key words and topic sentences. The most frequent grammatical structures represented in professional texts are dealt with: tenses, passive voice, if clauses, modal verbs, word order.		
General and specific knowledge acquired in course (objective)	The course objective is to further develop all four language skills with a special focus on reading techniques so as to facilitate reading of professional journals. Communication skill is to be developed in pair and group work and specialized vocabulary is gradually introduced.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	1+1		1+1
(total)	30		30
Examination method	The exam is both written and oral taken at the end of the first and second semester, along with several tests throughout the year.		
Credits	1+1	**Language**	English, Croatian
Compulsory reading	1. L.Obad: *An English Language Workbook for Students of Food Technology 1*. Prehrambeno tehnološki fakultet, Osijek, 1997. 2. Ž.Bujas: *Veliki englesko-hrvatski rječnik,* Globus, Zagreb,1999.		
Recommended reading	1. R. Murphy: *English Grammar in Use*, Cambridge University Press,1985. 2. S.Greenal:*Reward Intermediate*, Heineman, 1995. 3. Ž.Bujas:*Veliki hrvatsko-engleski rječnik*, Globus, Zagreb, 1999.		

Course title	**German Language I**		
Course code	94749	**Course status**	Compulsory
Study programme	Food Technology		
Semester	I + II		
Course lecturer	Antonija Šarić, PhD, assoc. prof.		
Course associates	Students are introduced to texts from the fields of chemistry,ecology and nutrition (Laboratory, Production and Ecology, Atom Structure, Water, Elements and Compounds, Oxidation, Carbohydrates, Active Components). Students are taught to develop reading techniques, specialized lexis. They practise verb tenses, word formation. Students learn to comprehend and interprete the specialized text at various levels. They are introduced to speciific features of German language via professional texts. Students are actively involved in exercises where they apply their skills and knowledge.		
General and specific knowledge acquired in course (objective)	The course objective is to master the basic vocabulary and specific grammatical structures to facilitate comprehension of a specialized text. Reading and writing skills are developed to enable text interpretation.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	1+1		1+1
(total)	30		30
Examination method	Written exam twice in semester and after the second semester both written and oral exams.		
Credits	1+1	**Language**	Croatian, German
Compulsory reading	S. Moro: *Deutsch in der Lebensmitteltechnologie*, Sveučilište J. J. Strossmayera u Osijeku, Prehrambeno tehnološki fakultet, Osijek, 1998. I. Medić: *Kleine deutsche Grammatik*, Školska knjiga, Zagreb, 1999. T. Marčetić: *Deutsche Grammatik im Ueberblick*, Školska knjiga, Zagreb, 1999. M. Uroić, A. Hurm: *Njemačko - hrvatski rječnik*, Školska knjiga, Zagreb 1994.		
Recommended reading	Z. Glovacki - Bernardi: *Osnove njemačke gramatike*, Školska knjiga, Zagreb, 1999. B. Jakić, A. Hurm: *Hrvatsko - njemački rječnik*, Školska knjiga, Zagreb, 1991.		

<table>
<tr><td>Course title</td><td colspan="3">Physical training and health education I</td></tr>
<tr><td>Course code</td><td>74377</td><td>Course status</td><td>Compulsory</td></tr>
<tr><td>Study programme</td><td colspan="3">Food Technology</td></tr>
<tr><td>Semester</td><td colspan="3">I + II</td></tr>
<tr><td>Course lecturer</td><td colspan="3">Mario Oršolić, MSc</td></tr>
<tr><td>ECTS credits</td><td colspan="3">1+1</td></tr>
<tr><td>Course content</td><td colspan="3">Students are divided in groups of 30 to 40. We divide them according to the number of enrolled students in two female groups and one male group. In each semester students attend 30 classes, which is alltogether 60 classes throughout the whole academic year. The classes take place in the sports hall of Medical School during the winter and summer semester up to the 1st of May. Then we move to the rowing club «Iktus» court and run along the coast of Drava. Students are active in sports in the 1st Croatian ligue are exempt from the classes after bringing the certificate of membership. In the sports hall classes are based on volleyball, basketball and indoor football. Everyone who wants, can also go to the swimming pool, visits are organized 3-4 times in a semester. Our aim is to train non-swimmers (if there are any), and then exercise swimming techniques.
<table>
<tr><th>Month</th><th></th><th>Hours</th></tr>
<tr><td>X.</td><td>-general physical preparations (Swedish ladder and benches, running)
-running(short sections),stretching, forming and strengthening exercises
-running (short sections 10-15 m), forming, strengthening and stretching exercises,sport game volleyball, elements of «hammer» technique and serving</td><td>4
2
2</td></tr>
<tr><td>XI.</td><td>- running(short sections to 20 m), forming, stretching and strengthening exercise, volleyball serving and smatching
- running in intervals 10x15 m, stretching, volleyball (game of 2 sets), male group: football tournament</td><td>4
4</td></tr>
<tr><td>XII.</td><td>-«catch the ball» game, stretching and strengthening(Swedish ladder)
-volleyball(game of 2 sets), male group: basketball of indoor football
-table tenis for those who dont play volleyball
-strengthening exercises whit skipping rope</td><td>6</td></tr>
<tr><td>I.</td><td>- specific physical preparation for volleyball
- running in intervals 10x20 m, stretching and strengthening on banches
- volleyball (game of 2 sets), football for the male group, table tenis and skipping ropes</td><td>2
6</td></tr>
<tr><td>III.</td><td>- general physical preparation, catch the ball,running (mixed)
- catch the ball,stretching, forming exercises, strengthening of arms, legs and the shoulder area
- volleyball tournament, male group indoor football and basketball</td><td>2
6</td></tr>
<tr><td>IV.</td><td>- running-intervals, forming, strengthrning and stretching exercise
- volleyball tournament
- male group: choice between basketball, volleyball and indoor football
- table tenis, single and pairs</td><td>8</td></tr>
<tr><td>V.</td><td>-rowing club «Iktus» court: running along the coast of Drava
- running in place whit leaps and stretching
- running in intervals 1500 m,
- volleyball in female group
- indoor football, male group</td><td>8</td></tr>
<tr><td>VI.</td><td>- running(long sections) 2,5 km, stretching
- indoor football for man, game 2x20 minutes</td><td>6</td></tr>
</table>
</td></tr>
</table>

Course title	**General Microbiology**		
Course code	88256	**Course status**	Compulsory
Study programme	Food Technology		
Semester	II		
Course lecturer	Tihomir Kovač, PhD, assist. prof.		
Course associates			
Course content	**Lectures:** Fundamental microbiology concepts. Shapes, morphology and microbial reproduction. Life functions of microorganisms. Nutrition and microbial specialization of food selction. Energy supplies of microbial cell. Biosynthesis and microbial cell growth. Metabolic pathways of carbohydrates, lipids and proteins. Microbial cell products in aerobic and anaerobic conditions. Environmental influence on microbial growth and reproduction. Microbial classification. **Laboratory excercises:** Laboratory accessories and microscope. Sterilization and sterilization equipment. Nutrition media and cultivation of microorganisms. General characteristic and representatives of molds, yeasts and actinomycetes. Isolating pure cultures of microorganisms. Determination of bacteria, yeasts and moulds.		
General and specific knowledge acquired in course (objective)	The course introduces students to morphology, ecology, microbial metabolism, classification, and microbial cell products in aerobic and anaerobic conditions.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	3		2
(total)	45		30
Examination method	oral plus two written (mid-term and final) exams		
Credits	6	**Language**	Croatian
Compulsory reading	1. S. Duraković: *Opća mikrobiologija*. Prehrambeno tehnološki inženjering, Zagreb, 1996. 2. S. Duraković, S. Redžepović: *Uvod u opću mikrobiologiju*, knjiga prva. Kugler, Zagreb, 2002. 3. S. Duraković, L. Duraković: *Priručnik* za *rad* u *mikrobiološkom laboratoriju*, I.dio-knjiga prva.Durieux, Zagreb, 1997. 4. S. Duraković, L. Duraković: *Priručnik za rad u mikrobiološkom laboratoriju* I. dio-knjiga druga .Durieux, Zagreb, 1997.		
Recommended reading	1. S. Duraković, L. Duraković: *Specijalna mikrobiologija*. Durieux, Zagreb, 2000. 2. S.Duraković: *Primjenjena mikrobiologija*. Prehrambeno tehnološki inženjering, Zagreb, 1996.		

Course title	**Mathematics II**		
Course code	94750	**Course status**	Compulsory
Study programme	Food Technology		
Semester	II		
Course lecturer	Tomislav Marošević, PhD, assoc. prof.		
Course associates			
Course content	Integral calculus: Definition and basic properties of the definite integral. Mean value theorem of integral calculus. Newton – Leibniz formula. The indefinite integral. Methods of integration (integration by parts, integration by substitution). Basic techniques of integration. Applications of integral calculus (area, solid of rotation, rectification, technical). Improper integrals. Ordinary differential equations: General and particular solution. First-order differential equations (variables-separable, homogeneous, first-order linear, Bernoulli and Riccati differential equation). Linear differential equations of the second order. Linear algebra: Vectors and vector algebra. Vector spaces. Linear dependence/independence of vectors. Basis. Decomposition of vector into components. Scalar product. Vector product of two vector. Scalar triple product. Matrices. Operations with matrices. Rank of matrices. Regular and inverse matrix. Determinants. Systems of linear equations. Gaussian algorithm. Solvability of systems of equations. Cramer's rule.		
General and specific knowledge acquired in course (objective)	Introduce students to the basic ideas and methods of integral calculus,theories of differential equation and linear algebra which serve as a basis for other courses. Ther basic terms will be dealt with during lectures in an informal way and their usage and application will be illustrated. During the practical work students will master certain techniques and they will be enabled to solve concrete problems.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	2		2
(total)	30		30
Examination method	Both lectures and labs are compulsory. The exam consists of written and oral exam and it is taken after the lectures and labs are finished. During the course tests will be given that can replace written and oral exam.		
Credits	6	**Language**	Croatian
Compulsory reading	1. D. Jukić, R. Scitovski, Matematika I, Prehrambeno tehnološki fakultet, Odjel za matematiku, Osijek 2000. 2. B. P. Demidović, Zadaci i riješeni primjeri iz više matematike s primjenom na tehničke nauke, Tehnička knjiga, Zagreb, 1986.		
Recommended reading	1. M. Crnjac, D. Jukić, R. Scitovski, Matematika, Osijek, 1994. 2. J. Pečarić i dr., Matematika za tehnološke fakultete, Zagreb, 1994. 3. S. Kurepa, Matematička analiza 1 i 2, Tehnička knjiga, Zagreb, 1972. 4. V. Devide i dr., Riješeni zadaci iz više matematike, Školska knjiga, Zagreb, 1979.		

