UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Fizikalno-biokemijske metode**
Course title:	**Physical-biochemical methods**

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Interdisciplinarni doktorski študijski program BIOZNANOSTI 3. stopnja	**Živilstvo**	**1,2**	**1,2,3,4**
Interdisciplinary Doctoral Study Programme in BIOSCIENCES 3rd cycle	**Food Science**	**1,2**	**1,2,3,4**

Vrsta predmeta / Course type	teoretični predmet / theoretical course
Univerzitetna koda predmeta / University course code:	

Predavanja **Lectures**	**Seminar** **Seminar**	**Vaje** **Tutorial**	**Klinične vaje** **work**	**Druge oblike študija**	**Samost. delo** **Individ. work**	**ECTS**
10	**10**	**20**	**/**	**/**	**85**	**5**

Nosilec predmeta / Lecturer:	Nosilec: prof. dr. Nataša Poklar Ulrih

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski / angleški Slovene / English
	Vaje / Tutorial:	slovenski / angleški Slovene / English

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Splošni pogoji za vpis na doktorski študij	General conditions for enrolment in doctoral studies.

Vsebina:	**Content (Syllabus outline):**

Študentje se bodo srečali z osnovami fizikalne-biokemije bioloških molekul, interakcijami med molekulami, vezanjem majhnih molekul (antibiotiki, aditivi, antioksidanti, kovinski ioni, etc. na makromolekule). Za proučevanje stabilnosti, interakcij in strukture molekul bodo študentje spoznali kalorimetrijo in spektroskopske tehnike, ki imajo široko uporabnost v živilstvu, farmaciji, biokemiji, medicini in drugih področjih. Površinska plazmonska resonance (SPR) je tehnika, ki se je v zadnjih letih pokazala tudi kot zelo pomembno orodje v farmacevtski in prehrambeni industriji. Vključi se lahko v vse faze odkrivanja novih zdravil, izboljševanja njihovih lastnosti, saj je možno zelo enostavno in hitro pregledati večje število vezavnih partnerjev za potencialne terapevtske tarče. Tista, ki se močno vežejo na receptorje, lahko v naslednji stopnji analiziramo z drugimi metodami. SPR postaja pomembno orodje tudi v prehrambeni industriji, kjer ga lahko uporabimo za kontrolo kvalitete hrane. Iz kompleksne mešanice molekul lahko hitro in z veliko natančnostjo zasledimo vezavo že zelo majhnih količin iskane molekule. Opisane bodo tudi komplementarne metode za študij molekulskih interakcij kot so izotermalna mikrokalorimetrija in termoforeza. Študentje bodo spoznali tudi različne tipe biosenzorjev, tako tiste, ki za svojo detekcijo uporabljajo encime, imunološka protitelesa, celične strukture, kot tudi cele mikroorganizme. Pri tem se bodo študentje spoznali z osnovami različnih metod detekcije (elektrokemijske, optične, termične). Poseben poudarek bo na uporabi biosenzorjev za analize živil in za spremljanje biotehnoloških procesov. V zadnjem obdobju se tehnike kot sta elektronska spinska resonanca (EPR) in nuklearna magnetna resonanca (NMR) vedno več uporabljata tudi v živilstvu za proučevanje structure in interakcij med molekulami. Študentje bodo spoznali osnove teh tehnik in njihovo uporabnost. Študentom bo omogočeno tudi delo na teh inštrumentih in prenos znanja na nova področja aplikacij.	Students will meet with the basics of physical-chemistry of biological molecules, interactions between molecules, binding of small molecules (antibiotics, additives, antioxidants, metal ions, etc..) to macromolecules. To study the stability, interactions and molecular structure, students will be introduced to differential scanning calorimetry and spectroscopic techniques, which have wide applicability in the food industry, pharmacy, biochemistry, medicine and other fields. Surface plasmon resonance (SPR) is a technique that has been shown in recent years as a very important tool in the pharmaceutical and food industry. It can be included in all phases of drug discovery, improve their properties, it is possible to very easily and quickly scan a large number of binding partners for potential therapeutic target. SPR is becoming an important tool in the food industry, which can be used for quality control. Complementary methods for studying molecular interactions, such as isothermal microcalorimetry and thermophoresis, will also be presented. Students will learn about the different types of biosensors. The ones, which for their detection are using enzyme-antibody immunological, cell structure, as well as whole organisms. The students will learn the basics of different detection methods (electrochemical, optical, and thermal). Special emphasis will be on the use of biosensors for food analysis and monitoring of biotechnological processes. Lately, techniques such as electron spin resonance (EPR) and nuclear magnetic resonance (NMR) and used in the food industry to study the structure and interactions between molecules. The emphasis of the subject is on the techniques and their applications in food science and industry. Students will work on these instruments and expand the application of these techniques into new areas of food science and technology.

Temeljni literatura in viri / Readings:

- Pare J.R.J., Belanger J.M.R. 1997. Instrumental methods in food analysis Elsevier, chapters: 4, 5
- Landbury J.E., Doyle, M.L. 2004. Biocalorimetry 2. Aplication of Calorimetry in the Biological Sciences, chapters: 1, 2, 10
- Belton P.S. 2003. Magnetic resonance in food science, Royal Society of Chemistry
- Malkhotra B.D., Turner A.P. 2003. Advances in Biosensors: Perspectives in Biosensors, JAI Press.
- Jeong-Yeol Yoon, Lonnie J. Lucas, 2013. Introduction to Biosensors, Springer-Verlag New York Inc.

