S V E U Č I L I Š T E U S P L I T U

SVEUČILIŠNI ODJEL ZA STUDIJE MORA

IZMJENE I DOPUNE STUDIJSKOG PROGRAMA

Diplomski studij Morsko ribarstvo

SPLIT, ožujak, 2020.

OPĆE INFORMACIJE O STUDIJSKOM PROGRAMU

Prvotni naziv studijskoga programa	Morsko ribarstvo		
Novi naziv studijskoga programa	Marine Fishery		
Nositelj studijskoga programa	Sveučilišni odjel za studije mora Sveučilišta u Splitu		
Suizvođač/i studijskoga programa	-		
Vrsta studijskoga programa	Stručni studijski program ☐	Sveučilišni studijski program ☒	
Razina studijskoga programa	Preddiplomski ☐	Diplomski ☒	Integrirani ☐
	Poslijediplomski sveučilišni ☐	Poslijediplomski specijalistički ☐	Diplomski specijalistički ☐
Akademski/stručni naziv koji se stječe po završetku studija	magistar/magistra inženjer/inženjerka morskog ribarstva		
Ukupni broj ECTS bodova	120 (252)		
Ukupni broj ECTS bodova predmeta u kojima je došlo do promjene	16		
Procjena postotka izmjena i dopuna studijskog programa	☒ Manje od 20% ☐ Više od 20%, manje od 40% ☐ Više od 40%		
Redni broj izmjene i dopune studijskog programa	1.		
Odluka fakultetskog vijeća o prihvaćanju izmjena i dopuna (dostaviti u prilogu)			
Preslika dopusnice za studijski program (dostaviti u prilogu)			

Popis i obrazloženje izmjena i/ili dopuna

U listopadu 2018. godine na Sveučilištu u Splitu je započeo razvojni projekt financiran od strane Europskog socijalnog fonda naziva *Internacionalizacija studijskih programa Morskog ribarstva i Vojnog pomorstva na Sveučilištu u Splitu*, oznake UP.03.1.1.02.0046 (http://interiv.unist.hr), kojem je cilj, između ostalog, upisati prvu generaciju stranih studenata na diplomskom sveučilišnom studiju Morsko ribarstvo na engleskom jeziku u akademskoj godini 2020./2021. na Sveučilišnom odjelu za studije mora.
Diplomski sveučilišni studij Morsko ribarstvo na engleskom jeziku je pripremljen u skladu s predloženim projektom onako kako je koncipiran u podnesenom prijavnom obrascu i pripadajućim prilozima, zatim s Ugovorom o provedbi i realizaciji navedenog projekta, cjelokupnom ugovornom dokumentacijom te Pravilnikom o postupku vrjednovanja studijskih programa Sveučilišta u Splitu prema kojem u manje izmjene programa spada izvođenje studijskog programa na stranom jeziku za studije koji su akreditirani na hrvatskom jeziku. S obzirom na navedeno, a također uz uvažavanje specifičnosti područja studija i potrebne prilagodbe prilikom pripreme studija za strane studente, diplomski sveučilišni studij Morsko ribarstvo na engleskom jeziku se u manjoj mjeri razlikuje od diplomskog sveučilišnog studija Morsko ribarstvo na hrvatskom jeziku (procjena postotka razlike iznosi 13,3%, odnosno 6,5%). Unatoč manjim razlikama, predmeti diplomskog sveučilišnog studija Morsko ribarstvo na engleskom jeziku omogućavaju stjecanje ishoda učenja ovog studijskog programa koji je akreditiran na hrvatskom jeziku, pa samim time i stjecanje akademskog naziva magistar/magistra inženjer/inženjerka morskog ribarstva (*Master of Science in Marine Fishery*). U sljedećoj su tablici prikazane samo manje izmjene i dopune studijskog programa koje prema Pravilniku o postupku vrjednovanja studijskih programa Sveučilišta u Splitu znače sadržajne promjene do 20% cijelog studijskog programa.

Semestar	Predmet	ECTS prije	ECTS poslije	Izmjena (navesti u čemu je izmjena)
2.	Mikrobiologija zagađenih voda / *Microbiology of polluted waters*	-	2	Uvođenje novog predmeta
3.	Tehnološki procesi proizvoda ribarstva / *Seafood processing technology*	3	3	Promjena naslova predmeta zbog izmjene i dopune sadržaja predmeta te promjena semestra u kojem se predmet izvodi i preraspodjela broja nastavnih sati
3.	Ribolov i kolebanje ribljih stokova	5	-	Izbacivanje postojećeg predmeta
3.	Klimatske promjene i morski ekosustavi / *Climate change and marine ecosystems*	2	3	Promjena broja ECTS-a zbog izmjene i dopune sadržaja predmeta
3.	Očuvanje bioraznolikosti u moru / *Conservation of marine biodiversity*	2	3	Promjena broja ECTS-a zbog izmjene i dopune sadržaja predmeta

Opis novog predmeta ili predmeta koji je nadopunjen i izmijenjen

NAME OF THE COURSE	**MICROBIOLOGY OF POLLUTED WATERS**					
Code	SMB505	Year of study	1			
Course teacher	Marin Ordulj, PhD	Credits (ECTS)	2			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			15	15	0	-

