	Department: Ecology, agronomy and aquaculture
	Study programme: Underwater science and technology
Description of the study programme	The study of underwater science and technology is an interdisciplinary study, and it is new not only for Croatia but also for the whole Mediterranean. Croatia has a long and developed coastline, and as a country is economically and culturally dependent on the sea. Numerous activities are related to the underwater work and technology, including construction projects on coastal and marine structures, marine industry, aquaculture, activities related to protection of the environment (sea and coastal areas), and underwater archaeology. All of these jobs require skilled labor, which is lacking in the Croatian labor market. Training people who currently perform such tasks is mainly a military and non-institutional or informal, therefore in both cases there is no higher education level with formal qualifications. The study will enable students to be self-organizing complex underwater tasks and activities, and will be able to communicate with experts from various fields such as biology, ecology, aquaculture, archeology, shipbuilding, construction, offshore engineering, environmental protection, coastal management and business and diving. It is therefore important that this study, except for diving training and other than specific knowledge in these areas, has a special emphasis on protecting our seas and marine environment, as one who performs underwater work of any kind must be aware of the potential impact of its activities on the environment and ways to protect environment of these effects. It is also important that the diver training is not mandatory, so that all those who wish to gain knowledge of the underwater science and technology but for whatever reason (er health) can not
	or does not want to dive.
Learning outcomes of the study programme	The study will enable students to be self-organizing complex underwater tasks and activities, and will be able to communicate with experts from various fields such as biology, ecology, aquaculture, archeology, shipbuilding, construction, offshore engineering, environmental protection, coastal management and
	business and diving. It is therefore important that this study, except for diving training and other than specific knowledge in these areas, has a special emphasis on protecting our seas and marine environment, as one who performs underwater work of any kind must be aware of the potential impact of its activities on the environment and ways to protect environment of these effects. It is also important that the diver training is not mandatory, so that all those who wish to gain knowledge of the underwater science and technology, but for whatever reason (eg health) can not or does not want to dive.
	Upon graduation, students will be able to:
	 use mathematical modeling apply statistical methods use computer aided engineering recognize main archaeological sites and determine their archaeological potential explain problems of research methodology and protection of archaeological sites date (approximately) underwater archaeological sites

1. Name of the	Numerical Methods
	Description of the courses offered in a foreign language
(by semesters)	ו וומו נורכזס
(by semesters)	- Final thesis
in summer term	- Coasts and Communities— applied biomimicry
foreign language	- Methods in underwater science and technology
offered in a	- Marine Biology
List of courses	- Fundamental scientific skills
	- Marine protection and conservation
(by semesters)	- Biomimicry
in winter term	- Pollution of Aquatic Systems
foreign language	- Marine Ecology
offered in a	- General Biology
List of courses	- Numerical Methods
	 independently manage the part of the project assigned to him/her
	communication and compromise during the project
	- establish and maintain relationship of mutual cooperation.
	underwater science and technology
	consideration implementation of methods and tools characteristic for
	international development and economical projects, which take into
	- plan project approach to the problems and situations in domestic and
	- present scientific results clearly and briefly in written and oral form
	 collect, analyze and interpret scientific data
	- select appropriate support system for underwater operations
	regulations
	- perform underwater activities safely, respecting legislations and
	- apply scientific methods to solve practical problems
	- predict and resolve coastal management problems
	 choose culture system according to biological characteristics of cultivated
	sea, coastal areas, deep sea, coral reefs, and estuaries
	- describe and explain differences of large marine living areas like: open
	their adaptations to different environmental conditions
	- classify diversity and various life styles of marine organisms and describe
	environment and processes of pollution recovery
	- nronose methods to prevent pollution of freshwater and marine
	organisms
	environment based on their knowledge on biological processes and
	- Anticipate and categorize possible problems and threats to the
	- recognize negative innuence of fresh-water and marine environment on
	environment
	- estimate effects of coastal and underwater construction on the
	offshore and underwater building
	- choose optimal structure and structural elements of for particular
	of for particular underwater construction
	- choose optimal construction materials and optimal building technology
	dynamics in the Adriatic
	physical processes which govern hydrographic properties and ocean
	- solve problems in different areas based on the understanding of main
	their conservation
	- determine category of archaeological sites and estimate necessity for