Cilji in kompetence:	**Objectives and competences:**
Študentje se seznanijo s fizikalnimi zakonitostmi, ki določajo lastnosti bioloških makromolekul v živilih. Spoznavanje fizikalno-kemijskih metod (inštrumentalnih metod), ki se v zadnjem času vedno bolj uporabljajo za proučevanje živil. Študentje se bodo v laboratoriju srečali s praktično uporabo nekaterih od naštetih inštrumentalnih tehnik v živilstvu, in biotehnologiji.	Students will learn about the physical laws that determine the properties of biological macromolecules in food. Understanding the physical-chemical methods (instrumental methods) that have recently been increasingly used for the study of food. Students will meet in the lab to practical application of some of these instrumental techniques in the food industry, and biotechnology.
Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Predmet daje znanje, potrebno pri razvoju novih metod v raziskovalnem delu v živilski in prehrambni stroki.	Knowledge and understanding: The course provides the knowledge necessary to develop new methods in research work in the food science and technology.
Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, laboratorijsko delo, samostojna priprava seminarjev in predstavitev.	Lectures, seminars, project workshops, laboratory work.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**

Seminar s predstavitvijo Pisno preverjanje znanja.	**50%** **50%**	Project with public presentation written exam

Reference nosilca / izvajalcev / Lecturer's references:

Prof. dr. Nataša Poklar Ulrih

1. ABRAM, Veronika, BERLEC, Barbara, OTA, Ajda, ŠENTJURC, Marjeta, BLATNIK, Petra, POKLAR ULRIH, Nataša. Effect of flavonoid structure on the fluidity of model lipid membranes. *Food chemistry*, ISSN 0308-8146. [Print ed.], 2013, vol. 139, issues 1-4, str. 804-813, doi: 10.1016/j.foodchem.2013.01.100.

2. SKRT, Mihaela, BENEDIK, Evgen, PODLIPNIK, Črtomir, POKLAR ULRIH, Nataša. Interactions of different polyphenols with bovine serum albumin using fluorescence quenching and molecular docking. *Food chemistry*, ISSN 0308-8146. [Print ed.], 2012, vol. 135, str. 2418-2424, doi: 10.1016/j.foodchem.2012.06.114.

3. OTA, Ajda, ABRAMOVIČ, Helena, ABRAM, Veronika, POKLAR ULRIH, Nataša. Interactions of p-coumaric, caffeic and ferulic acids and their styrenes with model lipid membranes. *Food chemistry*, ISSN 0308-8146. [Print ed.], 2011, vol. 125, issue 4, str. 1256-1261, doi: 10.1016/j.foodchem.2010.10.054.

4. GMAJNER, Dejan, POKLAR ULRIH, Nataša. Thermotropic phase behaviour of mixed liposomes consist of archaeal diether and conventional diester lipids. *Journal of thermal analysis and calorimetry*, ISSN 1388-6150, 2011, vol. 106, str. 255-260, doi: 10.1007/s10973-011-1596-4

5. POKLAR ULRIH, Nataša, OTA, Ajda, ŠENTJURC, Marjeta, KURE, Sandra, ABRAM, Veronika. Flavonoids and cell membrane fluidity. *Food chemistry*, ISSN 0308-8146. [Print ed.], 2010, issue 1, vol. 121, str. 78-84, doi: 10.1016/j.foodchem.2009.12.006.

6. PREVC, Tjaša, ŠEGATIN, Nataša, POKLAR ULRIH, Nataša, CIGIĆ, Blaž. DPPH assay of vegetable oils and model antioxidants in protic and aprotic solvents. Talanta, ISSN 0039-9140. [Print ed.], 2013, vol. 109, str. 13-19, doi: 10.1016/j.talanta.2013.03.046. [COBISS.SI-ID 4228984]

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Kakovost in varnost živil**
	Food quality and safety

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Interdisciplinarni doktorski študijski program BIOZNANOSTI 3. stopnja	**Živilstvo**	**1,2**	**1,2,3,4**
Interdisciplinary Doctoral Study Programme in BIOSCIENCES 3rd cycle	**Food Science**	**1,2**	**1,2,3,4**

Vrsta predmeta / Course type	teoretični predmet / theoretical course
Univerzitetna koda predmeta / University course code:	

Predavanja **Lectures**	**Seminar** **Seminar**	**Vaje** **Tutorial**	**Klinične vaje** **work**	**Druge oblike študija**	**Samost. delo** **Individ. work**	**ECTS**
20	**40**	**/**	**/**	**10**	**180**	**10**

Nosilec predmeta / Lecturer:	Nosilec: Prof. dr. Sonja Smole Možina

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski / angleški Slovene / English
	Vaje / Tutorial:	slovenski / angleški Slovene / English

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Splošni pogoji za vpis na doktorski študij	General conditions for enrolment in doctoral studies.

Vsebina:	**Content (Syllabus outline):**

Vsebinski poudarki predmeta vključujejo naslednje teme: Celostno obvladovanje varnosti in kakovosti živil; Analiza tveganj v živilski proizvodnji, vključno s stranskimi proizvodi in odpadki agro-živilstva in možnostmi njihovega ponovnega vključevanja v proizvodno verigo kakovostne in varne hrane in krme s podaljšano obstojnostjo). Teoretične osnove procesov oksidativnih pretvorb v živilih; predstavitev sodobnih pristopov k določitvi in vrednotenju razvoja oksidativnih sprememb v živilskih izdelkih ter njihovemu preprečevanju. Povezava omenjenih procesov s kemijsko sestavo in strukturnimi lastnostmi živil. Vpliv oksidacije sestavin živila na prehransko vrednost, varnost in senzorične lastnosti živil. Termično in netermično procesiranje živil z vidika kakovosti in varnosti živilskih izdelkov. Vrednotenje kakovosti hrane s fizikalno-kemijskimi parametri Senzorična analiza v vlogi zagotavljanja kakovosti in obstojnosti živil. Odkrivanje nedovoljenih postopkov in ponaredkov, ugotavljanje pristnosti živil, metodološki pristopi in primeri iz prakse. Ocena kemijskih, bioloških (mikrobioloških, biotehnoloških), fizikalnih tveganj. Ocena vloge sodobnih nanotehnologij za zagotavljanje kakovosti in varnosti hrane. Principi sledljivosti v proizvodno-prehranskih oskrbovalnih verigah. Kompetence in odgovornosti nosilcev dejavnosti od kmeta do kupca za zagotavljanje kakovosti in varnosti v proizvodno-prehranskih oskrbovalnih verigah. Vloga zunanjih dejavnikov (npr. državnih sistemov nadzora, javnih medijev, izobraževalnega sistema itd.) v sistemu preprečevanja tveganj oz. zagotavljanja varnosti in kakovosti hrane. Etika v sistemu zagotavljanja kakovosti in varnosti hrane. Predstavitev in analiza primerov iz prakse in raziskovalnih projektov. Kaj se lahko naučimo iz obojih? Mikrobna fiziologija v pogojih minimalnega konzerviranja hrane v luči zahtev za zagotavljanje varnih živil. Gensko spremenjeni organizmi v živilih – analitika in in sistem kakovosti po ISO 17025. Novi tehnološki pristopi za zagotavljanje varnosti in kakovosti hrane (in krme) v razmerah minimalnega procesiranja (novi	The main points in the contents of the subject are as follows: Integral concepts of food safety and quality management; Risk assessment in food processing (including risk assessment of food by-products and wastes for possible further processing into high quality and safe food or feed products or additives with prolonged shelf-life. Description of theoretical bases, which describe the processes of oxidative transformations in food; presentation of advanced approaches to determining and evaluation of the development of oxidative changes in food products and their prevention. Connection of these processes with chemical composition and structural properties of food. Impact of food component oxidation on nutritional value, safety and sensory properties of food. Thermal and non-thermal processing of food – quality and safety aspects. Physico-chemical parameters of food quality assessment. Sensoric analysis of food products – its role in food safety and quality management and shelf-life determination. Food authenticity; Detection of unacceptable procedures and falsification; Methodological approaches and case studies of food adulteration; Assessment of chemical, biological (microbiological and biotechnological) and physical hazards. Assessment of advances in nanotechnologies for food quality and safety; Principles of traceability in food production and supply chains. Competences and responsibilities of all stakeholders from the farmer to the consumer for ensuring quality and safety in the food chain. The role of extrinsic factors (e.g. national surveillance and inspection systems, public media, education system etc.) for risk management and ensuring quality and safety in food production and supply chains. Ethics in the system of food qualiyt and safety. Analysis of case studies from the practice and from recent research projects. What we could learn from them? Microbial physiology in minimal processing of foods in the light of food safety requirements. Genetically modified organisms in food – novelties in analytics and requirements for food safety according to ISO 17025; Novel technological principles for food and feed