Status of the course	Elective	Percentage of application of e-learning	
COURSE DESCRIPTION			
Course objectives	The microbiology of polluted waters focuses on the study of microorganisms which are allochthonous in water. The waters where they are found do not represent their natural environment. The presence of such microorganisms in water indicates microbiological pollution, and the aim of this course is to classify the microbiological or sanitary quality of waters based on the pollution level.		
Course enrolment requirements and entry competences required for the course	Basic knowledge of General Microbiology and Marine Microbiology		
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Familiarize with the sources of allochthonous microorganisms and their overview, as well as with characteristics of pathogenic microorganisms most commonly found in polluted waters. Acquire knowledge on indicator organisms, criteria, and standards for water quality assessment. Understand the fate of allochthonous microorganisms upon entering the aquatic environment and the factors which affect their survival. Assess the impact of microbiologically polluted waters on the water-based economic activities.		
Course content broken down in detail by weekly class schedule (syllabus)	**Lecture 1.** Know the sources of allochthonous microorganisms: municipal wastewater, atmosphere, soil, animal and fish farms, ballast water. Be able to define different groups of pathogenic microorganisms that enter the aquatic environment from various sources. Provide an overview of pathogenic bacteria, viruses, fungi, protists and other parasites commonly found in polluted waters. (2 hours) **Lecture 2.** Give an overview, including properties of allochthonous pathogenic groups of microorganisms found in eutrophicated waters. Familiarize with the changes the bloom of microorganisms causes in the water environment; understand how microorganisms create hypoxic and anoxic conditions and gain knowledge on the impact such conditions have on water environment. (2 hours) **Lecture 3.** Know different species of cyanobacteria that may be present in bathing waters. Be familiarized with the threats of cyanobacteria found in bathing waters. Know the causes of cyanobacterial blooms in the waters. Habilitate to different species of cyanobacteria that may be present in bathing waters and their negative impact in bathing waters. Know the legislation that governs the quality of bathing waters. (2 hours) **Lecture 4.** Habilitate students to the concept and definition of criteria and standards for water quality and to the review of standards for different types of water (drinking water, rivers, sea, etc.). Define the term and offer definition of the indicator and give an overview of the faecal pollution indicators: coliform bacteria, faecal coliforms (Escherichia coli), faecal streptococci, intestinal enterococci, and anaerobic bacteria. What is the purpose of determining the degree of pollution of different types of water? Explain what happens to microorganisms upon their arrival in the aquatic environment. Habilitate students to the survival of allochthonous microorganisms in the freshwater and marine environment; understand the mechanisms of adaptation and survival. Give an overview of the factors that have a significant impact on the survival of microorganisms: solar radiation (light), temperature, osmotic pressure, pH, nutrients, heavy metals, antagonistic activity of other organisms, and the combined effect of several factors. (2 hours) **Lecture 5.** Learn which information is used to create a beach profile. Acquire knowledge on how to create profile of the public beach. (2 hours) **Lecture 6.** Familiarize with the methods of elimination of potentially pathogenic microorganisms from drinking waters. Know the response of microorganisms to the disinfection methods used to treat drinking water. (2 hours) **Lecture 7.** Analyse which pathogenic microorganisms from pre-treated sources most often enter the aquatic environment and why. Provide an overview of pathogenic bacteria, viruses, fungi, protists and other parasites commonly found in		

<table>
<tr><td></td><td colspan="6">polluted waters. Understand the effect of water treatment procedures on pathogenic microorganisms. Know the regulations for urban wastewater treatments. Know the fate of microorganisms upon their arrival in the aquatic environment. (2 hours)
Lecture 8. Learn the processes of bioremediation; know which types of microorganisms can be used in the process of bioremediation to remove the negative effect of microbiologically polluted waters. (2 hours)
Lecture 9. Know how the microorganisms are transported in different waters through ballast water; Know the differences in survival among the specified groups of microorganisms. (2 hours)
Lecture 10. Know how biosensors can be used to monitor microbiologically polluted waters. Get acquainted with the usage of biosensors for measuring the impact of allochthonous and pathogenic microorganisms in the water. (2 hours)
SEMINARS
Each student creates seminar paper independently on the most important topics. The presentations of the seminars are followed by a discussion.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☒ seminars and workshops
☐ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">-</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>1</td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>1</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">The exam consists of an oral and a written part. The student is required to orally present a seminar. The final grade is obtained from the average of the grades achieved in oral and written part of the exam.</td></tr>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">Tortora, G.J., Funke, B.R., Case, C.L., Johnson, T.R. 2016. Microbiology: an introduction (Vol. 9). San Francisco, CA: Benjamin Cummings. 810 p.</td><td></td><td></td></tr>
<tr><td colspan="3">Mayer, R.M., Pepper, I.L. and Gerba, C.P. 2000. Environmental Microbiology, Academic Press, 585 p.</td><td></td><td></td></tr>
<tr><td colspan="3">C. B. Munn - Marine Microbiology: Ecology & Applications, 2nd Edition. 2011 CRC Press</td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">Ordulj. 2020. Instructional materials (internal script, ppt presentations, etc.).</td></tr>
<tr><td>Quality assurance methods that ensure the</td><td colspan="6">Students' performance will be evaluated and graded during the course, as well as at the final exam. During the course, the following are evaluated:
a) Attendance
b) Teaching activity</td></tr>
</table>

acquisition of exit competences	c) Knowledge acquired
Other (as the proposer wishes to add)	

