MARITIME DEPARTMENT

COURSE CATALOGUE 2022 / 2023

BACHELOR / UNDERGRADUATE LEVEL

WINTER SEMESTER

COURSE INFORMATION	
	CONTAINER AND RO-RO TRANSPORT TECHNOLOGIES
Degree	Bachelor
Semester	Winter 4
ECTS points	4
Course status	Elective
Course leader	Nermin Hasanspahić
Department, room no.	
Phone	nhasanspahic@unidu hr
e-mail	

COURSE DESCRIPTION

Course content

The course aims to provide the student with knowledge about various types of ships; purpose built container ship and its technical characteristics; various types of containers; stowage of containers onboard – stowage plans; stowage and segregation of dangerous cargoes; implementation of IMDG code; lashing of containers; forces acting on containers loaded on deck; cargo documents; RO-RO ships, ferries (RO-RO passenger ships) and its technical, characteristics and RO-RO terminals.

Learning outcomes

Students will be able to:• Identify the principal container ship and RO-RO ship types, characteristics, layout, sizes and tonnages, • Explain the lashing of containers,•Explain the modes of handling containers in ports,•Understand the nature of loading of dangerous goods onboard.

TEACHING MODE

☒Lectures ☐Seminars and workshops ☒Exercises ☐Independent assignments ☐Multimedia and internet ☐Distance learning	☒Consultations ☐Laboratory ☐Field work ☐Mentoring ☒Exams

EXAMINATION METHOD

☐ Oral ☒ Written ☒ Partial exam	Other:

READING

Compulsory reading

1.	Duško Vranid, Sergio Kos, Morska kontejnerska transportna tehnologija I , Rijeka 2006.
2.	Duško Vranid, Sergio Kos, Morska kontejnerska transportna tehnologija II , Rijeka 2006.
3.	Stowage & Segregation Guide to IMDG- Code, K.O Storck Verlag, Hamburg, 1998.
4.	David J. House, Cargo work for maritime operations, Elsevier Butterworth-Heinemann, 2005.

Optional reading

1.	Pravila za tehnički nadzor pomorskih brodova, Dio 23: Prijevoz tereta, Hrvatski registar brodova,Split 2009.
2.	http://www.containerhandbuch.de/

LIST OF TOPICS

No.		Hours		
		L	**E**	**S**
1.	The history of the containerization	**2**	**3**	

2.	Maritime transport of containers, world containerised trade routes and the major container ports	**2**	**3**	
3.	Container carrying vessels, various types of ships	**3**	**2**	
4.	Container carrying vessels, various types of ships	**3**	**2**	
5.	Container carrying vessels, various types of ships, technical characteristics	**3**	**2**	
6.	RO-RO ships, Ferries, technical characteristics	**3**	**2**	
7.	Containers, various types of containers	**3**	**2**	
8.	Containers, various types of containers	**3**	**2**	
9.	Positioning and securing of containers on board	**3**	**2**	
10.	Positioning and securing of containers on board	**3**	**2**	
11.	Container stowage plans,. Loading instruments	**3**	**2**	
12.	Carriage of dangerous cargoes	**3**	**2**	
13.	Stowage and segregation of dangerous cargoes	**3**	**2**	
14.	Container terminals	**3**	**2**	
15.	RO-RO terminals	**3**	**2**	
	TOTAL HOURS	**45**	**30**	
OTHER RELEVANT INFORMATION				

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COURSE INFORMATION	
	PASSENGER TRANSPORT TECHNOLOGY
Degree	Bachelor
Semester	Winter
ECTS points	4
Course status	Elective
Course leader	Srđan Vujičić, PhD. professor
Department, room no.	Maritime, B 35
Phone	+385 20 445723
e-mail	srdjan.vujicic@unidu.hr

COURSE DESCRIPTION
Course content
The aim of this course is to provide the student with understanding and knowledge of the history of passenger ships; types, construction, design and operational management of passenger ships; international conventions, codes and standards; watch keeping standards, maintenance of ships. The emphasis is on waste management system, intact and damage stability and watertight integrity of these ships. The student shall after the course have sufficient knowledge to thoroughly understand organizational structure on passenger ships.
Learning outcomes
Students will be able to:• identify passenger ships types,•understand international regulations•explain watertight inegrity,• understand organization and management structures on board passenger ships.