Course title	**Engineering Thermodynamics**		
Course code	74379	**Course status**	Compulsory
Study programme	Food Technology		
Semester	II		
Course lecturer	Sandra Budžaki, PhD, prof.		
Course associates	Marta Ostojčić, mag. ing		
Course content	**Lectures:** Basic concepts of thermodynamics and definitions. Thermodynamic and energy properties of state. Ideal gas. Ideal gas laws. The first law of thermodynamics. Investigation of basic thermodynamic processes. The isochoric process, the isobaric process, the isothermal process, the adiabatic process and the polytrophic process. Thermodynamic properties of real gasses and liquids. Compression and expansion processes. The Second law of Thermodynamics. Cycles. Concept of thermal efficiency. Cycle of internal and external combustion engines. Cycle of steam power plants. Cycles of refrigerating units. Cycles of liquefaction of gasses Thermodynamic properties of humid air. **Labs:** Analyse of numerical examples, which are compatibility with theoretical programme. Engineering calculation of processes, appliances and production facilities.		
General and specific knowledge acquired in course (objective)	The course Engineering Thermodynamics of the undergraduate study covers the fundamentals of the general thermodynamics principles and their engineering application. The aim is to offer the students a wide knowledge of the fundamental principles coordinated with their application what will be helpful to them in further study as well as in their work.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	3	1	1
(total)	45	15	15
Examination method	Written and/or oral exam. Written completion proof at least two times per semester.		
Credits	6.5	**Language**	Croatian
Compulsory reading	1. R. Budin, A. Mihelić – Bogdanić: *Osnove tehničke termodinamike*. Školska knjiga, Zagreb, 1990. 2. E. Hnatko: *Osnove termodinamike i termotehnike*. Strojarski fakultet, Slavonski Brod, 1995. 3. F. Bošnjaković: *Nauka o toplini I i II dio*. Tehnička termodinamika, Zagreb, 1990.		
Recommended reading	1. I. Galović: *Termodinamika I i II dio.* Školska knjiga, Zagreb, 2003. A.Y. 2. Cengel, M.A. Boles: *Thermodynamics: An Engineering Approach*. McGraw-Hill, Inc., 1998.		

Course title	**Machine Elements**		
Course code	94752	**Course status**	Compulsory
Study programme	Food Technology		
Semester	II		
Course lecturer	Darko Velić, PhD, prof. Krunoslav Aladić, PhD, assist. prof.		
Course associates			
Course content	Material structure, material forms and choices, characteristics. Materials mechanic form, plastics, creeping, exertion, fracture, toil. Heating and surface processing, calcinations, cementation process, nitration, chemical erosion, welding, forms and procedures. Machine elements, bolts, nuts, wedges, springs, shafts, spindles, bearings, coupling, transmitting mechanism of power, belted, chain transmitting, gearing. Analyse, dimensioning and principles of plaints, cylinder walls, cylinders, pipes, pipe-arc, flanges, gland, compression pots and, pillar. Transports devices , pipelines, armatures, pumps, fan, compressors, batching, transporters and elevators. Heating plans.		
General and specific knowledge acquired in course (objective)	During the course students acquire general knowledge of machine elements systems, until the special knowledge of norms and standards is used in designing technological operations in food industry.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	2		2
(total)	45		30
Examination method	Course is successfully resolved trough two preliminary exams during presentations or in the end of presentation by written and oral exam		
Credits	4,5	**Language**	Croatian
Compulsory reading	K.H.Decker, Elementi strojeva, Tehnička knjiga, Zagreb 2003.		
Recommended reading	Tehnička enciklopedija: HLZ-Zagreb, Zagreb 1993.		

Course title	**Ecology**			
Course code	85415	**Course status**	Compulsory	
Study programme	Food Technology			
Semester	II			
Course lecturer	Mirna Habuda-Stanić, PhD, prof.			
Course associates				
Course content	Basic terms of pollution and environmental protection. Basic ecological terms. Human population and food. Genetic modified organisms. Energy and environment. Ecology efficiency. Raw materials and solid waste. Chemicals and the biosphere. Air protection from pollution. Air pollution from stationary sources. Air pollution from mobile sources. Water pollution by urban wastewater. Noise as environmental pollution. Radioactive contamination and decontamination of living environmental. Paper and cardboard recycling. Organic waste recycling. Metallic waste recycling. Rubber and plastic recycling. International and national regulative in environmental protection. Development and environment. Determination of basic parameters of ecosystem on the field. Visit to solid waste dump. Visit to water-supply company. Visit to industrial plants for wastewater purification. Visit to paper recycling plant. Visit to plastic packing recycling plant.			
General and specific knowledge acquired in course (objective)	Familiarizing with composition and ecological processes in atmosphere, lithosphere and hydrosphere. Understanding the effect of different types of polluting the environment and human health. Familiarizing with processes in environment protection. Environmental protection and legislative.			
Teaching method	**Lectures**	**Seminars**	**Labs**	
(hrs/week)	2	1		
(total)	30	15		
Examination method	Oral examination. Two written completion proof through semester			
Credits	3	**Language**	Croatian	
Compulsory reading	1. H.F.Lund,: *Industrial Pollution Control Handbook*, McGraw-Hill, New York.1971. 2. R.Klepac: *Osnove ekologije*, JUMENA, Zagreb, 1988. 3. V. Glavač,: *Uvod u globalnu ekologiju*, MZOPU, Zagreb, 1999. 4. *Zakon o zaštiti okoliša*, Službeni list RH 82/94, NN. 5. D. Tuhtar: *Zagađenje zraka i vode*, Svjetlost, Sarajevo, 1990.			
Recommended reading	M.L.Davis, D.A. Cornwell, *Introduction to Environmental Engineering*, McGraw Hill, New York, 1998.			

Course title	**Informatics**		
Course code	177710	**Course status**	Compulsory
Study programme	Food Technology		
Semester	II		
Course lecturer	Jasmina Lukinac Čačić, PhD, prof.		
Course associates			
Course content	Information technology and digital society. Computing system. Data and information. Hardware. Software. People. Organization. Coomunication. Algorythm and computor programming. Model of computing system. Working memory. Equipment or data storing. Data structure. Physical and logical data organization. Operational systems. Communication and computor network. Role and tasks of information systems. Management of information systems Data mining and storing. Internet and e-business.		
General and specific knowledge acquired in course (objective)	To offer students basic knowledge of information technology and to master the basic skills in using computors with an aim of acquiring specialized knowledge necessary for management of business information. Specific competencies are developed through seminar papers and special assignments according to students' interests.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	1		2
(total)	15		30
Examination method	Continuous knowledge check 2(2 written exams) and final oral exam.		
Credits	2	**Language**	Croatian
Compulsory reading	Čerić, V., Varga, M., Informacijska tehnologija u poslovanju, Element, Zagreb, 2004. Novak, N.: Poseban studentski priručnik o ICT; Zagreb, Osijek, 2001.		
Recommended reading	Gupta, U., Information Systems, Success in the 21st century, Prentice Hall, Upper Saddle River, NJ, 2000. Hinkle, D., Marple, M., Stewart, K., MS Office XP Suite: A Comprehensive Approach, Student Edition, Glencoe/McGraw-Hill, 2002.		

Course title	**Physical Chemistry**		
Course code	88254	**Course status**	Compulsory
Study programme	Food Technology		
Semester	III		
Course lecturer	Lidija Jakobek Barron, PhD, prof.		
Course associates	Ivana Tomac, PhD, assist. prof. Petra Krivak, PhD		
Course content	**Lectures:** Perfect and real gases. Basic concepts of chemical thermodynamics (internal energy, enthalpy, entropy, free internal energy, free enthalpy, chemical potential). Basic laws of chemical thermodynamics (the zeroth, the first, the second and the third law of thermodynamics). Phase equilibriums and phase transitions. Colligative properties of solutions. The depression of freezing point, the elevation of boiling point, osmosis. Phase boundary equilibriums. Adsorption. The kinetics of physical processes. Viscosity. Electrolyte solutions and their properties. Kinetics and mechanisms of chemical reactions. Colloid systems. Gels, emulsions, foams. Structure and stability of colloid systems. Food-colloid systems and their properties. **Laboratory excercises:** Distillation. Adsorption. Viscosity. Chemical kinetics. Conductometry. Potentiometry. Colorimetry. Preparation, precipitation and properties of colloid solutions.		
General and specific knowledge acquired in course (objective)	**Basic knowledge from the field of chemical thermodynamics and regarding processes which take place in solutions, colloid systems and on the phase boundary. The mentioned concepts represent the basis needed for further comprehension and study of the courses of food technology, food engineering and process engineering.**		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	3		2
(total)	45		30
Examination method	Oral or two written exams during the semester.		
Credits	6	**Language**	Croatian
Compulsory reading	1. R. Brdička: *Osnove fizikalne kemije*. Školska knjiga, Zagreb, 1969. 2. P.W. Atkins, J. de Paula: *Atkins`s Physical Chemistry, Seventh Edition*. Oxford University Press, Oxford, 2002. 3. P.W. Atkins, C.A. Trapp, M.P. Cady, C.J. Giunta: *Student`s solutions manual to accompany Atkins`s Physical Chemistry, Seventh Edition*. Oxford University Press, Oxford, 2002. 4. M. Šeruga: *Laboratorijske vježbe iz fizikalne kemije*. Osijek, 1988.		
Recommended reading	1. I. Mekjavić: *Fizikalna kemija 1*. Školska knjiga, Zagreb, 1996. 2. I. Mekjavić: *Fizikalna kemija 2*. Golden marketing, Zagreb, 1999.		