NAME OF THE COURSE	SEAFOOD PROCESSING TECHNOLOGY					
Code	SMR518	Year of study	1			
Course teacher	Vida Šimat, PhD	Credits (ECTS)	3			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30	15	0	-
Status of the course	Elective	Percentage of application of e-learning				

COURSE DESCRIPTION		
Course objectives	The main objective of this course is to enable students to understand and implement the proper ways of handling fish and fishery products from catch to the table and selecting suitable methods of conservation and implementation of good manufacturing practices during various processes of conservation of fishery products.	
Course enrolment requirements and entry competences required for the course	Competence in applying knowledge of inorganic and organic chemistry and biochemistry and basic microbiology.	
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	- Explain the principles of individual technological processes for the conservation and processing of fishery products - analyze post-mortem changes affecting the quality and shelf life of fishery products - analyze the impact of technological processes on the quality and shelf life of fishery products	
Course content broken down in detail by weekly class schedule (syllabus)	**Lecture 1:** Introductory Lecture, Status and Trends in Fisheries, Fish Structure and Composition (3 hours) **Lecture 2:** Post-mortem changes on fish meat. (3 hours) **Lecture 3:** Degradation of raw materials and products. (2 hours) **Lecture 4:** Ice in Fisheries. (3 hours) **Lecture 5:** Fish preservation using low temperatures (cooling and freezing). (4 hours) **Lecture 6:** Fish preservation using high temperatures. Production of canned fish. (3 hours) **Lecture 7:** Fish preservation by drying. Fish preservation by smoking. (3 hours) **Lecture 8:** Fish preservation by marinating. Fish preservation by salting. (3 hours) **Lecture 9:** Preservation technologies of invertebrates and algae (3 hours) **Lecture 10:** Packaging materials and methods for fishery products (3 hours) **SEMINARS** Through seminars, each student independently implements a technological process for a product, and actively discusses and explains with the teacher and colleagues the defense procedures in production, the choice of packaging materials and packaging methods, and key points in the production process. The student is required to prepare the material discussed at the seminars. The teacher evaluates the student's participation in the seminar (demonstrated knowledge, understanding, problem-solving ability, reasoning, discussion activity, etc.).	
	×☐ lectures	×☐ independent assignments

<table>
<tr><td>Format of instruction</td><td colspan="6">×☐ seminars and workshops
☐ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="2">☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Students responsibilities</td><td colspan="8">Students are required to attend classes (lectures and exercises), to actively participate in the teaching process and pass the exam (colloquiums). The presence in the classroom will be recorded (lectures and exercises). A student is allowed one unexcused absence from exercises and two absences from lectures. Field exercises are obligatory. The omission is justified in the case of certain activities at the University for which it is necessary to have a written confirmation. Delay in classes (lectures and exercises) will also be recorded; three delays will be counted as one unexcused absence. 100% presence in the class will be rewarded with two points at the colloquium.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>0,5</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Field exercises</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>2,00</td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0,5</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="8">The course material is divided into two parts. Students take this unit separately through one written exam with 25 points and a defense of seminar paper with 75 points. At least 60% is required to be considered as one unit. The score is unique and is awarded according to the total number of points:
> 90 points - excellent (5)
76 - 89 points - very good (4)
63 - 75 points - good (3)
50 - 62 points - sufficient (2)
<50 student did not satisfy.</td></tr>
<tr><td rowspan="5">Required literature (available in the library and via other media)</td><td colspan="5">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="5">Sikorski ZE. (1990). Seafood: resources, nutritional composition and preservation, CRC Press, Inc. Boca Raton, Florida, SAD.</td><td></td><td>Teacher</td></tr>
<tr><td colspan="5">Gokoglu, N., Yerlikaya, P. (2015) Seafood Chilling, Refrigeration and Freezing_ Science and Technology-Wiley-Blackwell , UK</td><td></td><td>Teacher</td></tr>
<tr><td colspan="5">Ozogul Y. (2020). Innovative technologies in seafood processing. CRC Press, Boca Raton, Florida, SAD.</td><td></td><td>Teacher</td></tr>
<tr><td colspan="5">Bremner, H.A., (2002). Safety and qualtiy issues in Fish Processing, CRC Press, Inc. Boca Raton, Florida, SAD.</td><td></td><td>Teacher</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="8">1. Tewari G., Juneja VK. (2007). Advances in thermal and non-thermal food preservation. Blackwell Publishing Ltd. Oxford, UK.
2. Huss, H.H., Ababouch, L., Gram, L. (2003). Assessment and Management of Seafood Safety and Quality. Fao Fisheries Technical Paper 444, Food and Agriculture Organization of the United Nations, Rome.
3. Lee R., Lovatelli A., Ababouch L. (2008) Bivalve depuration: fundamental and practical aspects FAO, Rome, Italy.
4. Devahastin S. (2011). Physicochemical aspects of food engineering and processing. CRC Press, Inc. Boca Raton, Florida, SAD.</td></tr>
</table>