materiali za zmanjševanje problema adhezivnosti mikroorganizmov na površine, tvorbe mikrobnih biofilmov in drugih oblik perzistentnosti mikrobnih povzročiteljev kvarjenja in okužb, ki predstavljajo tveganje za varnost in kakovost živilskih proizvodov, razvoj novih protimikrobnih sredstev v boju proti odpornosti na klasične biocide oz. mikrobicide, strategije reševanja kot so aktivno pakiranje, biološka kontrola, kombinirano konzerviranje, higienski design itd.) Koncepti ocenjevanja varnosti v proizvodno-prehranski oskrbovalni verigi	safety and quality management under conditions of minimal processing (e.g., role of new materials for reducing the problem of microbial adhesion on surfaces, microbial biofilm formation and other forms of persistence of microorganisms presenting the risk of food spoilage or transmission of diseases; the problem of increasing resistance to antimicrobial agents, novel strategies such as active packaging, biological control, hurdle technologies, hygienic design etc.). General concepts of safety assessment in the food production and supply chains.

Temeljni literatura in viri / Readings:

Irudayaraj, Joseph (Ur.), Reh, Christoph (Ur.). Nondestructive testing of food quality. 1st ed., Ames (Iowa): Blackwell Publishing/IFT Press, 2008, XIII, 364 str.
Shaw, I.C. Food Safety: The Science of Keeping Food Safe.Oxford, Wiley-Blackwell, 2013; 428 str. (izbrana poglavja)
Cho, Yong-Jin (Ur.), Kang, Sukwon (Ur.). Emerging technologies for food quality and food safety evaluation. Boca Raton: CRC/Taylor & Francis, 2011, 346 str. (izbrana poglavja).
Bartosz Grzegorz (Ur.), Food Oxidants and Antioxidants. Boca Raton : CRC/Taylor & Francis, 2014, 551 str. (poglavja 1-8; str. 1-233)
ŽEL, Jana, MILAVEC, Mojca, MORISSET, Dany, PLAN, Damien, EEDE, G. van den, GRUDEN, Kristina. How to reliably test for GMOs, (Springer briefs in food, health, and nutrition). New York [etc.]: Springer, 2012. X, 100 str., ilustr. ISBN 978-1-4614-1389-9. [COBISS.SI-ID 2460239]
Smole Možina S.,, Klančnik, A., Raspor, P. Mechanisms of microbial resistance in biofilms. V: Simoes, M. (ur.), Mergulhao, F. (ur.). *Biofilms in bioengineering*, (Microbiology research advances). New York: Nova Science Publishers, 2013, str. 311-332.
Smole Možina, S., Jeršek, B., Demšar, L. Vidrih, R., Raspor, P. Dosežki sodelavcev živilstva na področju varnosti živil = Research achievements in the field of food safety. V: Raspor, P. (ur.), Hočevar, I. (ur.). *Živilstvo in prehrana včeraj, danes za jutri : 50 let študija živilske tehnologije : Ljubljana, 29. in 30. september 2011*. Ljubljana: BF, Oddelek za živilstvo, 2011, str. 41-58.
Jeršek, B., Klančnik, A., Kurinčič, M., Mavri, A., Kovač, J., Piskernik, S., Raspor, P., Smole Možina, S. Presentation of food microbiology and food safety research at the Chair = Predstavitev raziskav na področju živilske mikrobiologije in varnosti živil na katedri. V: Pomen biotehnologije in mikrobiologije za prihodnost, Ljubljana, 27th -28th Sept. 2012. Raspor, P. (ur.), Smole Možina, S. (ur.). *Biotechnology and microbiology for knowledge and benefit*, (Pomen biotehnologije in mikrobiologije za prihodnost, 09). Ljubljana: Biotehniška fakulteta, Oddelek za živilstvo, Katedra za biotehnologijo, mikrobiologijo in varnost živil, 2012, str. 17-32.
Drugi aktualni revijalni članki s področja, tekoče periodike in drugih učnih gradiv