Course title	**Fundamentals of Technology of Milk Processing**			
Course code	187662	**Course status**	Compulsory	
Study programme	Food Technology (Undergraduate study programme)			
Semester	III.			
Course lecturer	Mirela Lučan Čolić, PhD, assoc. prof.			
Course associates	Martina Antunović, BSc			
Course content	**Lectures:** Milk, production, factors affecting milk quantity and composition. Milking and transportation to processing. Milk composition, basic ingredients and importance in processing. Nutritional value of milk. Eggs, chemical composition, species, quality, application in the food industry. Honey, physicochemical properties, types, applications in the food industry. Primary milk treatment. Drinking milk. Fermented milk. Microbial cultures in dairy production. Cheese. Powdered milk. Ice cream.			
General and specific knowledge acquired in course (objective)	To understand the basics of the chemical structure, composition and nutritional properties of raw milk is essential for the proper selection of technological operations and processes that will ensure minimum processing, preservation of natural properties and health of milk and dairy products (in accordance with market trends and consumer requirements).			
Teaching method	**Lectures**	**Seminars**	**Exercises**	
(hrs/week)	2		2	
(total)	30		30	
Examination method	Exam 1: multiple choice questionnaires, short-answer questions; Exam 2: oral examination; Final grade is the average of two grades.			
Credits	4	**Language**	Croatian	
Compulsory reading	1. S. Miletić: *Mlijeko i mliječni proizvodi*. Hrvatsko mljekarsko društvo, Zagreb, 1994. 2. J. Havranek, V. Rupić: *Mlijeko od farme do mljekare*. Hrvatska mljekarska udruga, Zagreb, 2003. 3. Lj. Tratnik, R. Božanić: *Mlijeko i mliječni proizvodi.* Hrvatska mljekarska Udruga, Zagreb, 2012.			
Recommended reading	1. Lj. Tratnik: *Mlijeko – tehnologija, biokemija i mikrobiologija*. Hrvatska mljekarska udruga, Zagreb, 1998. 2. D. Sabadoš: *Kontrola i ocjenjivanje kakvoće mlijeka i mliječnih proizvoda*. Hrvatsko mljekarsko društvo, Zagreb, 1996.			

Course title	**Fundamentals of Technology of Carbohydrates**		
Course code	187663	**Course status**	Compulsory
Study programme	Food Technology (Undergraduate study programme)		
Semester	III		
Course lecturer	Drago Šubarić, PhD, full professor Jurislav Babić, PhD, full professor Đurđica Ačkar, PhD, assoc. professor Antun Jozinović, PhD, assoc. professor		
Course associates			
Course content	**Lectures:** Physical and chemical changes in raw materials of plant origin (sugar beet, cane, coffee, cocoa) and ingredients with an emphasis on factors affecting the quality of final food products and the importance of individual components in the technological quality assessment. Botanical and technological classification. The most important species and varieties. Basic storage conditions. Harvesting and storage conditions for use in the fresh state and / or processing. Fundamentals of starch technology. Corn starch production. Production and application of starch hydrolysates. Production of modified starches. By-products of the corn starch industry. Production of starch from potatoes and wheat. Sugar properties. Sugar production from sugar beet. Sugar industry by-products. Fundamentals of confectionery and related technology. Extrusion process and products. **Exercises:** Selected laboratory exercises (analyzes). Physico-chemical testing of raw materials and finished products. Sugar quality analysis. Production of modified starches. Industrial exercises.		
General and specific knowledge acquired in course (objective)	Chemical composition of raw materials with emphasis on the most important ingredients important for processing into final products. Knowing the chemical composition and nutritional values necessary for proper selection mode processing student acquires knowledge about the importance of each component in the evaluation of technological quality. Students acquire basic knowledge in the basics of starch technology, starch hydrolysates and modified starches, the basics of sucrose production from sugar beet and the basics of confectionery technology.		
Teaching method	**Lectures**	**Seminars**	**Exercises**
(hrs/week)	2		2
(total)	30		30
Examination method	The exam is taken in writing and orally at the end of semester or in form of two written (partial) exams during the semester.		
Credits	4	**Language**	Croatian
Compulsory reading	1. J. Babić, D. Šubarić, Đ. Ačkar (2011.): Tehnologija šećera (interna skripta). Prehrambeno tehnološki fakultet Sveučilišta Josipa Jurja Strossmayer-a u Osijeku. 2. J. Babić, D. Šubarić, Đ. Ačkar (2012.): Tehnologija škroba (interna skripta). Prehrambeno tehnološki fakultet Sveučilišta Josipa Jurja Strossmayer-a u Osijeku. 3. L. Goldoni (2004.): Tehnologija konditorskih proizvoda: kakao i čokolada. Kugler, Zagreb. 4. L. Goldoni (2004.): Tehnologija konditorskih proizvoda: bomboni. Kugler, Zagreb. 5. P. W. Van der Poel, H. Schiweck, T. Schwartz: Sugar Technology. Verlag Dr. Albert Bartens KG-Berlin, 1998.		

	6. R. L. Whistler, J. N. BeMiller, E. F. Paschall (1984): Starch, Chemistry and technology. Academic press, Orlando, SAD.
Recommended reading	1. R.H. Walter: Polysaccharide association structures in food, Marcel Dekker, INC, New York, Basel, Hong Kong, 1998.

Course title	**Food Microbiology**			
Course code	88259	**Course status**	Compulsory	
Study programme	Food Technology			
Semester	III			
Course lecturer	Hrvoje Pavlović, PhD, prof.			
Course associates				
Course content	**Lectures:** Application of microbial cultures in food industry and elsewhere. Food contamination during manufacturing process. Spoilage microorganisms of cereals, flour, bread and pasta, vegetables and fruit,milk and dairy products, meat and meat products, fish and fish products, heat preserved meat products, fruit and vegetables etc. in hermeticly seald packing. Microorganisms in spices and other additives used in food industry. Microorganisms in air and water. Food contamination of pathogenic microorganisms. Hazard analysis and critical control points. Prevention of growth and destruction of microorganisms in food. Regulations on microbial food safety. **Laboratory excercises:** Microbiological control of some food, air and water. Isolation and identification of some pathogenic microorganisms. Hygiene control of food industry processing units.			
General and specific knowledge acquired in course (objective)	The course introduces students to food contamination during manufacturing process, prevention of growth and destruction of microorganisms found in food, and application of microbial cultures in food industry and elsewhere.			
Teaching method	**Lectures**	**Seminars**	**Labs**	
(hrs/week)	3		2	
(total)	45		30	
Examination method	Oral, plus two written (mid. term and final) exams			
Credits	6	**Language**	Croatian	
Compulsory reading	1. S. Duraković, F. Delaš, B. Stilinović, L. Duraković: *Moderna mikrobiologija namirnica*-knjiga prva. Kugler, Zagreb, 2002. 2. S. Duraković, F. Delaš, L. Duraković: *Moderna mikrobiologija namirnica*-knjiga druga. Kugler, Zagreb, 2002. 3. S. Duraković: *Primjenjena mikrobiologija*. Prehrambeno tehnološki inženjering, Zagreb, 1996. 4. S.Kalenić, E. Mlinarić-Missoni: *Medicinska bakteriologija i mikologija*. Prehrambeno tehnološki inženjering, Zagreb, 1995. 5. G.J. Banwart:*Basic Food Microbiolgy*.New York,1989.			
Recommended reading	1. S. Duraković, L.Duraković:*Mikrobiologija namirnica osnove i dostignuća*-knjiga prva.Kugler, Zagreb, 2001. 2. S. Duraković, L. Duraković:*Mikrobiologija namirnica osnove i dostignuća*-knjiga druga.Kugler, Zagreb, 2001.			

Course title	**Organic Chemistry**		
Course code	85057	**Course status**	Compulsory
Study programme	Food Technology		
Semester	III		
Course lecturer	Dajana Gašo-Sokač, PhD, prof. Valentina Bušić, PhD, assist. prof.		
Course associates			
Course content	**Lectures:** Introduction. Stereochemistry of carbonil compounds. Alkanes. Alkenes. Alkynes. Benzene and reactions of arenes. Alkyl halides. Alcohols. Ethers. Carboxylic acids and carboxylic acid derivatives. Aldehydes and ketones. Amines. Phenols. Terpenes. Carbohydrates. Heterocyclic compounds. Polyfunctional carboxylic acids (dicarboxylic, oxy-, oxo-, amino-). Lipids. **Seminars:** Nomenclature, stereochemistry and stoichiometric examples of organic compounds. **Labs:** Introduction exercises (melting point, steam destilation, extraction with indifferent and reactive solvent, crystallization). Synthesis (esterification, reduction). Natural products isolation (isolation of pigments and chromatography, lactose, oleic acid, piperine).		
General and specific knowledge acquired in course (objective)	During this course student gets basic knowledge abouth the structure and reactivity of organic molecules, especialy abouth mechanism of the reactions and the stereochemistry. He also learns about organic compounds common to living systems and food.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	3	1	
(total)	45	15	
Examination method	Final exam is written and oral. During course student has 3 written tests that substitute a final exam.		
Credits	6	**Language**	Croatian
Compulsory reading	1. S. H. Pine: *Organska kemija*, Školska knjiga, Zagreb, 1994. 2. V. Rapić: *Postupci priprave i izolacije prirodnih spojeva*, Školska knjiga, Zagreb, 1994. 3. *Vodič kroz IUPAC-ovu nomenkalturu organskih spojeva*, preveli:Bregovec, Horvat, Majerski, Rapić, Školska knjiga , Zagreb, 2002. 4. V.Rapić: *Nomenklatura organskih spojeva*, Školska knjiga , Zagreb, 2004.		
Recommended reading	1. J. Clayden, N. Greeves, S. Warren and P. Wothers:*Organic Chemistry*, Oxford University Press, 2001. 2. F. A. Carey: *Organic Chemistry*, Mc Graw Hill 2000. 3. T. W. G. Solomons, C. B. Fryhle: *Organic Chemistry*, John Wiley&Sons, New York, 2000 4. D. E. Lewis: *Organic Chemistry a Modern Perspective,* Brown Publishers USA 1996		