Quality assurance methods that ensure the acquisition of exit competences	Students' performance will be evaluated and graded during the course, as well as at the final exam. During the course, he / she is evaluated through class attendance, teaching activities, acquired knowledge and exams.
Other (as the proposer wishes to add)	

NAME OF THE COURSE	**CLIMATE CHANGE AND MARINE ECOSYSTEMS**					
Code	SMR510	Year of study	2			
Course teacher	Maja Krželj, PhD	Credits (ECTS)	3			
Associate teachers	-	Type of instruction (number of hours)	L	S	E	F
			15	15	0	-
Status of the course	Elective	Percentage of application of e-learning	-			
COURSE DESCRIPTION						
Course objectives	The objective of the course is to introduce students to global and regional climate change and impact these changes have on marine ecosystems.					
Course enrolment requirements and entry competences required for the course	-					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	- to know the causes of climate change on a global and regional scale - to analyse the impacts of climate change on a global and regional level - to link climate change to changes occurring in marine ecosystems - to predict the effects of climate change on populations and composition of marine organisms' communities - to assess the potential and actual effects of climate change on living marine resources - to analyse problems and solutions related to the impact of climate change on marine ecosystems					
Course content broken down in detail by weekly class schedule (syllabus)	**Lecture 1:** Introduction. The concept of climate system, climate and mechanisms of climate change. **Lecture 2:** The causes of climate change: natural and anthropogenic. The role of CO_2 and other greenhouse gases in the atmosphere and in oceans. **Lecture 3:** Recorded changes in climate system at various spatial and temporal scales and their effects on ecosystems. Trends and oscillations of the atmosphere and the sea. **Lecture 4:** Global warming. Glacier melting and sea level rise. Possible trends in sea warming and ecosystem impact. Negative effects on the marine ecosystem. **Lecture 5:** Marine organisms as indicators of changes in the ecosystem. Population fluctuations, migration, changes in habitats and areas. **Lecture 6:** Climate change in the northern hemisphere, the Mediterranean and the Adriatic Sea. **Lecture 7:** Potential effects of climate change on marine fisheries (socio-economic element). Conferences, resolutions, strategies, plans and programmes for climate change mitigation and adaptation. **Seminar 1:** Calculation of carbon footprint and greenhouse gas emissions; Renewable energy sources (2 hours) **Seminar 2:** Documentary movie (2 hours) **Seminar 3:** Education, media, economics, climate financing and sustainable development (2 hours)					

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<tr><td></td><td colspan="6">Seminar 4: Climate change impact assessments, vulnerability and climate change assessment (2 hours)
Seminar 5: Discussion (2 hours)
Seminar 6: PAP / RAC Visit (3 hours)
Seminar 7: Student presentations (3 hours)</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☐ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☒ seminars</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">-</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
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<tr><td>Essay</td><td></td><td>Seminar essay</td><td>1</td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>1</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Students will be evaluated and graded during the course as well as at the final exam. During the course, attendance at classes, seminars and visits, seminar work, seminar activity and acquired knowledge are evaluated. It is necessary to meet all teacher's requirements (class attendance and individual presentation of seminar work) in order to pass the exam.
To pass the exam, the questions must be answered with an accuracy of at least 60%.
The grade on the exam is formed on the basis of the achievement achieved by the following scoring: 60 - 70 sufficient (2), 71 - 80 good (3), 81 - 90 very good (4), 91 - 100 excellent (5).</td></tr>
<tr><td rowspan="6">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">Marine Ecosystems and Global Change (2010) M Barange, JG Field, RP Harris, EE Hofmann, RI Perry, FE Werner. Oxford University Press, 440 p.</td><td></td><td></td></tr>
<tr><td colspan="3">Aquatic Ecosystems in a Changing Climate (2018) DP Hader, K Gao. CRC Press, 318 p.</td><td></td><td></td></tr>
<tr><td colspan="3">Climate Change Impacts on Marine Ecosystems (2012)
SC Doney, M Ruckelshaus, JE Duffy, JP Barry, F Chan, CA English, HM Galindo, JM Grebmeier, AB Hollowed, N Knowlton, J Polovina, NN Rabalais, WJ Sydeman, LD Talley. Annual Review of Marine Science 4819:11-37.</td><td></td><td></td></tr>
<tr><td colspan="3">Impacts of Climate Change on Marine Organisms and Ecosystems (2009) AS Brierley, MJ Kingsford. Current Biology 19 (14): R602-R614.</td><td></td><td></td></tr>
<tr><td colspan="3">Climate Change and Costal Ecosystems: Long-Term Effects of Climate and Nutrient Loading on Trophic Organization (2014) RJ Livingston. CRC Press, 572 p.</td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of</td><td colspan="5">-</td></tr>
</table>

submission of study programme proposal)	
Quality assurance methods that ensure the acquisition of exit competences	The lectures and seminars are designed to be interactive and encourage active student participation in the classroom through questions and comments, thus enabling continuous monitoring of students' work.
Other (as the proposer wishes to add)	Consultation times and exam dates will be published on the website of the University Department of Marine Studies. Inspection of the exam documentation/and or consultations can be made in office hours. Students can contact Course teacher by email.