course							
Number of ECTS	6	Manner of	2	2	2	Semester	
credits		implementation of					
		the study				1	
		programme					
Description of	This co	This course aims are to teach basic numerical methods to analyze a finite set of					
the course	experi	mental data (arising fo	r example	in physic	s, chemist	try, biology, eco	nomics).
	Students will be proficient in the use of statistical methods under application of						
	the sta	atistical program R.					
Learning	-	use mathematical mo	odelling				
outcomes of the	-	select and apply appr	ropriate s	tatistical r	nethods		
course	-	use computer aided	data analy	/sis (R)			
	-	apply scientific methe	ods to sol	ve practic	al probler	ns	
	-	collect, analyse and i	nterpret s	cientific d	lata		

2. Name of the	Gener	al Biology					
course							
Number of ECTS	5	Manner of	2	2	1	Semester	
credits		implementation of					
		the study				1	
		programme					
Description of	Introd	Introduction to fundamental concepts of biology and understanding biology in					
the course	the co	the context of evolution. Special focus on marine organism and their bauplan,					
	physio	physiology, and behavior					
Learning	-	recognize cell structu	ures and	understar	nd their f	unction and exp	lain the
outcomes of the		principles of inherita	nce in the	context o	of evolutio	on	
course	-	describe diversity of l	ife in the	context o	f adaptati	ion to the enviro	nment
	-	explain diversity of m	narine ani	mals, ma	rine plant	s and algae's, as	s well as
		animal physiology and behavior in the context of adaptation to the					
		environment					
	-	demonstrate basic sk	ills in mic	roscopy			

3. Name of the	Funda	mental scientific skills	;				
course							
Number of ECTS	5	Manner of	3	0	2	Semester	
credits		implementation of					
		the study				2	
		programme					
Description of	Introd	Introduction to the scientific method, data analysis, essential writing and					
the course	comm	communication skills, and the use of information technology					
Learning	-	communicate effecti	vely in or	al and wr	itten forn	n (able write a s	scientific
outcomes of the		paper)					
course	-	demonstrate a comp	rehensior	n of scient	ific literat	ure	
	-	formulate scientific	questions	and co	nsider ap	propriate ways	how to
		address them					
	-	demonstrate the effe	ective and	appropri	ate use of	information tec	hnology
	-	demonstrate good la	boratory ,	/ field pra	ctice and	knowledge of re	levant
		safety codes					
	-	analyse, evaluate and	d commur	nicate scie	entific info	ormation	

- formulate hypotheses and design experiments with appropriate
statistical analysis in mind
- design, conduct and report on a survey/investigation
 communicate their findings in an appropriate scientific manner

4. Name of the	Metho	Methods in underwater science and technology						
course								
Number of ECTS	6	Manner of	1	2	2	Semester		
credits		implementation o	of					
		the study				2		
		programme						
Description of	Learn	Learn about the major methodologies used in underwater science and						
the course	techno	ology – from historia	cal overview	to cutting	g edge app	lications		
	plan p	rojects under cons	ideration of	the plem	entation of	of appropriate i	methods	
	and to	and tools						
	Under	stand the character	ristic logistic	al and teo	hnologica	I challenges for	working	
	in fund	derwater science an	d technolog	y				
Learning	-	select and apply	methodolog	ies appro	priate to	scientific invest	tigations	
outcomes of the		on and under wat	er					
course	-	Be familiar w	ith techno	ologies	in mari	ne/maritime:	Biology,	
		Oceanography, Ar	rchaeology.					