Course title	**Organic Chemistry Practicum**			
Course code	85353	**Course status**	Compulsory	
Study programme	Food Technology			
Semester	III			
Course lecturer	Dajana Gašo-Sokač, PhD, prof. Valentina Bušić, PhD, assist. prof.			
Course associates				
Course content	**Introductory excercises** - melting point - steam destilation - extraction with indifferent and reactive solvent, - crystallization **Synthesis** - esterification - elecrtophylic aromatic supstitution - copulation **Natural products isolation** - isolation of pigments and chromatography - lactose isolation - oleic acid isolation - piperine isolation			
General and specific knowledge acquired in course (objective)	During this course student gets basic laboratory skills used in organic synthesis. He also gains skill in isolation techniques through the tasks on selected organic compound present in food.			
Teaching method	**Lectures**	**Seminars**	**Labs**	
(hrs/week)			3	
(total)			45	
Examination method	Entrance knowledge evaluation. 2 evaluations during the course or final exam. During the laboratory work students will also prepare lab reports.			
Credits	3	**Language**	Croatian	
Compulsory reading	1. S. H. Pine: *Organska kemija*, Školska knjiga, Zagreb, 1994. 2. V. Rapić: *Postupci priprave i izolacije prirodnih spojeva*, Školska knjiga, Zagreb, 1994. 3. Materijali objavljeni na web stranici PTF-a (autori: S. Kovač, D. Gašo-Sokač,V. Bušić)			
Recommended reading	1. S.Borčić, O. Kronja: *Praktikum preparativne organske kemije,* Školska knjiga, Zagreb, 1991. 2. Huenig, Maerkl, Sauer: *Integriertes Organisches Praktikum*, Verlag Chemie, Weinheim, New York 1979 3. Z. Kniewald i suradnici: *Priručnik za pripravu i izolaciju bioloških djelatnih supstancija,* Alfej Zagreb, 2000.			

Course title	**English Language II**		
Course code	88257	**Course status**	Compulsory
Study programme	Food Technology		
Semester	III + IV		
Course lecturer	Lahorka Budić, MSc Antonija Šarić, PhD, assoc. prof.		
Course associates			
Course content	In the course of the second year students deal with more complex texts related to their professional courses. The topics are the following: microbiology, microbes, structure and function of bacteria, microbes in food industry, viruses, biochemistry, proteins and carbohydrates, food quality control, influence of packaging on food, food analysis. Students are also taught to selectively search for information in various scientfic discourses so as to orally and individually expose certain topics which serve as an extension to already covered topics. The focus is on summary writing of specialized texts using all means for achieving text cohesion and coherence.		
General and specific knowledge acquired in course (objective)	The course objective is to continue developing all four language skills but the emphasis is on writing skills, comprehension and interpretation of more complex professional texts, detection of topic sentences and cohesive devices and expansion of specialized vocabulary.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	1+1		1+1
(total)	30		30
Examination method	The exam is both oral and written taken at the end of the third and fourth semester along with several tests during the academic year.		
Credits	1+1	**Language**	Croatian and English
Compulsory reading	1. L.Obad: *Radni materijali iz engleskog jezika za studente druge godine,* Prehrambeno tehnološki fakultet, Osijek, 1997. 2. Ž.Bujas:*Veliki englesko-hrvatski rječnik,* Globus, Zagreb, 1999.		
Recommended reading	1. S.Greenal: *Reward Upper-Intermediate*, Heinemann, 1997. 2. R.Murphy: *English Grammar in Use*, Cambridge University Press, 1985. 3. Ž.Bujas: *Veliki hrvatsko-engleski rječnik*, Globus, Zagreb, 1999.		

Course title	**German Language**		
Course code	88258	**Course status**	Compulsory
Study programme	Food Technology		
Semester	III + IV		
Course lecturer	Antonija Šarić, PhD, assoc. prof.		
Course associates			
Course content	Students are introduced to more complex texts in the fields of chemistry, ecology and diet to upgrade the specialized lexis (Diet habits, Milk, Food analysis, Environment preservation, Chemical processes and Waste waters, Water in industry, Organic chemistry, Proteins, Fats and carbohydrates). More grammatical structures are dealt with such as dependent clauses, passive voice that is practised in summary writing. Students are taught to use different reading techniques in text comprehension and interpretation, to select primary information, to pose questions at the sentence and text level.		
General and specific knowledge acquired in course (objective)	The course objective is to enable students to comprehend more complex texts in the fields of specialization due to reading techniques, to develop writing skills in summary writing as a form of text interpretation.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	1+1		1+1
(total)	30		30
Examination method	Written exam twice in semester and after the second semester both written and oral exams.		
Credits	1+1	**Language**	Croatian, German
Compulsory reading	S. Moro: *Radni materijal iz njemačkog jezika II*, Zbirka tekstova s razrađenim vježbama i rječnikom, Prehrambeno tehnološki fakultet Sveučilišta J. J. Strossmayer u Osijeku, 2004. I. Medić: *Kleine deutsche Grammatik*, Školska knjiga, Zagreb 1999. T. Marčetić: *Deutsche Grammatik im Ueberblick*, Školska knjiga, Zagreb, 1999. M. Uroić, A. Hurm:*Njemačko - hrvatski rječnik*, Školska knjiga, Zagreb, 1994.		
Recommended reading	Z. Glovacki -Bernardi:*Osnove njemačke gramatike*, Školska knjiga, Zagreb, 1996. B. Jakić, A. Hurm:*Hrvatsko - njemački rječnik*, Školska knjiga, Zagreb, 1991.		

<table>
<tr><td>Course title</td><td colspan="3">Physical Training and Health Education II</td></tr>
<tr><td>Course code</td><td>79477</td><td>Course status</td><td>Compulsory</td></tr>
<tr><td>Study programme</td><td colspan="3">Food Technology</td></tr>
<tr><td>Semester</td><td colspan="3">III i IV</td></tr>
<tr><td>Course lecturer</td><td colspan="3">Mario Oršolić, MSc</td></tr>
<tr><td>Course associates</td><td colspan="3"></td></tr>
<tr><td>Course content</td><td colspan="3">Students are divided in two groups, male and female. The classes are held at the Students Center Gym, winter and summer semester 2x30 classes. As in the first academic year, non obligatory visits to the swimming pool (3-4 times) are organized, and with the students of the second year 2-3 visits to the town skating-ring.

-warming-up activity, running in place, leaps, squatting, work in pairs, forming, stretching exercises, whit backgroung music(aerobic)

Working out at the Gym:
-getting familiar whit each device, way of using, setting up, porpose and all the accidents that might happen
- working on the device using 20% of the body weight, whit frequency of performance 10-30 x
- working on the device using 30% of the body weight, whit frequency 15x, and pause 10-15 min (two series)
- working on the device using 20% of the body weight, frequency 15x, on 18 work positions
- working on the device using 20% of the body weight whit time limitation of 20-30 sec
- individual work according to own wishes and needs

-in the summer semester, when the weather is nice, we spend last 15-20 minutes running longer sections(1000-1500 m), at the High School playground</td></tr>
<tr><td>General and specific knowledge acquired in course (objective)</td><td colspan="3">Students of the faculty are involved in sport competitions at the University level in the following disciplines: indoor football, volleyball (man and women), basketball (man), swimming (single and relay race, man and women), shooting (man and women), cross and for next year we are planning to start with rowing – the racing eight.
The gathering of students – sportsman is organized by The community of students – sportsman F.I.S.E.C. (Food industry students europian council Osijek), which involves the leaders of individual sections in such a way that students also take part in the organisation. F.I.S.E.C. is also for the most part a place at the faculty where students meet, where thay have their own computer room (phone: 031/224-352, fax 031/207-115, e-mail : crofisec@ptfos.hr). Every year at the end of May or the beginning of July, so called «Tehnologijada» take place competitions among students of Faculty of Food Technology of the Republic of Croatia. We regulary take part in these competiitions, which include: indoor football (man and women), basketball (man and women), volleyball, shooting, running 100 and 1000 m , swimming 50 m, and the scientific part.</td></tr>
<tr><td>Teaching method</td><td>Lectures</td><td>Seminars</td><td>Labs</td></tr>
<tr><td>(hrs/week)</td><td></td><td></td><td>2</td></tr>
<tr><td>(total)</td><td></td><td></td><td>30</td></tr>
</table>

Course title	**Nutritional Science**		
Course code	190906	**Course status**	Compulsory
Study programme	Food Technology		
Semester	IV		
Course lecturer	Daniela Čačić Kenjerić, PdD, full prof.		
Course associates	Lidija Šoher, MSc		
Course content	Essentials of gastrointestinal tract, food digestion, absorption and metabolism Energy requirements (basal metabolic needs, food intake effect, physical activity needs, age, climate) Nutrients (proteins, lipids, carbohydrates, vitamins, minerals, water) Foodstuffs of plant origin (cereals, fruits, vegetable) and animal origin (meat, fish, milk and eggs) Genetically modified foods Essentials of functional foods Essentials of meal planning Food–borne toxicants (biological, chemical and radioactive components) Nutrition quality and the state of nourishment		
General and specific knowledge acquired in course (objective)	Nutrition has progressed from the prevention of dietary deficiency to the promotion of a state of well-being and health and the reduction of the risk of disease. The Nutrition Science has to accept this challenge and through the education of nutritionists, food technologists, other experts, and even nation has to influence public health, and prevention of chronic, non-communicable diseases.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	3		
(total)	45		
Examination method	During the semester the students will be included in course through discussion and making seminars (the result of this work will influence in the final mark), and the exam will be oral.		
Credits	4	**Language**	Croatian
Compulsory reading	M.L. Mandić: *Znanost o prehrani*, Prehrambeno tehnološki fakultet, Osijek, 2003.		
Recommended reading	S. Rodwell Williams: *Essentials of Nutrition and Diet Therapy*, Mosby, St.Louis, 1999.		