NAME OF THE COURSE	**CONSERVATION OF MARINE BIODIVERSITY**					
Code	SMR517	Year of study	2			
Course teacher	Zvjezdana Popović Perković, PhD	Credits (ECTS)	3			
Associate teachers	-	Type of instruction (number of hours)	L	S	E	F
			15	15	0	-
Status of the course	Elective	Percentage of application of e-learning	-			
COURSE DESCRIPTION						
Course objectives	By learning about the basic characteristics and processes which influence biodiversity in marine ecosystems, students will gain practical and theoretical knowledge for understanding the issues of active and passive principles of biodiversity conservation. Students also learn about the factors that influence the loss of biodiversity (special focus on the Mediterranean and the Adriatic Sea), and about possible solutions for its conservation.					
Course enrolment requirements and entry competences required for the course	-					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Acquire knowledge on: - the consequences of human activities that endanger individual species, their habitats and communities (littoralisation, maritime transport, hydro-construction, catch and breeding of marine organisms) and their mechanisms of action (direct and indirect); - the biological and ecological traits of endangered species (distribution, growth, reproduction, role in the ecosystem, elements which threaten them and methods of protection (legislation)). - Familiarize with the legal framework for addressing marine protection (Convention on the Law of the Sea, Convention on Biological Diversity, Code of Conduct for Responsible Fisheries, The Barcelona Convention). - Understand ecological isolation as an evolutionary mechanism in the emergence of new species.					
Course content broken down in detail by weekly class schedule (syllabus)	**Lecture 1.** Introduce students to the requirements for obtaining a signature, examination procedure and interpretation of the grading system, and the course content. Introduction to the course. Mechanisms that endanger individual species, their habitats and their living communities. Learning outcomes: The student must understand the concept of biodiversity and temporal patterns of biodiversity (speciation and extinction of species). The student also must acquire the knowledge on consequences of human activities which threaten certain species, their habitats and living communities (littoralisation,					

	maritime transport, hydro-construction, catch and breeding of marine organisms) and learn about the mechanisms of their action (direct and indirect). The student must understand the principle of sustainable development, that is, the measures of reasonable use of resources for their conservation. **Lecture 2.** International organizations, conventions, programmes and plans in the field of marine protection. IUCN Red List of threatened species. Learning outcomes: The student must be familiar with leading international programmes and plans that address sea issues (FAO, IMO, UNESCO, UNEP; WWF, IUCN, Natura 2000). Be familiarized with the legal framework addressing marine protection (Convention on the Law of the Sea, Convention on Biological Diversity, Code of Conduct for Responsible Fisheries, The Barcelona Convention). The student must be habilitated to the contents of the IUCN Red List, the categories and the criteria for threatened species. **Lecture 3.** Protection of biodiversity of the Mediterranean and Croatia. Overview of endangered species and lower systematic categories of flora and fauna in the Mediterranean and Adriatic. Learning outcomes: Familiarize with national organizations, programmes and plans, as well as legislation and byelaws (Environmental Protection Act, Nature Protection Act, regulations) which govern marine environment. The student must know the criteria for classifying taxa into strictly protected and protected taxa, and how to handle such taxa. The student must know the Ordinance on the level of compensation for damage caused by prohibited activities on protected animal taxa (OG 84/96). The student must know categories and criteria listed in the Red Book of the Republic of Croatia. **Lecture 4.** Ecology of endangered flora species in the Mediterranean and Adriatic. Learning outcomes: Acquire knowledge on biology and ecology of endangered plant species (distribution, growth, reproduction, role in the ecosystem, mechanisms that threaten them and ways of protection (legislation). **Lecture 5.** Ecology of endangered animal species in the Mediterranean and Adriatic: from Protozoa to Mollusca. Learning outcomes: Acquire knowledge on biology and ecology of endangered species from the above groups (distribution, growth, reproduction, role in the ecosystem, the mechanisms that threaten them, and methods of protection (legislation)). **Lecture 6.** Ecology of endangered animal species in the Mediterranean and Adriatic: Mollusca and Anellida. Learning outcomes: Acquire knowledge on biology and ecology of endangered species from the above groups (distribution, growth, reproduction, role in the ecosystem, mechanisms that threaten them, and methods of protection (legislation)). **Lecture 7**. Ecology of endangered animal species in the Mediterranean and Adriatic: from Arthropods to Echinoderms. Learning outcomes: Acquire knowledge on biology and ecology of endangered species from the above groups (distribution, growth, reproduction, role in the ecosystem, the mechanisms that threaten them, and methods of protection (legislation)). **Lecture 8.** Ecology of endangered fauna species in the Mediterranean and Adriatic: from Echinoderms to Acrania. Learning outcomes: Acquire knowledge on biology and ecology of the endangered species from the above groups (distribution, growth, reproduction, role in the ecosystem, mechanisms that threaten them and methods of protection) (Regulation on Sea Cucumber Protection (Official Gazette 76/98)). **Lecture 9.** Ecology of endangered animal species in the Mediterranean and Adriatic: Cyclostomata and Chondrichthyes. Learning outcomes: Acquire knowledge on biology and ecology of endangered species from the above groups (distribution, growth, reproduction, role in the ecosystem, mechanisms that threaten them, and methods of protection (Red list of Marine Fish of Croatia)).