Cilji in kompetence:	**Objectives and competences:**

Usposobitev kandidata za izvedbo najzahtevnejših nalog na področju in opravljanje raziskav, katerih rezultati bodo predstavljali pomembne prispevke temeljni ali aplikativni znanosti na področju kakovosti in varnosti živil.	The candidate should acquire theoretical knowledge and skills for food quality and safety management and also for basic and applied research work that can provide important results in the field of food quality and safety.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Kandidatovo poznavanje in razumevanje procesov, ki so povezani z izgubo kakovosti hrane in tveganji za zdravje potrošnika, poznavanje pomena in uporabnosti klasičnih in sodobnih fizikalnih, kemijskih, senzoričnih, mikrobioloških in biotehnoloških principov in metod za nadzor in vrednotenje kakovosti in varnosti živilskih izdelkov oz. proizvodno-prehranskih oskrbovalnih verig.	Knowledge and understanding of the processes associated with loss of food quality and safety, knowledge of the importance and usefulness of traditional and modern physical, chemical, sensory, microbiological and biotechnological approaches for determination and evaluation of quality and safety of food products and processes along the whole food production and supply chains.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, samostojen študij in izdelava projektne naloge.	Lectures, individual study, project work.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Ocena seminarskega dela	**50**	Assessment of the seminar work
Ocena izpita	**50**	Written examination

Reference nosilca / Lecturer's references:

Sonja Smole Možina

1. MAVRI, Ana, SMOLE MOŽINA, Sonja. Development of antimicrobial resistance in

Campylobacter jejuni and *Campylobacter coli* adapted to biocides. *International journal of food microbiology*, ISSN 0168-1605. [Print ed.], 2013, vol. 160, issue 3, str. 304-312, doi: 10.1016/j.ijfoodmicro.2012.11.006. [COBISS.SI-ID 4159864]

2. KATALINIĆ, Višnja, SMOLE MOŽINA, Sonja, GENERALIĆ, Ivana, SKROZA, Danijela, LJUBENKOV, Ivica, KLANČNIK, Anja. Phenolic profile, antioxidant capacity, and antimicrobial activity of leaf extracts from six Vitis vinifera L. varieties. *International journal of food properties*, ISSN 1094-2912, 2013, vol. 16, issue 1, str. 45-60. doi: 10.1080/10942912.2010.526274. [COBISS.SI-ID 3814264]

3. MAVRI, Ana, SMOLE MOŽINA, Sonja. Resistance to bile salt and sodium deoxycholate in macrolide- and fluoroquinolone-susceptible and resistant Campylobacter jejuni and Campylobacter coli strains. *Microbial drug resistance*, ISSN 1076-6294, 2013, vol. 19, issue 3, str. 168-174, doi: 10.1089/mdr.2012.0217. [COBISS.SI-ID 4187768]

4. GENERALIĆ, Ivana, SKROZA, Danijela, ŠURJAK, Jana, SMOLE MOŽINA, Sonja, LJUBENKOV, Ivica, KATALINIĆ, Ana, ŠIMAT, Vida, KATALINIĆ, Višnja. Seasonal variations of phenolics and biological properties of sage. *Chemistry & biodiversity*, ISSN 1612-1872, 2012, vol. 9, issue 2, str. 441-457, doi: 10.1002/cbdv.201100219. [COBISS.SI-ID 3965304]

5. UZUNOVIĆ, Selma, SMOLE MOŽINA, Sonja. Campylobacter infections in Zenica-Doboj Canton, Bosnia and Herzegovina - a story. *Medicinski glasnik*, ISSN 1840-0132, 2013, vol. 10, no. 1, str. 1-11. [COBISS.SI-ID 4190072]

6. MAVRI, Ana, ABRAMOVIČ, Helena, POLAK, Tomaž, BERTONCELJ, Jasna, JAMNIK, Polona, SMOLE MOŽINA, Sonja, JERŠEK, Barbara. Chemical properties and antioxidant and antimicrobial activities of Slovenian propolis. *Chemistry & biodiversity*, ISSN 1612-1872, 2012, vol. 9, issue 8, str. 1545-1558, doi: 10.1002/cbdv.201100337. [COBISS.SI-ID 4052088]

7. MAVRI, Ana, KURINČIČ, Marija, SMOLE MOŽINA, Sonja. The prevalence of antibiotic and biocide resistance among Campylobacter coli and Campylobacter jejuni from different sources. *Food technology and biotechnology*, ISSN 1330-9862, 2012, vol. 50, no. 3, str. 371-376. [COBISS.SI-ID 4051064]

8. VALENČIČ, Vasilij, BANDELJ MAVSAR, Dunja, BUČAR-MIKLAVČIČ, Milena, BUTINAR, Bojan, ČADEŽ, Neža, GOLOB, Terezija, RASPOR, Peter, SMOLE MOŽINA, Sonja. The impact of production technology on the growth of indigenous microflora and quality of table olives from Slovenian Istria. *Food technology and biotechnology*, ISSN 1330-9862, 2010, vol. 48, no. 3, str. 404-410. [COBISS.SI-ID 1853651]

9. ŠIKIĆ POGAČAR, Maja, KLANČNIK, Anja, SMOLE MOŽINA, Sonja, CENCIČ, Avrelija. Attachment, invasion, and translocation of Campylobacter jejuni in pig small-intestinal epithelial cells. *Foodborne pathogens and disease*, ISSN 1535-3141, 2010, issue 5, vol. 7, str. 589-595, doi: 10.1089/fpd.2009.0301. [COBISS.SI-ID 3737720]

10. ŠIKIĆ POGAČAR, Maja, RUBEŠA-MIHALJEVIĆ, Roberta, KLANČNIK, Anja, BRUMINI, Gordana, ABRAM, Maja, SMOLE MOŽINA, Sonja. Survival of stress exposed Campylobacter jejuni in the murine macrophage J774 cell line. *International journal of food microbiology*, ISSN 0168-1605. [Print ed.], 2009, vol. 129, no. 1, str. 68-73, doi: 10.1016/j.ijfoodmicro.2008.11.010. [COBISS.SI-ID 3532920]

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Povezava senzoričnih in instrumentalnih metod**
Course title:	**Interaction of sensory and instrumental methods**

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Interdisciplinarni doktorski študijski program BIOZNANOSTI 3. stopnja	**Živilstvo**	**1,2**	**1,2,3,4**
Interdisciplinary Doctoral Study Programme in BIOSCIENCES 3rd cycle	**Food Science**	**1,2**	**1,2,3,4**

Vrsta predmeta / Course type	teoretični predmet / theoretical course
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
10	**/**	**/**	**/**	**25**	**90**	**5**

Nosilec predmeta / Lecturer:	Nosilec: doc. dr. Mojca Korošec

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski / angleški Slovene / English
	Vaje / Tutorial:	slovenski / angleški Slovene / English

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Splošni pogoji za vpis na doktorski študij.	General conditions for enrolment in Doctoral Study.