Course title	**Biochemistry**		
Course code	79476	**Course status**	Compulsory
Study programme	Food Technology		
Semester	IV		
Course lecturer	Ivica Strelec, PhD, prof.		
Course associates			
Course content	**Lectures:** Introduction to biochemistry. Amino acids. Proteins: structure and function. Enzymes: active site. Kinetics. Inhibitors. Nucleotides. Nucleic acids: structure of DNA and RNA. DNA duplication. Protein biosynthesis. Polysaccharides: structure and role. Lipids: structure and role. Cell membranes. Energetics of cellular reactions. Metabolism. Glycolysis. Citric acid cycle. Respiration. ATP synthesis. Gluconeogenesis. Pentose-phosphate cycle. Glycogen metabolism. Degradation and synthesis of fatty acids. Photosynthesis and Calvin cycle. Urea cycle. **Seminars:** Problems and calculations on: ionisation of amino acids and proteins, enzyme kinetics, protein biosynthesis. **Laboratora excercises:** Protein assay. Enzyme activity and kinetics. Protein purification. Protein electrophoresis. Computer simulation of the protein purification process.		
General and specific knowledge acquired in course (objective)	Basic knowledge required for understanding microbiology, food science and food technologies. Basic skills in working with proteins and enzymes in a standard biochemical laboratory.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	4		2
(total)	60		30
Examination method	Written and oral, with two partial exams during the semester.		
Credits	6.5	**Language**	Croatian
Compulsory reading	Stryer L.: Biokemija, II izdanje (prijevod), Školska knjiga (1991)		
Recommended reading	Mathews, C.K. i Van Holde, K.E.: Biochemistry, 2. izdanje, Benjamin/Cummings Publishing (1996). Voet D.D. i Voet J.G.: Biochemistry, John Wiley & Sons (1995).		

Course title	**Water Technology and Wastewater Treatment**			
Course code	88262	**Course status**	Compulsory	
Study programme	Food Technology			
Semester	IV			
Course lecturer	Mirna Habuda-Stanić, PhD, prof. Marija Stjepanović, PhD, assoc. prof.			
Course associates				
Course content	Water quality. Physical indicators of water quality: temperature, odor and taste, color, turbidity, suspended solids, conductivity. Chemical indicators of water quality: total dissolved matters, acidity, alkalinity, water hardness, dissolved gases, organic matter, nutrients, metals, other chemical indicators. Biological indicators of water quality. Water classification. Technological water treatment: filtration, flocculation, iron and manganese removal, water disinfection. Ion exchange. Membrane processes. Technological shames: drinking water technology, food industrial water technology, cooling water, water boiler plant. Sources of water contamination: households, industry, rainfalls, cooling water. Pretreatment and primary treatment: sifting, fragmentation, equalization, precipitation. Secondary treatment: activated sludge, trickling filters, lagoons, anaerobic digestion. Tertiary treatment: physical, chemical, biological treatment. **Laboratory excercises:** Water analysis: pH value, conductivity, alkalinity, hardness, dissolved oxygen, chemical oxygen demand, biochemical oxygen demand, nitrogenous compounds, chlorides, sulfates, iron, arsenic. Hardness and carbon removal from water. Flocculation by JAR test.			
General and specific knowledge acquired in course (objective)	Make the students familiar with physical-chemical properties of natural waters, water quality for particular purposes, regulations as well as with contamination of water and wastewater treatment.			
Teaching method	**Lectures**	**Seminars**	**Labs**	
(hrs/week)	2		2	
(total)	45		15	
Examination method	Two written completion proof through semester, Written and oral examination.			
Credits	4	**Language**	Croatian	
Compulsory reading	1. AWWA: *Water Quality and treatment*, A Handbook of Community Water supplies; Fifth Edition by The American Water Works Association, 1999. 2. S.Tedeschi, *Zaštita voda*, Hrvatsko društvo građevinskih inženjera, Zagreb, 1997. 3. I.Gulić*: Kondicioniranje vode*, Hrvatski savez građevinskih inženjera, Zagreb, 2003. 4. *Standard Methods for the Examination of Water and Wastewater*, 20th Edition, American Public Health Association, 1999.			
Recommended reading	1. *Pravilnik o zdravstvenoj ispravnosti vode za pić*e, Narodne novine br. 182/2004. 2. M.Kuleš, M.Habuda-Stanić, *Analiza vode*, PTF, Osijek, 2000.			

Course title	**Package and Food Packaging**		
Course code	79479	**Course status**	Compulsory
Study programme	Food Technology		
Semester	IV		
Course lecturer	Lidija Jakobek Barron, PhD, prof.		
Course associates	Petra Matić, PhD		
Course content	**Lectures:** The role and importance of a package. Systematisation and function of packages. The elements important for creating of a package. Packaging materials: metals (tin-plate, aluminium, chromium coated steel, steel), glass, plastic packaging materials, laminated food packaging materials, paper, cardboard and paperboard, wood, textile. Biodegradable packaging materials. Possible shapes of a package. Packaging systems for a particular type of foodstuff. Interactions in a food-package-environment systems. Permeation and migration processes. New features in a packaging technology of food products. Active and intelligent packaging. Modified atmosphere packaging. Food packaging and environment. Ecologically acceptable package. Recycling of food packaging. Safety and legislative regulations related to the usage and application of a package in a food industry. **Laboratory excercises:** Determination of pH value of a paper package, Mass of a tin coating by gravimetric method (Clark's method), Porosity of laque on a metal package by a non-destructive method (method by Ettinger), Resistance of glass to acids and base, Global migration from a packaging material		
General and specific knowledge acquired in course (objective)	The aim of this study is to familiarize the students with packaging materials that are used in food industry together with packaging technology. Also students will learn about interactions in food-package-environment systems.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	2		1
(total)	30		15
Examination method	Written exam and/or 2 written exams during the semester.		
Credits	3	**Language**	Croatian
Compulsory reading	1. G. L. Robertson: *Food Packaging-Principles and practice*. Marcel Dekker, New York, 1993. 2. P. Ackerman, M. Jägerstad, T. Ohlsson*: Foods and Packaging Materials-Chemical Interactions*. The Royal Society of Chemistry, Cambridge, 1997. 3. R. Coles, D. McDowel, M. J. Kirwan: *Food Packaging Technology*. Blackwell Publishing, CRC Press, New York, 2003. 4. R. Ahvenainen: *Novel Food Packaging Techniques*. Woodhead Publishing, Cambridge, 2003.		
Recommended reading	1. N. Stričević: *Suvremena ambalaža 1*. Školska knjiga, Zagreb, 1982. 2. N. Stričević: *Suvremena ambalaža 2*. Školska knjiga, Zagreb, 1983.		

Course title	**Transport Phenomena**		
Course code	79480	**Course status**	Compulsory
Study programme	Food Technology		
Semester	IV		
Course lecturer	Mirela Planinić, PhD, prof. Ana Bucić-Kojić, PhD, prof.		
Course associates	Gordana Šelo, PhD		
Course content	**Lectures:** Physical basis. Newton's law of viscosity. General conservation law. Mass and energy transport mechanisms. Momentum transfer. Continuity equation. Bernoulli equation. Flow pattern and Reynolds number. Mechanical energy loss. Motion of fluid around the body. Flow in the mixing tank. Flow through the packed beds. Transport of liquids. Transport of gases. Transport of solids. Heat transfer. Heat transfer by conduction. Heat transfer by convection. Application the boundary layer theory for convection heat transfer analysis. Heat transfer in the mixer. Overall heat transfer. Heat transfer by radiation. Heat transfer equipment. Mass transfer. Mass transfer by diffusion. Mass transfer by convection (turbulent mass transfer). Application the boundary layer theory for convection mass transfer analysis. Analogy of momentum, heat and mass transfer. **Laboratory excercises:** Audio-practices – solution of the problems that related with transport phenomena; laboratory and industrial		
General and specific knowledge acquired in course (objective)	Transport phenomena are concerned with the study of momentum, heat and mass transfer with a unified approach to the transfer process. Knowledge of transfer process is fundamental for the understanding of process engineering and applied sciences.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	4		2
(total)	60		30
Examination method	Written, and oral if necessary. Parts of exam will be held during the semester. Each part of exam contains two teaching units.		
Credits	6.5	**Language**	Croatian
Compulsory reading	1. E. Sokele: *Transport fluida*. Interna skripta, Osijek, 1999. 2. E. Sokele: *Prijenos topline*. Interna skripta, Osijek, 1998. 3. S. Tomas: *Formule, dijagrami i tablice – Prijenos tvari i energije*. Interna skripta, Osijek, 1998. 4. S. Tomas, M. Planinić: *Prijenos tvari i energije - Mapa uređaja*. Interna skripta, Osijek, 1999. 5. S. Tomas, M. Planinić: *Prijenos tvari*. Interna skripta, Osijek, 2000. 6. K. Ražnjević: *Termodinamičke tablice*. Svjetlost, Sarajevo, 1989		
Recommended reading	1. R. S. Brodkey, H. C. Hershey: *Transport Phenomena*. McGraw-Hill, New York, 1988. 2. J. M. Coulson, et al.: *Chemical Engineering I, III, IV*. Pergamon Press, Oxford.		

	1999. 3. R. H. Perry, D. W. Green: *Perry's Chemical Engineer's Handbook*. 7nd Ed, McGraw-Hill, New York, 1997. 4. A. F. Mills: *Basic Heat & Mass Transfer*. 2nd ed., Prentice Hall, Upper Saddle River, New Jersey, 1999. 5. J. Welti-Chanes, J.F. Velez-Ruiz, G.V. Barbosa-Canovas: *Transport Phenomena in Food Processing.* CRC Press LLC, Boca Raton, London, New York, Washington D.C., 2003.