<table>
<tr><td></td><td colspan="6">Lecture 10. Ecology of endangered animal species in the Mediterranean and Adriatic: Osteichties.
Learning outcomes: Acquire knowledge on biology and ecology of endangered species from the above group (distribution, growth, reproduction, role in the ecosystem, mechanisms that threaten them, and methods of protection (Red list of Marine Fish of Croatia)).
Lecture 11. Ecology of endangered animal species in the Mediterranean and Adriatic: Reptilia and Aves.
Learning outcomes: Acquire knowledge on biology and ecology of endangered species from the above groups (distribution, growth, reproduction, role in the ecosystem, mechanisms that threaten them and methods of protection) (Regulation on the protection of certain species of reptiles - Reptilia).
Lecture 12. Ecology of endangered animal species in the Mediterranean and Adriatic: Mammalia.
Learning outcomes: Acquire knowledge on biology and ecology of endangered species from the above groups (distribution, growth, reproduction, role in the ecosystem, mechanisms that threaten them and methods of protection) (ACCOBAMS (The Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic area), Ordinance on Mammal Protection (Mammalia) (OG 31/95).
Lecture 13. Movie The tree of life.
Learning outcomes: Understand the concept of biodiversity (taxonomic, genetic and ecosystem variability), and the processes of speciation and species extinction. Understand weather changes across fossil discoveries. Understand ecological isolation as an evolutionary mechanism in the emergence of new species. Understand Darwin's theory of evolution and natural selection. According to Darwin's theory, variations within species occur by chance and the survival or extinction of organisms is determined by their ability to adapt to the environment. Understand Haeckel's recapitulative theory - ontogeny is parallel to phylogeny.
Lectures 14 and 15. Film The end of the line.
Learning outcomes: Understand the impact of fishing on the reduction of marine biodiversity (overfishing and by-catch) on the case of north Atlantic cod and Atlantic bluefin tuna; learn about the importance of protecting endangered species and the socio-economic context.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☒ seminars and workshops
☐ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Students who have attended at least 80% of classes during the semester and have prepared and delivered seminar paper successfully have the right to take the test.</td></tr>
<tr><td rowspan="6">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>0,5</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>1,5</td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Students' work will be evaluated and graded during the course (class attendance, class activity, preparation and presentation of seminar work). Students who have attended at least 80% of classes during the semester are eligible to get the signature. There are no classic exams. The final grade makes up 75% of the design and presentation of the seminar paper and 25% attendance and activity. The</td></tr>
</table>

	evaluation of the seminar paper encompasses independence in research, ability to analyse and synthesize problems, with a particular focus on structuring material, presentation of the topic (visual and speaking skills), ability to transfer knowledge, critical review of one's own and work of others.		
Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Norse, E.A. 1993. Global marine biological diversity: A strategy for building conservation and decision making. Island Press, Washington D.C.000. Global biodiversity - Earth's living resources in the 21st century. World Conservation Press, Cambridge.		1
Optional literature (at the time of submission of study programme proposal)	Radović, J. 2000. An overview of the state of biological and landscape diversity of Croatia with the protection strategy and action plans. Ministry of Environmental Protection and Physical Planning, XVIII: 158 pp. UNEP World Conservation Monitoring Centre. 2 Gaston, K.J. (ed.). 1996. Biodiversity: A Biology of Numbers and Difference. IUCN: Svjetski crveni popis biljaka i životinja (www.redlist.org). Državni zavod za zaštitu prirode. 2004. Crveni popis ugroženih biljaka i životinja RH. Nybakken, J. W.E. 1997. Marine biology: An ecological approach. B. Cummings LTD Wilson, E.O. 1992. The diversity of life. Penguin books, London.		
Quality assurance methods that ensure the acquisition of exit competences	Students' performance will be evaluated and graded during the course, as well as at the final exam. During the course, the following is evaluated: a) attendance b) activity during class c) knowledge acquired		
Other (as the proposer wishes to add)	-		

Popis obveznih i izbornih predmeta prema dopusnici (hrv.)

POPIS PREDMETA							
Godina studija: 1.							
Semestar: 1.							
STATUS	KOD	PREDMET	SATI U SEMESTRU				ECTS
			P	S	V	T	
Obvezni	SMR214	Gospodarenje živim bogatstvima mora	30	15	15	0	5
	SMR412	Primijenjena ihtiologija	30	0	30	0	5
	SMB501	Integralno upravljanje obalnim zonama	30	15	0	0	4
	SMR404	Terenska nastava					6
	Ukupno obvezni		90	30	45	0	20
Izborni	SMB209	Botanika mora	30	0	30	0	5
	SMR209	Tehnike podvodnih istraživanja	30	0	15	0	4
	SMB215	Parazitologija morskih organizama	15	0	30	0	4
	SMR311	Biologija i ekologija ihtioplanktona	30	0	15	0	4
	SMB407	Genetika populacija morskih organizama	30	0	0	0	3

	SMB408	Ekologija estuarija	30	0	0	0	3
	SMR409	Razmnožavanje morskih organizama	30	0	30	0	5
	SMR410	Ekologija i zaštita morskog okoliša	30	0	30	0	5
	SMR413	Tehnologija hlađenja i smrzavanja morskih organizama	30	0	15	0	3
	SMR416	Eutrofikacija, proizvodnost mora i ribolov	30	0	0	0	3
	SMR417	Modeliranje i simulacije u ribarstvu	30	0	15	0	4
	SMR420	Zoologija mora	30	0	30	0	5
	Biraju se izborni predmeti minimalne ukupne vrijednosti 10 ECTS bodova.						