TEACHING MODE	
☒Lectures	☒Consultations
☒Seminars and workshops	☐Laboratory
☒Exercises	☐Field work

☐Independent assignments ☐Multimedia and internet ☐Distance learning	☐Mentoring ☒Exams

EXAMINATION METHOD	
☒ Oral ☐ Written ☐ Partial exam	Other:

READING

Compulsory reading

1.	International Convention for the Prevention of Pollution from Ships (MARPOL)
2.	International Convention for the Safety of Life at Sea (SOLAS), 1974
3.	The Code on Intact Stability for All Types of Ships, 2008.
4.	Damage stability, SOLAS chapter II-1
5.	Pravila za tehnički nadzor pomorskih brodova , Dio 21 Prijevoz putnika, HRB, 2004.

Optional reading

1.	Pravila za tehnički nadzor pomorskih brodova, Dio 23: Prijevoz tereta, Hrvatski registar brodova,Split 2009.

LIST OF TOPICS

No.		**Hours**		
		L	**E**	**S**
1.	The history of passenger ships	**3**	**1**	
2.	Types of passenger ships	**3**	**1**	
3.	Passenger ship construction and design	**3**	**1**	
4.	International conventions, codes and standards	**3**	**1**	

5.	MARPOL – waste management	**3**	**1**	
6.	Intact and damage stability	**3**	**1**	
7.	Watertight integrity of passenger ships	**3**	**1**	
8.	Cruise industry	**3**	**1**	
9.	Cruise ships, cruise ships organizational structure	**3**	**1**	
10.	Cruise ships organizational structure	**3**	**1**	
11.	Cruise destinations	**3**	**1**	
12.	Ferries	**3**	**1**	
13.	Yachts	**3**	**1**	
14.	High speed crafts (HSC)	**3**	**1**	
15.	Passenger terminals	**3**	**1**	
	TOTAL HOURS	**45**	**15**	

OTHER RELEVANT INFORMATION

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COURSE INFORMATION	
	Maritime English Language I-1
Degree	Bachelor
Semester	winter
ECTS points	4
Course status	Compulsory
Course leader	Lia Dragojevic
Department, room no.	Maritime Department
Phone	445-786
e-mail	lia@unidu.hr

COURSE DESCRIPTION

Course content

Maritime English Language is a university course which is designed for future merchant marine officers in a national, as well as an international traffic.

The content of the course is in compliance with the requirements and laws of the Republic of Croatia regarding education, training and certification of seafarers. It is designed in accordance with International Conventions for Seafarers which our country signed.

In addition, the content is adapted to Bologna Declaration recommendations and requirements for high school public education institutions.

Maritime English is an obligatory college with 2+2 hours per week in 1st winter semester. It encompasses the study of grammatical structures as follows:

1. Types of Words

2. Irregular Plural of Nouns

3. Verbs and Tenses

4. Passive Voice

5. Conditional Sentences

6. Direct and Indirect speech

In addition to grammatical structures, the vocabulary from the register of Maritime English , ESP (English for Specific Purposes) is being taught.