Vsebina:	Content (Syllabus outline):
Specifična znanja s področja senzorične analize. Sodobne senzorične metode: profiliranje arome, kvantitativna opisna analiza, profiliranje teksture, senzorični spekter, profiliranje po lastni izbiri. Aroma/tuja aroma: receptorji za zaznavanje. Sodobne senzorične in instrumentalne metode (GC/vohanje in HTLC/okušanje, elektronski nos, elektronski jezik) za določanje senzorično aktivnih snovi in za ugotavljanje pristnosti oziroma potvorjenosti živil. Povezave med različnimi parametri kakovosti (instrumentalnimi in senzoričnimi) in oblikovanje podatkovnih baz.	Specific knowledge in the field of sensory analysis. Modern methods of sensory analysis: flavour profiling, quantitative descriptive analysis, texture profiling, sensory spectrum, free choice profiling. Flavour/off flavour: receptors for flavour perception. Modern sensory and instrumental methods (GC/olfactometry and HTLC/gustatory testing, electronic nose, electronic tongue) for determining the aroma active components and to identify adulteration and authenticity of food. The interaction of different parameters (instrumental and sensory) and generation of the databases.

Temeljni literatura in viri / Readings:

Izbrana poglavja iz naslednjih publikacij:

- Chen, Jianse (Ur), Engelen, Lina (Ur), Food Oral processing. 1st ed., Wiley-BlackWell, 2012, 225-335.
- Irudayaraj, Joseph (Ur.), Reh, Christoph (Ur.). Nondestructive testing of food quality. 1st ed., Ames (Iowa): Blackwell Publishing/IFT Press, 2008, XIII, 1-33; 237-283.

in

- revijalni članki s področja, tekoča periodika, druga učna gradiva

Cilji in kompetence:	Objectives and competences:
Osnovni cilj predmeta je poglobitev specifičnih znanj s področja senzorične in instrumentalne analize. Seznanjanje s tehnikami frakcioniranja vzorca in analizo senzorično aktivnih komponent s sodobnimi metodami GC/vohanje, HTLC/okušanje, E-nos in E-jezik. Usposobitev kandidata za kompleksno razumevanje deskriptorjev hlapnih in nehlapnih aromatičnih komponent (senzorično aktivnih komponent, komponente arome in tuje arome).	The basic educational objective is to deepen specific knowledge in the field of sensory and instrumental analysis. Insight in the fraction techniques of samples and analysis of the sensory active components by the modern sensory and instrumental methods GC/olfactometry, HTLC/gustatory testing, E-nose, E-tongue). Training of candidates for a complex understanding of descriptors of odorous or aromatic components and flavouring substances (sensory active components, component of flavour and off flavour).

Predvideni študijski rezultati:	Intended learning outcomes:

Znanje in razumevanje:	Knowledge and understanding:
Kandidat je usposobljen za izvedbo raziskav na področju uporabe sodobnih senzoričnih in instrumentalnih tehnik, celovito in kritično ovrednotenje dobljenih rezultatov ter pravilno interpretacijo rezultatov. Kandidat v okviru predmeta pridobi znanje o nastajanju in uporabi podatkovnih baz.	Intended learning outcomes are to qualify a candidate for the execution of research applying the advanced sensory and instrumental techniques, comprehensive and critical evaluation of the obtained results and the correct interpretation of results. Candidates in this course will acquire knowledge on the generation and use of databases.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, seminarji na temo izbranega primera (case study), laboratorijske vaje.	Lectures, seminars on the topic of the selected case (case study), laboratory exercises.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Študent na izbrani temi pripravi projektno seminarsko nalogo, ki je pogoj za opravljanje izpita; ustni izpit.	seminar: 30%, pisni izpit / written exam: 70 %	Students prepare a paper project from the selected theme, which is a prerequisite for the exam; oral exam.

Reference nosilca / izvajalcev / Lecturer's references:

KOROŠEC, Mojca

1. KOROŠEC, Mojca, GOLOB, Terezija, BERTONCELJ, Jasna, STIBILJ, Vekoslava, KOROUŠIĆ-SELJAK, Barbara. The Slovenian food composition database. V: FINGLAS, Paul M. (ur.). Food composition and sustainable diets, 9th International Food Data Conference, September 14-17, 2011, Norwich, United Kingdom, (Food chemistry, ISSN 0308-8146, Vol. 140, no. 3). Amsterdam [etc.]: Elsevier, 2013, str. 495-499, doi: 10.1016/j.foodchem.2013.01.005. [COBISS.SI-ID 4197496], [JCR, SNIP, WoS do 4. 12. 2015: št. citatov (TC): 5, čistih citatov (CI): 2, Scopus do 26. 11. 2016: št. citatov (TC): 5, čistih citatov (CI): 2

2. BERTONCELJ, Jasna, GOLOB, Terezija, KROPF, Urška, **KOROŠEC, Mojca**. Characterisation of Slovenian honeys on the basis of sensory and physicochemical analysis with a chemometric approach. International journal of food science & technology, ISSN 0950-5423. [Print ed.], 2011, vol. 46, str. 1661-1671, doi: 10.1111/j.1365-2621.2011.02664.x. [COBISS.SI-ID 3903096], [JCR, SNIP, WoS do 6. 6. 2016: št. citatov (TC): 13, čistih citatov (CI): 13, Scopus do 17. 11. 2016: št. citatov (TC): 15, čistih citatov (CI): 15

3. BERTONCELJ, Jasna, POLAK, Tomaž, KROPF, Urška, **KOROŠEC, Mojca**, GOLOB, Terezija.

LC-DAD-ESI/MS analysis of flavonoids and abscisic acid with chemometric approach for the classification of Slovenian honey. Food chemistry, ISSN 0308-8146. [Print ed.], 2011, vol. 127, str. 296-302, doi: 10.1016/j.foodchem.2011.01.003. [COBISS.SI-ID 3869048], [JCR, SNIP, WoS do 6. 9. 2016: št. citatov (TC): 33, čistih citatov (CI): 30, Scopus do 6. 10. 2016: št. citatov (TC): 37, čistih citatov (CI): 34]