POPIS PREDMETA

Godina studija: 1.

Semestar: 2.

STATUS	KOD	PREDMET	SATI U SEMESTRU				ECTS
			P	S	V	T	
Obvezni	SMR308	Ocjena kakvoće proizvoda mora	30	0	15	5	4
	SMR312	Lovnost i selektivnost ribolovnih alata	30	0	30	0	5
	SMR314	Dinamika i procjena iskorištavanih populacija	30	0	15	0	4
	SMR433	Terenska nastava					4
	Ukupno obvezni		90	0	60	5	17
Izborni	SMR107	Povijest istraživanja mora i morskog ribarstva	30	15	0	0	3
	SMR112	Odnosi među morskim organizmima	30	15	0	0	3
	SMR219	Toksičnost školjkaša	15	0	0	0	2
	SMR221	Odgovorni ribolov i njegovo reguliranje	30	15	0	0	4
	SMR317	Bioproizvodnja i trofički odnosi u moru	30	0	15	0	4
	SMB414	Ekotoksikologija	30	0	15	0	3
	SMB415	Ekologija morskih sisavaca	30	0	0	0	3
	SMR424	Očuvanje riblje sirovine soljenjem, sušenjem i dimljenjem	30	0	15	0	4
	SMB425	Marikultura beskralježnjaka	15	15	0	0	3
	SMB426	Postupci provjere, analize i prikaza prostornih podataka	15	0	15	0	3
	SMR426	Sportski i rekreacijski ribolov na moru	15	0	15	0	2
	SMR430	Ponašanje riba	15	15	0	0	2
	SMR431	Utjecaj ribolova na bentoske zajednice	15	15	0	0	2
	SMR432	Instrumenti zaštite i upravljanja ekosustavima mora	30	15	0	0	4
	SMR519	Fiziologija prilagodbe morskih organizama	15	15	0	0	3
	Biraju se izborni predmeti minimalne ukupne vrijednosti 13 ECTS bodova.						

POPIS PREDMETA							
Godina studija: 2.							
Semestar: 3.							
STATUS	KOD	PREDMET	SATI U SEMESTRU				ECTS
			P	S	V	T	
Obvezni	SMB503	Metodika znanstvenog rada	15	30	0	0	3
	SMR503	Statističke metode u biotehnologiji	30	0	30	0	4
	SMR510	Ribolov i kolebanje ribljih stokova	30	15	15	0	5
	SMR504	Terenska nastava					6
	Ukupno obvezni		75	45	45	0	18
Izborni	SMB207	Biološka invazija	15	0	0	0	2
	SMR210	Primijenjena histologija morskih organizama	15	0	15	0	2
	SMB306	Biološka raznolikost	30	0	0	0	3
	SMR313	Ekologija ranih razvojnih stadija riba	15	0	15	0	2
	SMR501	Biološka raznolikost Jadrana	45	30	0	0	6
	SMR506	Biotehnologija i genetika u ribarstvu i akvakulturi	30	0	30	0	4
	SMB507	Optika mora	15	0	0	0	2
	SMB509	Procjene utjecaja na okoliš	15	15	0	0	3
	SMB510	Klimatske promjene i morski ekosustavi	15	0	0	0	2
	SMR511	Živo bogatstvo Jadrana i njegovo iskorištavanje	30	30	0	0	5
	SMR513	Marikultura i okoliš	30	0	30	0	5
	SMB514	Biologija, ekologija i dinamika populacija glavonožaca	15	15	0	0	3
	SMR515	Planktonske kulture i njihov uzgoj	30	0	45	0	5
	SMR516	Pravo zaštite ribolova i morskog okoliša	30	15	0	0	3
	SMR517	Očuvanje bioraznolikosti u moru	15	15	0	0	2
	SMR518	Prehrambeni proizvodi iz mora	30	0	15	0	3
	SMR520	Dobrobit vodenih laboratorijskih životinja	30	15	0	0	4
	SMR521	Biologija, ekologija i uzgoj školjkaša	15	0	0	0	2
	SMR523	Daljinska istraživanja s primjenom u ribarstvu	15	0	15	0	2
	SMR524	Prikupljanje, rukovanje i obrada podataka	30	0	30	0	5
	SMR525	Kontrolirana reprodukcija morskih organizama	30	0	30	0	5
	SMR528	Klima i živi svijet u moru	30	15	0	0	4
	Biraju se izborni predmeti minimalne ukupne vrijednosti 12 ECTS bodova.						

POPIS PREDMETA

Godina studija: 2.								
Semestar: 4.								
STATUS	KOD	PREDMET	SATI U SEMESTRU				ECTS
			P	S	V	T	
Obvezni	SMR529	Diplomski rad					30
	Ukupno obvezni						30
Izborni	-	-	-	-	-	-	-
	-						

Popis obveznih i izbornih predmeta studijskog programa u okviru projekta InteRiV (engl.)