5. Name of the	Biomir	nicry					
Number of ECTS credits	5	Manner of implementation of the study programme	2		2	Semester 3	
Description of the course	This cc busine biomin occurin circula of econ fields, basical Biomin limits a on Ear conduc avoid t dynam	purse teaches students sses and even financial nicry design method. T ng materials, products rity of nature which re- nomic success. Biomim including bionics, biom lly important aspects of nicry is about innovation and boundaries set by t th. Biomimicry designs cive to life, to up-cycle the release of harmful s ic equilibrium.	how to de l structure his metho , processe sults i a su icry goes imetics au f biomimi on, invent the basic a are under instead of substance	esign mate esign mate s and soc d relies o s, and is r istainabili beyond al nd bio-nai cry as the ion, and c and uncha the man the man s, and to e	erials, pro ieties with n inspirat nentored ty seen as ready imp notechnol more hol more hol reativity, ngeable o date to m aterials, t evolve by	ducts, processes the help of the ion from natural by the sustained the ultimate mo oortant and succe logy - all of whic istic approach. restricted only b operational conce aintain conditio o be energy effice adapting to Eart	s, entire s, entire ly d easure essful h are h are y the litions ns cient, to th's
Learning outcomes of the course	Unders - -	standing and demonstr Understanding and ir apply them Applied knowledge, c habitats and ecosyste Identify and use of m	ation of le aterpretat customiza ems in solu- nain princi	earning th ion of the tion and s ving probl ples of bio	rough pra fundame kills of inc ems omimicry:	actical projects ntal rules of nat dividual species, how to use nat	ure and ure as a

model, standard and as a mentor
- Understand the importance and the foundations of different ways of
adapting to nature: to work more efficiently, function and
communication between natural systems and their apply in solving social
and individual human and technological problems
After completion of the course students will be able to:
- Demonstrate practical examples of biomimicry
 Adopt the principles of natural principles of biomimicry
- Critical thinking, recognize and enacting decisions about what is and
what is not biomimicry
- Develop a plan to t apply biomimicry to solve problems in any area
- implement a project in their practical principles of biomimicry, with a
view to sustainable development

6. Name of the	Coasts	and Communities – a	oplied bio	mimicry			
course							
Number of ECTS	6	Manner of	4	1	1	Semester	
credits		implementation of					
		the study				4	
		programme					
Description of	The g	oalof this course isto	o train st	udentsto	think cr	itically, andunc	lerstand
the course	thecor	nplexityof coastalsy	vstemsand	theirinte	gratedas	functionality	. The
	course	will include: (1) overvi	ewandde	scription	of the va	riouscoastalecos	systems;
	(2) hi	storical overview oft	he mana	gement	ofcoastal	areas, regiona	ally and
	globall	y; (3) the differe	ent form	ns ofuse	e, andth	e impact of	changes
	incoas	talsystems, (4) an	overvie	wof key	issues	affecting thec	hangeof
	coasta	lareastodayandtomorr	ow; (5) a	review of	the majo	printernational,	national
	and lo	cal lawsandregulation	ofcoasta	I manage	mentand	coastalsystems;	(6) the
	basic p	principles and methods o	f adaptive	emanager	nent of co	pastalsystems, w	vhichare
	based on theoptimalandsustainable use ofcoastalresources; (7) Studentswilllearn						
	thebas	ic useandapplicationo	f GIS inin	dividualar	ndgroup N	workongivenpro	jects. In
	this fa	bulous object will be us	sed lectur	es, field w	vork, indiv	vidual and group	project
	tasks,	prescribe reading an	d encour	age discu	ission an	d critical think	ing and
	unders	standing; in particular	will be e	ncourage	d debate	on the condition	ons and
	standa	irds applied science a	ind techn	iology, as	well as	on the possibi	lities of
	application of sustainable development in their everyday lives.						
Learning	-	Understanding and d	emonstra	tion of lea	arning thre	ough practical	
outcomes of the		application of sustain	able plan	ning in co	astal area	S	
course	-	Understanding and in	iterpretat	ion of bas	ic rules of	r sustainable pla	nning
		systems in coastal are	eas				1
	-	Applied knowledge a		o adapt ce	ertain acti	vities, industry a	ina
		technology to sustain	able use (of coastal	resources) d have ta vaa it e	
	-	Recognize and use of	main prir	icipies of	nature an	a now to use it a	as a
		model, standard and	as a ment	CON A second the second			
	-	Understanding the in	iportance	and the I	oundation	ns of different w	ays of
		aujustment and deve	iopment (systems t	o numan activity	y and
		viability and function	of comm	most natu	iral and el	nective, based o	n the
				unication	m natural	systems so that	t they
		contribute to long-tel	rm numar	i developi	nent and	solving social ar	10