Learning outcomes

Having finished successfully the first semester of Maritime English Language Course, the student of Nautical Department, future Marine Officer obtains the following competences:1.Mastering terminology from naval architecture, construction and design in English2.Acquisition of vocabulary of ship's equipment in English 3.Differentiating types of vessels in world traffic in English 4.Differentiating types of vessels and their essential features in English5.The knowledge of the organizational structure of the staff of merchant marine in English 6.Insight into Marine Meteorology in English 7.Understanding organizational and functional parts on the example of The Port of Rijeka in English 8.Understanding types of cargoes in seaborne trade in English 9.Knowledge of the equipment for handling the cargo in English

TEACHING MODE

☐Lectures	☐Consultations
☐Seminars and workshops	☐Laboratory
☐Exercises	☐Field work
☐Independent assignments	☐Mentoring
☐Multimedia and internet	☐Exams
☐Distance learning	

EXAMINATION METHOD

☐ Oral	Other:
☐ Written	
☐ Partial exam	

READING

Compulsory reading	
1.	B.Pritchard: Maritime English 1, Školska knjiga, Zagreb, 1996.
2.	www.pfri.uniri.hr/bopri: A Maritime English Course
3.	B.Pritchard: Hrvatsko-engleski rječnik pomorskog nazivlja, Školska knjiga, Zagreb, 1989.

Optional reading	
1.	Luzer, J., Spinčid, A: Gramatička vježbenica engleskog jezika za pomorce, Rijeka, 1994.
2.	3Eastwood, John: Oxford Learner's Grammar Finder & Oxford Learner's Grammar Builder, Oxford: Oxford, University Press 2009.
3.	*www.pfri.uniri.hr/bopri:Englesko-hrvatski pomorski rječnik*

LIST OF TOPICS

No.		Hours		
		L	**E**	**S**
1.	Ship and Ship Terms- Ship Design and Construction	**2**	**2**	
2.	Ship and Ship Terms- Structural Members of a Ship	**2**	**2**	
3.	Ship and Ship Terms- Ship's Equipment	**2**	**2**	
4.	Types of Ships- Liners	**2**	**2**	
5.	Types of Ships- Tramps	**2**	**2**	
6.	Types of Ships- Liquid andDry Bulk Cargo Ships	**2**	**2**	
7.	Types of Ships- Break Bulk Cargo Ships	**2**	**2**	
8.	Types of Ships-Specialized Craft	**2**	**2**	
9.	The Merchant Ship and Its Organization 1	**2**	**2**	

10.	The Merchant Ship and Its Organization 2	**2**	**2**	
11.	Meteorology	**2**	**2**	
12.	The Port of Rijeka	**2**	**2**	
13.	Cargoes	**2**	**2**	
14.	Cargo Handling Equipment 1	**2**	**2**	
15.	Cargo Handling Equipment 2	**2**	**2**	
	TOTAL HOURS	**30**	**30**	

OTHER RELEVANT INFORMATION

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COURSE INFORMATION	
	Maritime English Language II-1
Degree	Bachelor
Semester	winter
ECTS points	4
Course status	Compulsory
Course leader	Lia Dragojevic
Department, room no.	Maritime Department
Phone	445-786
e-mail	lia@unidu.hr

COURSE DESCRIPTION

Course content

Maritime English course II-1 encompasses materials published in e-manuals MarEng and MarEng Plus published as a result of an International European Project Leonardo da Vinci.

The content is suitable for seafarers for their university level competences as well as self-studying during their service at sea both in inner as well as international waters.

The content of the course has been approved by the experts in Maritime English from professionals of European Union Member States (Spain, Portugal, Finland, Poland, Latvia, Belgium, Croatia)

Learning outcomes

Having finished university level course Maritime English II-1 (winter semester), the candidates are capable to communicate at sea in written language as well as in oral especially from the following areas: ports, port management, loading a modern container vessel, modern vessel, leaving the port, navigation in a fairway, heavy weather, distress, crew and its tasks, changing the watch, survival in an emergency, helicopter rescue, encounter with the coastguard. Besides that, the competence in listening, speaking, writing and translating are being intensively mastered to achieve the best results in service in compliance with Croatian legislation, STCW Convention as well as IMO requirements.

TEACHING MODE

☒Lectures ☐Seminars and workshops ☒Exercises ☐Independent assignments ☒Multimedia and internet ☐Distance learning	☐Consultations ☐Laboratory ☐Field work ☐Mentoring ☐Exams

EXAMINATION METHOD	
☐ Oral ☒ Written ☒ Partial exam	Other: Regular attendance obligatory. In class examinations continually.