4. KROPF, Urška, GOLOB, Terezija, NEČEMER, Marijan, KUMP, Peter, **KOROŠEC, Mojca**, BERTONCELJ, Jasna, OGRINC, Nives. Carbon and nitrogen natural stable isotopes in Slovene honey : adulteration and botanical and geographical aspects. Journal of agricultural and food chemistry, ISSN 0021-8561, 2010, vol. 58, no. 24, str. 12794-12803, doi: 10.1021/jf102940s. [COBISS.SI-ID 24189223], [JCR, SNIP, WoS do 7. 11. 2016: št. citatov (TC): 21, čistih citatov (CI): 18, Scopus do 23. 11. 2016: št. citatov (TC): 25, čistih citatov (CI): 22

5. GOLOB, Terezija, BERTONCELJ, Jasna, **KOROŠEC, Mojca**. Flevor - kompleksna senzorična zaznava. Dietetikus, 2013, letn. 15, št. 1/2, str. 25-28. [COBISS.SI-ID 4250232]

6. GOLOB, Terezija, BERTONCELJ, Jasna, KROPF, Urška, **KOROŠEC, Mojca**. Senzorična analiza živil. Ljubljana: Biotehniška fakulteta, Oddelek za živilstvo, 2006. 81 str., ilustr. ISBN 961-6333-42-9. [COBISS.SI-ID 223939072]

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Sodobne tehnologije rastlinskih živil**
Course title:	**Contemporary technologies of plant food**

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Interdisciplinarni doktorski študijski program BIOZNANOSTI 3. stopnja	**živilstvo**	**1,2**	**1,2,3,4**
Interdisciplinary Doctoral Study Programme in BIOSCIENCES 3rd cycle	**Food science**	**1,2**	**1,2,3,4**

Vrsta predmeta / Course type	Izbirni predmet / Elective subject
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
10	**15**	**15**	**/**	**/**	**85**	**5**

Nosilec predmeta / Lecturer:	Nosilec: prof. dr. Janez Hribar

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski / angleški Slovene / English
	Vaje / Tutorial:	slovenski / angleški Slovene / English

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Splošni pogoji za vpis na doktorski študij	General conditions for enrolment in Doctoral study

Vsebina:	**Content (Syllabus outline):**

Usmerjati poobiralno fiziologijo sadja v skladišču (mejne vrednosti O_2 in temperature) v izboljšanje parametrov kakovosti, ki jih določajo potrošniki. Pilotna aplikacija dinamične atmosfere za skladiščenje sadja ter vpliv dinamične atmosfere na pojav fizioloških bolezni. Študij sinteze aromatskih spojin med zorenjem sadja ter pomembnost arome sadja s stališča potrošnika. Študij uporabe mejnih temperatur (0,2 °C nad zmrziščem sadja) kot alternativa uporabe 1-MCP. Študij fiziologije sadja in vrtnin pri pakiranju v modificirano atmosfero in uporaba plastičnih folij z namensko prepustnostjo ter uporaba adsorbentov CO_2 in O_2. Uporaba naravnih aditivov za izboljšanje funkcionalnih lastnosti moke in povečanje prehranske vrednosti kruha. Uporaba modernih tehnologije predelave grozdja (flotacija, makrooksigencacija) in pridelave vina (mikrooksigenacija, reduktivna tehnologija). Študij ohranjanja aromatičnih spojin vina (sortnih, fermentacijskih in zorilnih arom). Proučevanje dejavnikov, ki vplivajo na alkoholno in jabolčno-mlečnokislinsko fermentacijo. Študij optimalnega zorenja vina in drugih proizvodov iz grozdja in vina. Zmanjšanje uporabe enoloških sredstev ob zagotavljanju prehranske vrednosti vina kot varnega živila. Študij fizikalno-kemijske in mikrobiološke stabilnosti vina.	Steer poobiralno physiology of fruit in storage (limiting O_2 and temperature) to improve the quality parameters as perceived by consumers. The application of pilot dynamic atmosphere storage of fruits and the impact of dynamic atmosphere on the occurrence of physiological diseases. Study of the synthesis of aroma compounds during ripening of fruit and the importance of fruit flavors from the perspective of the consumer. Study of the application of minimum temperature (0.2 °C above the freezing point of fruit) as an alternative to the use of 1-MCP. Study of the physiology of fruits and vegetables packed in a modified atmosphere and use of plastic films with a known permeability and the use of CO_2 and O_2 adsorbents. The use of natural additives for improving the functional properties of flour and increasing the nutritional value of bread. The use of modern technologies for grape processing (flotation , macrooxygenation) and wine production (microoxygenation, reductive technology). Studies of preserving the aroma compounds of wine (varietal , fermentation and aging aromas). The study of factors affecting the alcoholic and malolactic fermentation. Study of optimal ripening of wine and other grape and wine products. Reduce the use of oenological agents while ensuring the nutritional value of wine as a safe food . Study of physico-chemical and microbiological stabilization of wine .

Temeljni literatura in viri / Readings:

Izbrana poglavja iz naslednjih publikacij:

- Ben-Yehoshua, S. 2005. Environmentally friendly technologies for agricultural produce quality, strani: 61 – 112; 133 – 148; 447 – 491.
- Ottaway, P. B. 2004. The international review of food science and technology, 142 str.
- Thomphson, K., 2008. Fruit and Vegetables: Harvesting, Handling and Storage, 480 str.
- Rodrigues S., Fernandes FAN, 2012, Advances in Fruit Processing Technologies, 472 str.
- Arvanitoyannis I. 2012, Modified Atmosphere and Active Packaging Technologies, 826 str.
- Jackson, R.S. 2008. Wine science. Principles and applications. 3rd edition. Elsevier Inc., Oxford.
- Jackson, R.S. 2009. Wine tasting: A professional handbook. 2nd edition. Elsevier Inc., Oxford.
- Kilcast, D. 2010. Sensory analysis for food and beverage quality control: A practical guide. Woodhead Publishing Limited, Cambridge.
- Reynolds, A.G. 2010. Managing wine quality. Volume 1: Viticulture and wine quality. Woodhead Publishing Limited, Cambridge.
- Reynolds, A.G. 2010. Managing wine quality. Volume 2: Oenology and wine quality. Woodhead Publishing Limited, Cambridge.
- Ribéreau-Gayon, P., Glories, Y., Maujean, A., Dubourdieu, D. 2006. Handbook of enology,

Volume 1: Microbiology of wine and vinifications, 2nd edition. John Wiley & Sons, Ltd., Chichester.