Course title	**Hygiene and Sanitation**		
Course code	79481	**Course status**	Compulsory
Study programme	Food Technology		
Semester	IV		
Course lecturer	Drago Šubarić, PhD, prof. Jurislav Babić, PhD, prof. Đurđica Ačkar, PhD, prof. Antun Jozinović, PhD, assoc. prof.		
Course associates			
Course content	**Lecures:** The basic principles of hygiene and sanitation in the food industry. Microorganisms. Sources of food and food plant contamination. Personal hygiene. Food poisoning types and causes. Cleaning compounds and sanitizers in a food plant, equipment cleaning protocol. Chemically food contaminants. Sanitation methods. Cleaning and sanitation systems. Waste disposal. Pest control (insects, rodents, birds). HAACP system (hazard analysis and critical control point). Good manufacturing practice, good hygiene practice, good laboratory practice. Law and regulations. **Laboratory excercises:** Field work will be related to specific industries: plant designing demands related to hygiene and sanitation, major pathogens micoorganisms, cleaning and sanitation compounds and equipment. HACCP system integration.		
General and specific knowledge acquired in course (objective)	The course is designed to give basic concepts of hygiene and sanitation in food production. This course also provides students with knowledge to produce safety food, taking into account: prevention of microbiological food contamination, appropriate cleaning principles together with proper use of cleaners, good manufacturing practice, cleaning process facilities, personal hygiene, sanitary food handling and HACCP system.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	2	1	1
(total)	30	15	15
Examination method	Oral or written examination of whole subject matter at the end of semester or in form of two oral exams during semester.		
Credits	3	**Language**	Croatian
Compulsory reading	1. N. G. Marriott: Essentials of food sanitation., International Thomson Publishing, 1997. 2. C. De W. Blackburn, P. J. McClure: Foodborne pathogens. Hazards, risk analysis and control. CRC Press, Boston, New York, Washington, 2002. 3. V. Turčić: HACCP i higijena namirnica. Zagreb, 2000.		
Recommended reading	1. S. Duraković: Primijenjena mikrobiologija. PTI Zagreb, 1996. 2. S. Duraković: Prehrambena mikrobiologija. Medicinska naklada Zagreb, 1991. 3. Duraković, L. Duraković: Mikrobiologija namirnica. Kugler Zagreb, 2001.		

Course title	**Processes in Food Industry**		
Course code	35433	**Course status**	Compulsory
Study programme	Food Technology		
Semester	V		
Course lecturer	Anita Pichler, PhD, prof.		
Course associates	Ivana Ivić, PhD		
Course content	**Lectures:** Terms definition of: food technology, food science, food engineering, unit processes and technological processes. Physical and thermophysical properties of food, different systems density, specific heat, latent heat, entalphy, heat conduct, heat diffusion, dielectric properties, viscosity properties, rheology principles. Fundamentals of food preservation processes; food deteriorations, principles of food preservation: pasteurization, blanching, thermic sterilization, cooling preservation and in controled atmosphere, freezing, preservation, preservation by aditives, biological preservation, ionizing radiation preservation, nonthermal methods of preservation, principles of liquid foods concentration processes, concentration by evaporation, freezing concentration. Theoretical basics of dehydration processes of food, process phases, water forms in food, water activity, isotherms sorption, changes during dehydration, stability of dehydrated food, ability of rehydration. Principles of membrane processes, reverse osmosis, nanofiltration, ultrafiltration and microfiltration. Extrusion fundamentals.		
General and specific knowledge acquired in course (objective)	The course is designed to give the basic knowledge of physical and thermophysical properties of food. The course also provides the general knowledge of food deterioration reasons, principles of food preservation and basic of membrane separation processes.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	3	1	2
(total)	45	15	30
Examination method	Written and oral examination of the whole subject matter at the end of semester or in the form of two written exams during semester and oral at the end of semester		
Credits	7	**Language**	Croatian
Compulsory reading	1. T. Lovrić: Procesi u prehrambenoj industriji s osnovama prehrambenog inženjerstva, Hinus, Zagreb 2003. 2. D. R. Heldman, R. W. Hartel: Principles of Food Processing, Chapmen and Hall, 1998. 3. J. G. Brennan, J. R. Butters, N. D. Cowell and A. E. V. Lilley: Food Engineering Operations, Third edition, Essevier applied science, 1990. 4. D. R. Heldman: Food Process Engineering, Westport, Connecticut, 1975.		
Recommended reading	1. G. V. Barbosa-Canovas, U. R. Pothakamury, E. Palon, B. G. Swanson: Nonthermal Preservation of Foods, Marcel Dekker, INC. 1998. 2. C. P. Mallett: Frozen Food Technology, Blackie Academic & Professional, 1992. 3. N. D. Frame: Technology of Extrusion Cooking, Blackie Academic & Professional, 1993. 4. M. Mulder: Basic Principles of Membrane Technology, Kluwes Academic Publishiers, 1996. 5. R. P. Borwankar, C. F. Shoemaker: Rheology of Foods, Elsivier Applied Science, 1992.		

Course title	**Food Chemistry**			
Course code	35435	**Course status**	Compulsory	
Study programme	Food Technology			
Semester	V			
Course lecturer	Mirela Kopjar, PhD, prof.			
Course associates				
Course content	What is food chemistry? Aproach to the study of food chemistry. Chemical and biochemical reactions that can lead to alteration of food quality and safety. Food as dispersed system. Food components: Carbohydrates (Nonenzymic browning), Lipids, Amino acids, Peptides and Proteins, Vitamins, Elements, Pigments, Flavour compounds, Enzymes, in relation to their roles as parts of complex biochemical systems and as modified by handling, processing and environmental factors. Shelf life of foods.			
General and specific knowledge acquired in course (objective)	Analytical approach to the food chemistry, food formulation, processing and storage stability. Composition and properties of food. Determination of chemical and biochemical reactions that occur in food during handling, processing and storage.			
Teaching method	**Lectures**	**Seminars**	**Labs**	
(hrs/week)	3		1	
(total)	45		15	
Examination method	Written reports during courses (semester) and at the end of courses oral exam.			
Credits	5	**Language**	Croatian, English	
Compulsory reading	1. O.R. Fennema, Food Chemistry, 3 rd ed., by Marcel Dekker, Inc, N.Y., 1996. 2. Norman N. Potter, Joseph H. Hotchkiss, *Food Science* (3th ed.), Chapman&Hall, New York, 1995. 3. W. Baltes, *Lebensmittelchemie* (Dritte Auflage), Springer-Verlag Berlin, Heildelberg, 1992. 4. H.-D. Belitz, W. Grosch; *Lehrbuch der Lebensmittelchemie* (4. Auflag), Springer-Verlag, Berlin, Heildelberg, 1992.			
Recommended reading	1. A. L. Nelson, High-Fiber Ingredients, Eagan Press Handbook Series, 2003. 2. F. J. Francis, Colorants, Eagan Press Handbook Series, 2003. 3. P. R. Mathewson, Enzymes, Eagan Press Handbook Series, 2003. 4. C. E. Stauffer, Fats and Oils, Eagan Press Handbook Series, 2003. 5. Scientific journals			

Course title	**Food Quality Control**		
Course code	187668	**Course status**	Compulsory
Study programme	Food Technology		
Semester	V		
Course lecturer	Ivana Flanjak, PhD, prof.		
Course associates	Blanka Bilić Rajs, PhD, assist. prof.		
Course content	**Lectures:** Food legislation, safety and quality aspects. Statistical quality control: statistical process control, control charts, sampling procedures. Introduction to food analysis. Croatian regulations and international standards related to food analysis. Evaluation of analitical data. Sampling and sampling preparation. Moisture and total solids analysis. Ash analysis. Fat analysis. Protein analysis. Carbohydrate analysis. Vitamin analysis. Mineral analysis. Fat characterization. Protein separation and characterization. Application of enzimes in food analysis. Immunoassays. Sensory analysis. **Laboratory excercises:** Determination of moisture and total solids. Determination of ash content. Volumetric determination of sugars by cuper reduction. Determination of sugars by HPLC. Determination of fat by the Soxhlet method. Determination of starch (Ewers). Determination of nitrogen and protein by the Kjeldahl method using the Kjeltec instrument. Detemination of alcohol in beverages by gas chromatography (GC). Determination of ascorbic acid in fruit and vegetables by titration (DCP).		
General and specific knowledge acquired in course (objective)	The course introduces student to legislative bases of control of food safety and quality, as well as to statistical and analytical methods used to this effect. Students will learn to analyse and evaluate composition of food product and apply food regulations.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	3		3
(total)	45		45
Examination method	Oral and written exam with two written exams over the course of semester. Final colloquium is needed.		
Credits	7	**Language**	Croatian
Compulsory reading	1. LJ. Primorac, D. Čačić-Kenjerić, I. Flanjak, I. Banjari: Kontrola kakvoće hrane. Prehrambeno tehnološki fakultet, Osijek, 2008. 2. Zakoni, pravilnici, norme.		
Recommended reading	1. S.S. Nielsen: *Food Analysis* .Kluwer Academic/Plenum Publishers, New York, Boston, Dordrecht, London, Moscow, 2003. 2. D.A.Skoog, D.M. West, F.J. Holler: Osnove analitičke kemije. Školska knjiga , Zagreb, 1999.		

Course title	**Process Measurements and Control**		
Course code	35436	**Course status**	Compulsory
Study programme	Food Technology		
Semester	V		
Course lecturer	Frane Čačić Kenjerić, PhD, assoc. prof.		
Course associates			
Course content	Measuring and its purpose. Process variable measurements and sensors. Instrumentation overview: industrial, process and laboratory. Measurements of mechanical (path, level, thickness, density, contraction, force, tension, angle, velocity, rotational speed, torque, power, flow, viscosity), thermic (temperature, quantity of heat, humidity), optical (photoelectrical, lightness) and other process quantities. Types and sources of noise. Practical examples. Automatic control and its purpose. Basic structure and elements of the control loop. Implementation of control system. Properties of controlled systems. Linearisation of caracteristic curve. Dynamic behaviour of the systems and its mathematical description. Description of linear, continous and time invariant systems in time and frequency domain. Laplace transform and transfer function. Bode diagram. Basic dynamic elements. Control loop and its charachteristics. Control loop stability and methods of stability analysis. Perfomance indexes in time and frequency domain. Basic controller types. Control loop synthesis. Classic methods of synthesis of linear continous control systems. Empirical rules for setting the conroller parameters. Practical examples. Principles of digital implementation of control systems.		
General and specific knowledge acquired in course (objective)	This course of study gives the basics of process measurements, description of system dynamic behaviour, structural presentation of the basic elements and systems of automatic control, and feedback system stability analysis. Additionaly, the students acquire basic knowledge about control algorithm design and how to evaluate achieved control quality. In the laboratory excersises they gain skills in work with process measuring equipment, in using basic software tools for control system analysis and shynthesis(Matlab), and learn about a methodology of practical control system implementation.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	3		1
(total)	45		15
Examination method	Final examination consists of the written and the oral examination, or of oral examination only for those students who have successfully solved written tests during semester.		
Credits	5	**Language**	Croatian
Compulsory reading	Tomac, J.: Osnove automatske regulacije - predavanja, Fakultetska skripta, ETF, Osijek, 2004.		
Recommended reading	Šurina, T.: Automatska regulacija, Školska knjiga, Zagreb, 1991. Šantić, A.: Elektronička instrumentacija, Školska knjiga, Zagreb, 1988.		