List of courses							
Year of study: 1							
Semester: 1							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	SMR214	Management of marine living resources	30	15	15	-	5
	SMR412	Applied ichthyology	30	0	30	-	5
	SMB501	Integrated coastal zone management	30	15	0	-	4
	SMR404	Field work					6
	Total		90	30	45	-	20
Elective	SMB209	Marine botany*	30	0	30	-	5
	SMR209	Underwater research techniques	30	0	15	-	4
	SMB215	Parasitology of marine organisms	15	0	30	-	4
	SMR311	Biology and ecology of ichthyoplankton	30	0	15	-	4
	SMB407	Genetics of marine organisms	30	0	0	-	3
	SMB408	Ecology of estuaries	30	0	0	-	3
	SMR409	Reproduction of marine organisms*	30	0	30	-	5
	SMR410	Ecology and protection of marine organisms	30	0	30	-	5
	SMR413	Technology of cooling and freezing of marine organisms	30	0	15	-	3
	SMR416	Eutrophication, sea productivity and fishing	30	0	0	-	3
	SMR417	Modeling and simulations in fisheries	30	0	15	-	4
	SMR420	Marine zoology	30	0	30	-	5
	Total		345	0	210	-	48

List of courses

Year of study: 1							
Semester: 2							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	SMR312	Selectivity and catchability of fishing gears	30	0	30	-	5
	SMR314	Fish population dynamics and stock assessment	30	0	15	-	4
	SMR503	Statistical methods in biotechnology	30	0	30	-	4
	SMR433	Field work					4
	Total		90	0	75	-	17
Elective	SMR107	History of marine research and marine fisheries	30	15	0	-	3
	SMR112	Relationships between marine organisms	30	15	0	-	3
	SMR219	Shellfish toxicity	15	0	0	-	2
	SMR221	Responsible fisheries and its regulation	30	15	0	-	4
	SMR317	Bioproduction and trophic relations in the sea	30	0	15	-	4
	SMB414	Ecotoxicology	30	0	15	-	3
	SMB415	Marine mammal ecology	30	0	0	-	3
	SMR424	Preservation of raw fish by salting, drying and smoking	30	0	15	-	4
	SMB425	Mariculture of invertebrates	15	15	0	-	3
	SMB426	Procedures for checking, analyzing and displaying spatial data	15	0	15	-	3
	SMR426	Sport and recreational fishing at sea	15	0	15	-	2
	SMR430	Fish behavior	15	15	0	-	2
	SMR431	Impact of fishing on benthic communities	15	15	0	-	2
	SMR432	Instruments for the protection and management of marine ecosystems	30	15	0	-	4
	SMB505	Microbiology of polluted waters*	15	15	0	-	2
	SMR513	Mariculture and environment*	30	0	30	-	5
	SMR518	Seafood processing technology*	30	15	0	-	3
	SMR519	Adaptation physiology of marine organisms*	15	15	0	-	3
	Total		420	150	105	-	55

List of courses				
Year of study: 2				
Semester: 3				
STATUS	CODE	COURSE	HOURS IN SEMESTER	ECTS

			L	S	E	F	
Mandatory	SMR308	Seafood quality assessment	30	10	5	-	4
	SMB503	Methodology of scientific work	15	30	0	-	3
	SMR504	Field work					6
	Total		45	40	5	-	13
Elective	SMB207	Biological invasion	15	0	0	-	2
	SMR210	Applied histology of marine organisms	15	0	15	-	2
	SMB306	Biodiversity	30	0	0	-	3
	SMR313	Ecology of early developmental fish stages	15	0	15	-	2
	SMR501	Adriatic biodiversity	45	30	0	-	6
	SMR506	Biotechnology and genetics in fisheries and aquaculture*	30	0	30	-	4
	SMB507	Sea optics	15	0	0	-	2
	SMB509	Environmental impact assessments	15	15	0	-	3
	SMB510	Climate change and marine ecosystems*	15	15	0	-	3
	SMR511	The living wealth of the Adriatic and its exploitation	30	30	0	-	5
	SMB514	Biology, ecology and population dynamics of cephalopods*	15	15	0	-	3
	SMR515	Planktonic cultures and their cultivation	30	0	45	-	5
	SMR516	The right to protect fishing and the marine environment	30	15	0	-	3
	SMR517	Conservation of marine biodiversity*	15	15	0	-	3
	SMR520	Welfare of aquatic laboratory animals*	30	15	0	-	4
	SMR521	Biology, ecology and shellfish farming	15	0	0	-	2
	SMR523	Remote sensing with application in fisheries	15	0	15	-	2
	SMR524	Data collection, handling and processing	30	0	30	-	5
	SMR525	Controlled reproduction of marine organisms	30	0	30	-	5
	SMR528	Climate and living world in the sea	30	15	0	-	4
	Total		465	165	180	-	68

List of courses							
Year of study: 2							
Semester: 4							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Mandatory	SMR529	Diploma thesis					30
	Total						30

* Izborni predmeti dostupni studentima tijekom sljedeće dvije akademske godine