individual problems
After completion of the course students will be able to:
- Demonstrate and identify practical examples of sustainable development
in coastal areas
 To adopt the principle of natural principles of coastal ecosystems
 critical thinking, recognize and enacting decisions about what is
sustainable and what is not
- Develop a plan and design the basic steps in solving problems in the
coastal environment
- implement a practical project at its base principles drživog development
in coastal areas

7. Name of the course	Marin	e Ecology					
Number of ECTS credits	5	Manner of implementation of the study programme	2	1	1	Semester 4	
Description of the course	Introd mathe	Introduction to population, community, and ecosystem ecology with a mathematical approach					
Learning outcomes of the course	- - -	 demonstrate a basic knowledge on how marine systems function explain ecological processes and systems in the sea describe basic population and community ecology recognize currently strong impact of human activities and its current and predicted consequences describe the basics of how human activities can impact marine systems and organisms 					

8. Name of the	Polluti	on of Aquatic Systems						
course								
Number of ECTS	5	Manner of	2	1	1	Semester		
credits		implementation of						
		the study				3		
		programme						
Description of	To gair	To gain knowledge of pollution and protection of water and the sea						
the course								
Learning	-	- differentiate pollutants						
outcomes of the	 identify and evaluate sources of pollution 							
course	 predict impact of pollution on water and marine ecosystems 							
	 suggest protection and control methods 							
	 compare national and international legal framework 							

9. Name of the	Marine Biology						
course							
Number of ECTS	5	Manner of	2	1	1	Semester	
credits		implementation of					
		the study				3	

	programme								
Description of	Introduction to fundamental concepts on marine organisms and their								
the course	adaptations and adaptive strategies to challenges of living in the sea in general								
	and to specific and differing marine environments and habitat								
	Introduction to the historical development of the tools used in marine biology								
	Evolutionary perspective of marine biological diversity								
Learning	- describe marine organism diversity and adaptations								
outcomes of the	- profoundly explain the interplay of structure and function in marine								
course	organisms								
	- identify different marine communities								
	- describe of marine communities and compare and contrasttheir								
	adaptations and adaptive strategies								

10. Name of the	Marine protection and conservation						
course							
Number of ECTS	5	Manner of	2	1	1	Semester	
credits		implementation of					
		the study				5	
		programme					
Description of	Introduction to the major anthropogenic threats to the marine and coastal						
the course	environment, special focus on marine traffic, exploitation of marine resources,						
	and global climate change.						
	Overview over national, regional and global regulations and legal responsibilities,						
	special focus on MARPOL.						
	Learn about ways to conserve marine organisms and environments.						
Learning	- Know the major anthropogenic threats to the marine environment and						
outcomes of the	ways to prevent or reduce them via regulatory tools and via the re-						
course	designing of human intercations with the sea.						

11. Name of the	Final t	hesis						
course								
Number of ECTS	10	Manner of				Semester		
credits		implementation of						
		the study				6		
		programme						
Description of	Final thesis conceived and written in English and mentored under the use of							
the course	English as the professional and communicative language The goal of the final							
	thesis is to conceive, plan, conduct, analyze, report and discuss the results of							
	your own scientific study							
Learning	- Intensely study a field of special interest and find open questions and							
outcomes of the	knowledge gaps.							
course	- Formulate questions based on these gaps and formulate clear and							
	testable hypotheses.							
	- Design an appropriate experimental design and find the appropriate							
	methods.							
	Collect and process data for analysis. Choose and conduct the appropriate data							
	analysis and demonstrate your data and analytical/statistical results in							
	appropriate figures and tables. Summarize and discuss your results. Demonstrate							
	the familiarity with the related literature and relate this literature to your results.							