READING	
Compulsory reading	
1.	Murrell, Stephan, Nagliati Peter i Stefano Canestri. 2009. Safe Sailing: SMCP training for seafarers, Single-user CD-ROM, Cambridge: Cambridge University Press
2.	2002. IMO SMCP Standard Marine Communication Phrases, London: International Maritime Organization.
3.	Web-based Maritime English Learning Tool; The MarEng project (10/2004 - 05/2007) concentrated on creating a Web-based Maritime English Language Learning Tool. The project was partially financed by the Leonardo da Vinci Programme of the Europen Union. The MarEng Learning Tool has been complemented with a MarEng Plus Learning Tool, which was created during the MarEng Plus project (10/2008 - 11/2010).
Optional reading	
1.	Dragojević, Lia. (2008.) „Standardni pomorsko-komunikacijski izrazi Međunarodne Pomorske Organizacije = IMO Standard Marine Communication Phrases (IMO SMCP 2001)“. Naše more 54(1-2): 69.-70. Dubrovnik : Sveučilište u Dubrovniku.
2.	Dragojević, Lia (2007.) „Pomorski engleski nasuprot pomorskom hrvatskom: kontrastivna analiza leksika.“ Strani jezici 36(4): 301-316. Zagreb: Odjel za strane jezike Hrvatskog filološkog društva u suradnji sa Školskom knjigom.
3.	Dragojević, Lia (2014.) Sociolingvističke posebnosti jezika i dijalekta pomorske struke - p(r)oučavanje engleskog i hrvatskog U Standardni jezici i sociolekti u 21. stoljedu = Standard languages and sociolects in the 21st century, Zbornik radova s međunarodnoga znanstvenog skupa Hrvatskoga društva za primijenjenu lingvistiku održanog 18. do 20. travnja 2013. u Dubrovniku, Zagreb: Hrvatsko društvo za primijenjenu lingvistiku i Srednja

	Europa, uredili Mateusz-Milan Stanojevid, Anita Peti-Stantid i Goranka Antunovid, str. 195-209.

LIST OF TOPICS

No.		Hours		
		L	**E**	**S**
1.	In Port	**2**	**2**	
2.	Welcome to a Modern Port	**2**	**2**	
3.	Loading the MS Marina	**2**	**2**	
4.	The Ship	**2**	**2**	
5.	Leaving Port	**2**	**2**	
6.	In the Fairway	**2**	**2**	
7.	Heavy Weather	**2**	**2**	
8.	Mayday Mayday	**2**	**2**	
9.	The Crew and Its Tasks	**2**	**2**	
10.	At Sea – Changing the Watch	**2**	**2**	
11.	Survival in an Emergency	**2**	**2**	
12.	Helicopter Rescue	**2**	**2**	
13.	An Encounter with the Coast Guard	**2**	**2**	

14.	Epilogue	**2**	**2**	
15.	Summary	**2**	**2**	
	TOTAL HOURS			

OTHER RELEVANT INFORMATION
Electronic equipment at disposal at Language Lab A-35 Ćira Carića 4 Dubrovnik

COURSE INFORMATION	
	Maritime English Language III-1
Degree	Bachelor
Semester	winter
ECTS points	4
Course status	Compulsory
Course leader	Lia Dragojevic
Department, room no.	Maritime Department
Phone	445-786
e-mail	lia@unidu.hr

COURSE DESCRIPTION

Course content

Maritime English course III-1 encompasses materials published in e-manuals MarEng and MarEng Plus published as a result of an International European Project Leonardo da Vinci.

The content is suitable for seafarers for their university level competences as well as self-studying during their service at sea both in inner as well as international waters.