- Ribéreau-Gayon, P., Glories, Y., Maujean, A., Dubourdieu, D. 2006. Handbook of enology, Volume 2: Chemistry of wine stabilization and treatments, 2nd edition. John Wiley & Sons, Ltd., Chichester.

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Cilji in kompetence:

Znanje in razumevanje: Študentje se seznanijo s sodobnimi tehnološkimi postopki predelave rastlinskih živil, ki vključuje sadje, zelenjavo, poljščine in vino. Spoznajo tehnologijo, ki omogoča pridobitev kakovosti in stabilnosti pridelkov, ki jo vedno bolj zahtevajo potrošniki. Študentje se bodo v laboratoriju srečali s praktično uporabo nekaterih od naštetih tehnologij.

Objectives and competences:

Knowledge and Understanding: Students get acquainted with modern technological processes of plant foods, which include fruits, vegetables, cereals and wine. Learn about the technology, which will allow obtaining the quality and stability of products that consumers increasingly demand. Students will meet in the laboratory to practical application of some of these technologies.

Predvideni študijski rezultati:

Znanje in razumevanje:
Predmet daje znanje, potrebno pri razvoju sodobnih tehnologij v živilski tehnologiji. Seznani se s kritičnim ovrednotenjem prednosti in pomanjkljivosti novih tehnologij s stališča končnega proizvoda.

Intended learning outcomes:

Knowledge and Understanding:
The subject gives the knowledge needed in the development of modern technologies in food technology. Pair it with a critical evaluation of the advantages and disadvantages of new technologies from the perspective of the end product.

Metode poučevanja in učenja:

Predavanja, laboratorijsko delo, samostojna priprava seminarjev in predstavitev. Pisno preverjanje znanja.

Learning and teaching methods:

Lectures, laboratory work, independent preparation of seminars and presentations. Written examination.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Študent pripravi seminar, ki je pogoj za pisni izpit.	Seminar: 50 % Pisni izpit/written exam: 50 %	Student prepare seminar that is a prerequisite for the written exam.

Reference nosilca / izvajalcev / Lecturer's references:

Janez Hribar

1. SINKOVIČ, Lovro, HRIBAR, Janez, VIDRIH, Rajko. Influence of cultivar and storage of chicory (Cichorium intybus L.) plants on polyphenol composition and antioxidative potential. *Czech Journal of Food Sciences*, ISSN 1212-1800, 2014, vol. 32, no. 1, str. 10-15. [COBISS.SI-ID 4363896], [JCR, SNIP]
2. KADIVEC, Mirta, MOŽE BORNŠEK, Špela, POLAK, Tomaž, DEMŠAR, Lea, HRIBAR, Janez, POŽRL, Tomaž. Phenolic content of strawberry spreads during processing and storage. *Journal of agricultural and food chemistry*, ISSN 0021-8561, 2013, vol. 61, str. 9220-9229, doi: 10.1021/jf4035767. [COBISS.SI-ID 4287864],
3. KOPJAR, Mirela, HRIBAR, Janez, SIMČIČ, Marjan, ZLATIĆ, Emil, POŽRL, Tomaž, PILIŽOTA, Vlasta. Effect of trehalose addition on volatiles responsible for strawberry aroma. *Natural product communications*, ISSN 1934-578X, 2013, vol. 8, no. 12, str. 1767-

1770, ilustr. [COBISS.SI-ID 4353912], [JCR,SNIP]
VIDRIH, Rajko, HRIBAR, Janez, SOLAR, Anita, ZLATIĆ, Emil. The influence of atmosphere on the oxidation of ground walnut during storage at 20 °C. *Food technology and biotechnology*, ISSN 1330-9862, 2012, vol. 50, no. 4, str. 454-460. [COBISS.SI-ID 4014968], [JCR, SNIP]

4. UNUK, Tatjana, TIJSKENS, Leopold M. M., GERMŠEK, Blaž, ZADRAVEC, Peter, VOGRIN, Andrej, HRIBAR, Janez, SIMČIČ, Marjan, TOJNKO, Stanislav. Effect of location in the canopy on the colour development of three apple cultivars during growth. *Journal of the Science of Food and Agriculture*, ISSN 0022-5142, 2012, vol. 92, no. 12, str. 2450-2458, doi: 10.1002/jsfa.5651. [COBISS.SI-ID 4057208], [JCR, SNIP
5. TIJSKENS, Leopold M. M., UNUK, Tatjana, TOJNKO, Stanislav, HRIBAR, Janez, SIMČIČ, Marjan. Colour development in the apple orchard. *Journal of Fruit and Ornamental Plant Research*, ISSN 1231-0948, 2011, vol. 19, no. 1, str. 113-121. [COBISS.SI-ID 3208236]

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Sodobne tehnologije animalnih živil**
Course title:	**New technologies in food of animal origin**

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Interdisciplinarni doktorski študijski program BIOZNANOSTI 3. stopnja	**Živilstvo**	**1,2**	**1,2,3,4**
Interdisciplinary Doctoral Study Programme in BIOSCIENCES 3rd cycle	**Food Science**	**1,2**	**1,2,3,4**

Vrsta predmeta / Course type	teoretični predmet / theoretical course
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
10	**20**	**/**	**/**	**/**	**95**	**5**

Nosilec predmeta / Lecturer:	Nosilec: prof. dr. Lea Demšar

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski Slovene
	Vaje / Tutorial:	slovenski Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Splošni pogoji za vpis na doktorski študij.	General conditions for enrolment in doctoral studies.