Course title	**Economics of Food Processing Industry**		
Course code	66871	**Course status**	Compulsory
Study programme	Food Technology		
Semester	V		
Course lecturer	Dragan Kovačević, PhD, prof.		
Course associates			
Course content	Basic economic definitions. Market economic and globalization. Macroeconomic and basic macroeconomic indicators in Croatia. Role of the government in modern economics. Food industry situation and perspective in Croatia and EU. Microeconomics: supply, demand and market. Market for food products in Croatia. Business in agriculture and food processing (legislation, state subsidies, institutions and non-government organizations). Management in food processing industry. Business ethics. Marketing in food industry. Market research. Investing and new products. Global trends influence on consumer behaviour (organic and functional food, ecological agriculture, food safety, increase in standards and purchasing power, etc.).		
General and specific knowledge acquired in course (objective)	Global trends (especially market liberalization), changes in consumer philosophy and standard of living, demand for better food quality and safety - determinants for development of food industry and new products. In the food industry, food technology engineers often work like managers, so fundamental knowledge in marketing, management and economic trends are very important for making quality business decisions. Also, it must be taken into account that a certain number of engineers will start their own business after graduation.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	2	1	
(total)	30	15	
Examination method	Oral and/or written exam; Continuous examination throughout semester – minimum 2 written exams		
Credits	5	**Language**	Croatian
Compulsory reading	1. Samuelson, P. A., Nordhaus, W. D. (2000): Ekonomija, Mate d.o.o. Zagreb, Zagreb (XV. izdanje). 2. Tracy, M. (2000): Hrana i poljoprivreda u tržišnom gospodarstvu, Mate d.o.o. Zagreb, Zagreb. 3. Kotler, P. (2001): Upravljanje marketingom, Mate d.o.o. Zagreb, Zagreb. 4. Weihrich, H., Koontz, H. (1998): Menedžment, Mate d.o.o. Zagreb, Zagreb.		
Recommended reading	1. Thurow, L. C. (1997): Budućnost Kapitalizma, Mate d.o.o. Zagreb, Zagreb. 2. Kolega, A. (1994): Tržništvo poljodjelskih proizvoda, NZ Globus, Zagreb. 3. Osredečki, E. (1995): Poslovno komuniciranje i poslovni bonton, Naklada Edo Zagreb, Zagreb.		

Course title	**Fundamentals of Cereal Technology**			
Course code	187664	**Course status**	Compulsory	
Study programme	Food Technology (Undergraduate study)			
Semester	VI.			
Course lecturer	Daliborka Koceva Komlenić, PhD, full professor Marko Jukić, PhD, full professor			
Course associates				
Course content	**Lectures:** Physical and chemical changes in cereal grains and the significance of certain components in the technological quality evaluation. Botanical and technological classification. The most important types and sorts. Basic storage conditions. Flour production. Grain milling procedures. Milling products. Bread and bakery goods production. Bakery products. Sensory and quality evaluation, transport, packing and storage of bakery products. Raw material, operations and processes in pasta technology, as well as in cookie and wafer production. **Laboratory excercises:** Physical and chemical analytical methods for evaluation of flour, dough and final products.			
General and specific knowledge acquired in course (objective)	Informing the chemical composition of cereal grain with a review on the most important components for production and final products. Understanding the chemical composition and nutritional values necessary for the right choice of the production process type the students gain knowledge of the importance of individual chemical components for technological quality evaluation. Students gain basic knowledge of milling and baking technology, as well as pasta and cookie production.			
Teaching method	**Lectures**	**Seminars**	**Labs**	
(hrs/week)	2		2	
(total)	30		30	
Examination method	The exam is divided into two partial tests during the lectures or just an oral exam at the end of the semester.			
Credits	4.5	**Language**	Croatian	
Compulsory reading	1. Teaching materials on the Faculty web site. 2. E.S. Posner, A.N. Hibbs: Wheat Flour Milling. American Association of Cereal Chemists, Inc. St. Paul, Minnesota, U.S.D. 1997. 3. Y. Pomeranz: Wheat: Chemistry and Technology. Volumen I i II. American Association of Cereal Chemists, St. Paul, Minnesota, 1988. 4. Z. Katić: Sušenje i sušare u poljoprivredi. Multigraf d.o.o. Zagreb, 1997. 5. E. J. Pyler: Baking Science and Tehnology. Volumen I i II. Sosland Publishing Company, Marriam, Kansas, 1988. 6. Ch. Mercier, C. Cantarelli: Pasta and extrusion cooked foods. Elsevier Applied Science Publishers, London, New York, 1986.			
Recommended reading	1. K. Kulp, K. Lorenz, and J. Brümmer (Ed.): Frozen and Refrigerated Doughs and Batters, American Association of Cereal Chemists, St. Paul, Minnesota, 1995. 2. S. A. Matz: Bakery Technology: Packaging, Nutrition, Product Development, Quality Assurance. Elsevier Science Publishers, Essex, U.K., 1989. 3. Y. Pomeranz: Advances in Cereal Science and Technology. Volumen I i II. American Association of Cereal Chemists, St. Paul, Minnesota, 1978.			

Course title	**Fundamentals of Fruit and Vegetable Technologies**			
Course code	187665	**Course status**	Compulsory	
Study programme	Food Technology (Undergraduate University Study Programme)			
Semester	VI			
Course lecturer	Nela Nedić Tiban, full professor			
Course associates	Food Technology (Undergraduate University Study Programme)			
Course content	**Lectures:** The physical and chemical changes in raw materials of plant origin (fruit and vegetables) with a focus on the raw materials ingredients important for food product, and the importance of some components in the evaluation of technological quality. Botanical and technological classification. The most important species and varieties. Quality factors of raw materials important for formulation of certain food products and their quality. Harvesting and storage conditions for use in fresh and/or for processing. Fundamentals of fruit and vegetables processing. **Laboratory excercises:** Individual work in the laboratory. Selected analysis that are important for quality of raw materials and products.			
General and specific knowledge acquired in course (objective)	The chemical composition of the fruit and vegetables with a focus on major components for processing, and final products. Understanding of chemical composition and nutritional value necessary for selection proper method of processing, student gain knowledge about the importance of individual components in evaluation of technological quality. This course provides knowledge in domain of quality and properties of fruits and vegetables, with a focus on the key factors that influence final product quality and parameters prevailing in the technological process.			
Teaching method	**Lectures**	**Seminars**	**Labs**	
(hrs/week)	2		2	
(total)	30		30	
Examination method	Written and oral examination at the end of semester or two written partial exams during the semester.			
Credits	4,5	**Language**	Croatian	
Compulsory reading	1. A.A. Kader, 2003, Postharvest Technology of Horticultural Crops, Third Ed., Univ.of California, Division of Agriculture and Natural Resources, Publication 3529. 2. T. Lovrić i V. Piližota, 1994, Tehnologija konzerviranja i prerade voća i povrća, ur. akademik Milan Maceljski, Nakladni zavod, Globus, Zagreb.			
Recommended reading	Scientific journals and publications			

Course title	**Fundamental Technology of Wines and Oils**		
Course code	187666	**Course status**	Compulsory
Study programme	Food Technology (Undergraduate study program)		
Semester	VI		
Course lecturer	Tihomir Moslavac, full professor Anita Pichler, associate professor		
Course associates	Ivana Ivić, master of engineering		
Course content	Origin and botanical characteristics of grapevines, mechanical and chemical composition of grapes, grape varieties for wine production, chemical composition of musts. The sulfurization of must and wine, the role of SO2 in wine production. Basics of technological process of production of white and red wines. Fruit wines and the basics of fruit wine production technology. Wine categorization according to the Rulebook of wine production. Fundamentals of oil technology. Clafisication of oilseeds (seeds and crops). Preparation of oilseeds for processing. Production of vegetable oils. The production of oils with pressing (pre-pressing, full pressing, cold pressing). Production of oils with solvent extraction. Refining (chemical, physical). Storage of oils, stabilization and transportation. By-products of the oil industries. Fundamentals of technology product based on vegetable oils.		
General and specific knowledge acquired in course (objective)	The course is designed to give the basic knowledge of wine and wine production. The course also provides the general knowledge of production of oils from vegetable raw materials, refining of oils and quality of oil products.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	2		2
(total)	30		30
Examination method	Written and oral examination of the whole subject matter at the end of semester or in the form of two written exams during semester and oral at the end of semester.		
Credits	4,5	**Language**	Croatian
Compulsory reading	1. A. A. Kader, Postharvest technology of Horticultural Crops, Sec.Ed., 1992, Univ.of California, Division of Agriculture and Natural Resources Publication 3311. 2. S. Čorbo: Tehnologija ulja i masti, Poljoprivredno-prehrambeni fakultet Univerziteta u Sarajevu, 2008. 3. M. Zoričić: Kultura vina, Bratovština hrvatskih vinskih vitezova Zagreb, 2009.		
Recommended reading	Scientific papers and journals		