Vsebina:	**Content (Syllabus outline):**
Meso: - sodobni procesi konzerviranja in kakovost mesa in mesnih izdelkov (aseptično procesiranje, mikrovalovno segrevanje, nove tehnologije, sous vide tehnologija, aktivno pakiranje, …) - problematika heterocikličnih aminov v toplotno obdelanih živilih živalskega izvora (poznavanje biosinteznih poti, njihova identifikacija, delovanje *in vitro*, fiziološko-zdravstveni učinki nekaterih heterocikličnih	**Meat:** - contemporary processes of preservation and quality of meat and meat products (aseptic processing, microwave heating, new technologies, *sous vide* technology, active packaging, ...) - issue of heterocyclic amines in heat-treated foods of animal origin (knowledge of the biosynthetic pathway, their identification, activity *in vitro*, physiologically-health effects of some heterocyclic amines and Maillard

aminov in produkti Maillardove reakcije; načini zmanjševanja tvorbe) - problematika maščobnokislinskega profila mesa in mesnih izdelkov (vpliv prehrane živali, analitika, možnost razvoja funkcionalnega živila z optimalnim maščobnokislinskim profilom) **Mleko:** - kot izvor funkcionalnih sestavin: *bioaktivni peptidi* – pregled, primer ACE-inhibitornih peptidov, protimikrobnih peptidov, kazeinopeptidov (definicija, struktura, proizvodnja, varnost, aplikacija), *bakteriocini* mlečnokislinskih bakterij ter možnost njihove uporabe kot naravnih biokonzervansov – primer nizin, gassericini (definicija, sinteza, razvrstitev, lastnosti, delovanje, aplikacija, regulative), *oligosaharidi* (fiziološki učinki, sodobne analitske metode karakterizacije), *konjugirana linolna kislina* (naravni izvor, komercialno pridobivanje, analitske metode določanja, zdravju pozitivni učinki) - razvoj in oblikovanje funkcionalnih mlečnih izdelkov za posamezne kategorije potrošnikov (izdelki s prilagojeno sestavo - brezlaktozni mlečni izdelki ali z znižano vsebnostjo laktoze; izdelki obogateni s konjugirano linolno kislino, bioaktivnimi peptidi, antioksidanti, simbiotiki; zaščitne starterske kulture, pripravki na bazi serumskih beljakovin)	reaction products; methods of reducing formation) - problems bound on fatty acid profile of meat and meat products (impact of animal nutrition, analitics, possibility of developing functional foods with optimal fatty acid profile) **Milk:** - as a source of functional components: *bioactive peptides* – overview, case study of ACE-inhibitory peptides, antimicrobial peptides, caseinopeptides (definition, structure, production, safety assessment, application); bacteriocins of lactic acid bacteria and their possible use as natural biopreservatives, case study of nisin, gassericins (definition, synthesis, classification, characteristics, mode of action, application, regulative); *oligosaccharides* (physiological functions, modern analytical methods for their characterization); *conjugated linoleic acid* (natural sources and commercial production of CLA, analytical methods, health benefits of CLA) - development and designing of functional products for particular category of consumers (products with adapted composition: reduced lactose or lactose-free dairy products; products enriched with conjugated linoleic acid, bioactive peptides, antioxidants and/or symbiotics; protective starter cultures; whey proteins based products)

Temeljni literatura in viri / Readings:

Izbrana poglavja iz monografij:

Sun D.W. 2012. Thermal food processing: new technologies and quality issues. New York, CRC Press: 666 str.

Hui Y. H. 2012. Handbook of Meat and Meat Processing, Second Edition. New York, CRC Press: 1000 str.

Research and applications in bacteriocins. 2007. Riley M.A., Gillor O. (eds.). Wymondham, UK: Horizon Bioscience: 218 str.

Functional dairy products. 2003. Mattila-Sandholm T., Saarela M. (eds.). CRC Woodhead publishing Ltd., 1-312.

Introduction to Functional Food Science. 2013. Martirosyan, DM (ed.). Food Science Publisher, 6-58.

Revijalni članki s področja, tekoča periodika, druga učna gradiva...

Cilji in kompetence:	**Objectives and competences:**

Temeljni izobraževalni cilj je poglobitev znanja za samostojno delo na področju raziskav predelave mesa in mleka, s poudarkom na seznanjanju s principi in tehnologijami predelave, tako tradicionalnih kot sodobnih, ter kakovostjo in zagotavljanjem varnosti živil živalskega izvora.	The goals of the course are deepening and extending knowledge and skills for self-dependent work on the meat and milk technology area, with a focus on communicating the principles and techniques of processing, traditional and modern, as well as ensuring quality and safety of foods of animal origin.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Predviden študijski rezultat je kandidata usposobiti za izvedbo raziskav na področju raziskav predelave mesa in mleka, rezultati katerih bodo predstavljali pomembne prispevke temeljni ali aplikativni znanosti na področju živilskih znanosti. Študent v okviru predmeta pridobi sposobnost identifikacije, kritične presoje in reševanja tehnoloških problemov, razvoja novih živil, zbiranja podatkov analiz in njihove interpretacije, uporabe domače in tuje strokovne literature preko knjižnice BF in IKT, timskega dela.	Knowledge and understanding: Students acquire capacity to implement the in the field of meat and milk processing; the results of these studies will constitute an important contribution to basic or applied science in the field of food science. Students receive direction and indicate the possibility of potential research, critical thinking and solving technological problems, novel foods, use of data collection analysis in this area, as well as use of domestic and foreign literature through BF and IKT libraries, and get ready to write articles and work in a professional team.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, samostojna priprava seminarjev in predstavitev.	Lectures, seminar, independent preparation and presentation.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
a) oddana, pregledana in zagovarjana seminarska naloga	**50**	a) seminar
b) izpit (pisni ali ustni)	**50**	b) exam (oral or written)

Reference nosilca / Lecturer's references:

Lea Demšar

1. Demšar, Lea, Skvarča, Marlena, Žlender, Božidar, Lušnic Polak, Mateja, Polak, Tomaž. Quality assessment of Slovenian krvavica, a traditional blood sausage : sensory evaluation. Journal of food processing and preservation, ISSN 1745-4549, 2014, vol. 38, str. 97-105, ilustr., doi: 10.1111/j.1745-4549.2012.00750.x. [COBISS.SI-ID 4080248]
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