Course title	**Fundamentals of Technology of Meat and Fish**		
Course code		**Status kolegija**	Obvezni
Study programme	Food technology (Undergraduate study)		
Semester	VI.		
Course lecturer	Dragan Kovačević, PhD, full prof. Krešimir Mastanjević, PhD, assoc. prof.		
Course associates			
Course content	**Lectures:** Situation and perspective in food industry of production of raw materials of animal origin in Croatia and EU. Anatomy and chemical composition and nutritional characteristics of meat and fish. Types and breeds of cattle, poultry and game. Assessment of market quality of meat. Market classification and characterization of meat. Transport of animals to the slaughter house. Veterinary health surveillance in the meat industry and the application of HACCP. Fish systematisation. Placing fish on the market. Cattle, poultry, game and fish diseases. Post-mortem changes and maturation of the meat and fish. Slaughtering and carcass processing. Cutting meat. Microflora and spoilage of meat and fish. Methods of preserving meat and fish. Technological processes and machines for production and conserving mea and fish products. Meat and fish products systematisation. Achievements in meat and fish products packaging. **Laboratory excercises:** Laboratory exercises – determination of physical, chemical and sensory characteristics of meat and fish products. Writing a seminar paper - technological production calculation of specific meat or fish products.		
General and specific knowledge acquired in course (objective)	Knowledge of anatomy, chemical composition and nutritional characteristics of raw materials of animal origin is essential for choosing adequate technological operations, conserving, packaging and preservation methods of meat and fish products. Insight in area of animal diseases, especially zoonoses, current legislation and current concepts of veterinary-sanitary inspection in the meat and fish processing industries in connection with consumer protection and the precondition for export to the EU. Choosing adequate conserving methods that will ensure minimum processing, preservation of natural properties and health safety of food (in accordance with market trends and consumer requirements) - requires knowledge of the structure, chemical composition and nutritional properties of meat and fish, and especially the latest technological developments and the latest method of canning and packaging of food.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	2	-	2
(total)	30	-	30
Examination method	Done laboratory practice, continuous assessment during the semester at least 2 times and written examination.		
Credits	4,5	**Language**	Croatian
Compulsory reading	1. Kovačević, D. (2001): Kemija i tehnologija mesa i ribe, Prehrambeno tehnološki fakultet, Osijek (sveučilišni udžbenik). 2. Kovačević, D. (2005): Sirovine prehrambene industrije - meso i riba, Prehrambeno tehnološki fakultet, Osijek (sveučilišni udžbenik). 3. Uremović, Z., Uremović, M., Pavić, V., Mioč, B., Mužić, S., Janječić, Z. (2002): Stočarstvo, Agronomski fakultet Sveučilišta u Zagrebu, Zagreb.		
Recommended reading	1. Kovačević, D. (2017): Kemija i tehnologija šunki i pršuta, Prehrambeno tehnološki fakultet, Osijek (sveučilišni udžbenik). 2. Kovačević, D. (2014): Tehnologija kulena i drugih fermentiranih kobasica, Prehrambeno tehnološki fakultet, Osijek (sveučilišni udžbenik).		

	3. Živković, J. (2001): Higijena i tehnologija mesa (I. Dio), (II. dopunjeno izdanje), Veterinarski fakultet Sveučilišta u Zagrebu, Zagreb. 4. Varnam, A. H., Sutherland, J. P. (1995): Meat and Meat Products. Technology, chemistry and microbiology, Chapman & Hall, London - Glasgow - Weinheim - New York-Tokyo - Melbourne - Madras.

Course title	**Food Toxicology**		
Course code	135767	**Course status**	Elective
Study programme	Prehrambena tehnologija (preddiplomski sveučilišni studij)		
Semester	VI		
Course lecturer	Tomislav Klapec, PhD, prof.		
Course associates			
Course content	**Lectures:** -absorption, distribution, excretion and metabolism of toxicants -mechanism of action of toxicants -toxic effects in the organism -toxicants in food -determination of toxicants in food -risk assessment of toxicants -regulation of exposure to toxic substances **Laboratory excercises:** -determination of deoxynivalenol in grains by HPLC -determination of fumonisins in corn by HPLC -HPLC determination of polycyclic aromatic hydrocarbons in instant coffee -spectrofluorimetric determination of aluminium in water -spectrofluorimetric determination of histamine in fish		
General and specific knowledge acquired in course (objective)	Following introductory basic principles of interaction between body and toxic substances, this course familiarizes student with occurrence, mechanism of action, detrimental effects, methods of determination and means of prevention of food contamination with toxicants.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	2	1	1
(total)	30	15	15
Examination method	oral plus two written (mid-term and final) exams		
Credits	3	**Language**	Croatian, English
Compulsory reading	T. Klapec: *Osnove toksikologije s toksikologijom hrane*, Interna skripta, Prehrambeno tehnološki fakultet, Osijek, 2002.		
Recommended reading	1. T. Shibamoto, L.F. Bjeldanes: *Introduction to Food Toxicology*, Academic Press, San Diego, 1993. 2. A. Wallace Hayes (ur.): *Principles and Methods of Toxicology*, Taylor & Francis, Philadelphia, 2001. 3. B.G. Katzung (ur.): *Basic and Clinical Pharmacology*, McGraw-Hill, London, 2004. 4. C.D. Klaassen, M.O. Amdur, J. Doull: *Toxicology, A Basic Science of Poisons*, Macmillan Publishing Company, New York, 1986.		

Course title	**Functional Foods and Supplements**		
Course code	85354	**Course status**	Elective
Study programme	Prehrambena tehnologija (preddiplomski sveučilišni studij)		
Semester	VI		
Course lecturer	Daniela Čačić Kenjerić, PhD, full prof.		
Course associates	Ines Banjari, PhD, assoc. prof. Milica Cvijetić Stokanović, MSc		
Course content	**Lectures:** Defining functional foods, functional foods legislation (EU, US, Japan etc.), labelling Functional foods and health: functional health claims, markers; colonic functional foods, functional foods and coronary heart disease, functional foods anti-tumour properties, functional foods and acute infections. Developing functional food products: maximising the functional benefits of plant foods (macronutrient and micronutrient enhancing), developing functional ingredients, functional fats and spreads, functional confectionery, probiotic and prebiotic functional foods, dietary fibre functional products. The role and position of supplements in human health. To disseminate course content, the students according the favour, elect particular content, independently elaborate, present and discuss. **Seminars:** The students have to practice preparation of scientific project proposal. **Laboratory excercises:** Gain experience with using computers for literature searching. Determination of buffering capacity of functional foods. Determination of inhibitory effect of fermented functional foods by probiotic.		
General and specific knowledge acquired in course (objective)	The course is focusing on human well-being, the influence of functional components on metabolism, the cardiovascular system and intestinal physiology. In view of these facts, it is necessary to assess and evaluate the developments in food production in terms of their effect on the individual consumer and the society at large.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	2	1	1
(total)	30	15	15
Examination method	During the semester the students will be included in course through discussion and making seminars (the result of this work will influence in the final mark), and the exam will be oral		
Credits	3	**Language**	Croatian
Compulsory reading	1. G.R. Gibson, M.W.Williams: *Functional foods*. CRC Press, Woodhead Publishing Limited, Boca Raton, Boston, New York, Washington, DC, 2000. 2. predavanja nastavnik će prirediti odgovarajući pisani materijal		
Recommended reading	1. R. Chadwick, S.Henson, B.Moseley, G.Koenen, M.Liakopoulos, C.Midden, A.Palou, G.Rechkemmer, D.Schröder, A.von Wright: *Functional Foods*. Springer, Berlin, 2003.		

Course title	**Basics of Biotechnology**		
Course code	85355	**Course status**	Elective
Study programme	Prehrambena tehnologija (preddiplomski sveučilišni studij)		
Semester	VI		
Course lecturer	Natalija Velić, PhD, prof.		
Course associates	Vinko Krstanović, PhD, prof.		
Course content	**Lectures:** Definition and importance of biotechnology. Short historic overview of biotechnology. Basic scheme of a bioprocess. Processes preceeeding and following bioreactor. Classification of bioprocesses based on microorganism used. Cell processes and their regulation. Cell cultivation, growth and reproduction. External factors influencing bioprocess. Primary and secondary metabolism. Equipment for bioprocesses. Batch and continuous bioprocesses. Bioprocess characteristics: stochiometry, yields, productivity. New biotechnology: recombinant DNA technology; metabolic, enzymatic and protein engineering. Biotechnology in environment protection: wastewater treatment, composting, bioremediation. **Laboratory excercises:** Aerobic and anaerobic processes (calculation, preparation and application).		
General and specific knowledge acquired in course (objective)	Gaining new knowledge for planning, preparation and application bioprocesses.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	2		2
(total)	30		30
Examination method	Essay (evaluation of work and presentation), 2 written examinations during the semester and final oral examination.		
Credits	3	**Language**	Croatian
Compulsory reading	1. Marić V., Šantek B. (2009) *Biokemijsko inženjerstvo*, Golden marketing-tehnička knjiga, Zagreb. 2. Doran M. D. (1995) *Bioprocess Engineering Principles*, AP, NY		
Recommended reading	1. Bailey J.E., Ollis D.F. (1986.) *Biochemical Engineering Fundamentals*, McGraw-Hill, Singapore.		

Course title	**Traditional Biotechnology**		
Course code	85356	**Course status**	Elective
Study programme	Prehrambena tehnologija (preddiplomski sveučilišni studij)		
Semester	VI		
Course lecturer	Kristina Mastanjević, PhD, prof.		
Course associates	Vinko Krstanović, PhD, prof.		
Course content	**Lectures:** Definition and importance of biotechnology in food production. Historic overview of biotechnology in food production. Basics of bioprocesses. Bakers yeast and microbial biomass production. Organic acid production: acetic acid, citric acid, lactic acid. Lactic fermentation. Fermented dairy products, probiotics. Starter cultures. Fermented meat products. Wine production. Beer production. Production of strong alcoholic beverages and ethanol. Other fermented food products. Microbial production of enzymes and their application in food industry. **Laboratory excercises:** Enzymatic starch hydrolysis. Alcoholic fermentation on industrial media Microbial production of lactic acid. Microbial production of acetic acid.		
General and specific knowledge acquired in course (objective)	Gaining knowledge for planning, preparation and control of food production bioprocesses.		
Teaching method	**Lectures**	**Seminars**	**Labs**
(hrs/week)	2		2
(total)	30		30
Examination method	Essay (evaluation of work and presentation), 2 written examinations during the semester and final oral examination.		
Credits	3	**Language**	Croatian
Compulsory reading	1. Johanides V. et al. (1984) *Industrijska mikrobiologija*, skripta, PBF, Zagreb. 2. Marić V.(2000) *Biotehnologija i sirovine*, Stručna i poslovna knjiga, Zagreb, 2000. 3. Wood B.J.B.,ed. (1998) *Microbiology of Fermented Foods*, 2nd edition (volume 1 and 2), Blackie Academic & professional, London.		
Recommended reading	1. Marić V., Šantek B. (2009) *Biokemijsko inženjerstvo*, Golden marketing-tehnička knjiga, Zagreb. 2. Doran M. D. (1995) *Bioprocess Engineering Principles*, AP, NY		