The content of the course has been approved by the experts in Maritime English from professionals of European Union Member States (Spain, Portugal, Finland, Poland, Latvia, Belgium, Croatia)

Learning outcomes

Having finished university level course Maritime English II-1 (winter semester), the candidates are capable to communicate at sea in written language as well as in oral especially from the following areas: ports, port management, loading a modern container vessel, modern vessel, leaving the port, navigation in a fairway, heavy weather, distress, crew and its tasks, changing the watch, survival in an emergency, helicopter rescue, encounter with the coastguard. Besides that, the competence in listening, speaking, writing and translating are being intensively mastered to achieve the best results in service in compliance with Croatian legislation, STCW Convention as well as IMO requirements.

TEACHING MODE

☒Lectures ☐Seminars and workshops ☒Exercises ☐Independent assignments ☒Multimedia and internet ☐Distance learning	☐Consultations ☐Laboratory ☐Field work ☐Mentoring ☐Exams

EXAMINATION METHOD	
☐ Oral ☒ Written ☒ Partial exam	Other: Regular attendance obligatory. In class examinations continually.

READING	
Compulsory reading	
1.	Murrell, Stephan, Nagliati Peter i Stefano Canestri. 2009. Safe Sailing: SMCP training for seafarers, Single-user CD-ROM, Cambridge: Cambridge University Press
2.	2002. IMO SMCP Standard Marine Communication Phrases, London: International Maritime Organization.
3.	Web-based Maritime English Learning Tool; The MarEng project (10/2004 - 05/2007) concentrated on creating a Web-based Maritime English Language Learning Tool. The project was partially financed by the Leonardo da Vinci Programme of the Europen Union. The MarEng Learning Tool has been complemented with a MarEng Plus Learning Tool, which was created during the MarEng Plus project (10/2008 - 11/2010).
Optional reading	
1.	Dragojević, Lia. (2008.) „Standardni pomorsko-komunikacijski izrazi Međunarodne Pomorske Organizacije = IMO Standard Marine Communication Phrases (IMO SMCP 2001)“. Naše more 54(1-2): 69.-70. Dubrovnik : Sveučilište u Dubrovniku.
2.	Dragojević, Lia (2007.) „Pomorski engleski nasuprot pomorskom hrvatskom: kontrastivna analiza leksika.“ Strani jezici 36(4): 301-316. Zagreb: Odjel za strane jezike Hrvatskog filološkog društva u suradnji sa Školskom knjigom.
3.	Dragojević, Lia (2014.) Sociolingvističke posebnosti jezika i dijalekta pomorske struke - p(r)oučavanje engleskog i hrvatskog U Standardni jezici i sociolekti u 21. stoljedu = Standard languages and sociolects in the 21st century, Zbornik radova s međunarodnoga znanstvenog skupa Hrvatskoga društva za primijenjenu lingvistiku održanog 18. do 20. travnja 2013. u Dubrovniku, Zagreb: Hrvatsko društvo za primijenjenu lingvistiku i Srednja

	Europa, uredili Mateusz-Milan Stanojevid, Anita Peti-Stantid i Goranka Antunovid, str. 195-209.

LIST OF TOPICS

No.		Hours		
		L	**E**	**S**
1.	In Port	**2**	**2**	
2.	Welcome to a Modern Port	**2**	**2**	
3.	Loading the MS Marina	**2**	**2**	
4.	The Ship	**2**	**2**	
5.	Leaving Port	**2**	**2**	
6.	In the Fairway	**2**	**2**	
7.	Heavy Weather	**2**	**2**	
8.	Mayday Mayday	**2**	**2**	
9.	The Crew and Its Tasks	**2**	**2**	
10.	At Sea – Changing the Watch	**2**	**2**	
11.	Survival in an Emergency	**2**	**2**	
12.	Helicopter Rescue	**2**	**2**	
13.	An Encounter with the Coast Guard	**2**	**2**	

14.	Epilogue	**2**	**2**	
15.	Summary	**2**	**2**	
	TOTAL HOURS			

OTHER RELEVANT INFORMATION
Electronic equipment at disposal at Language Lab A-35 Ćira Carića 4 Dubrovnik

SUMMER SEMESTER

COURSE INFORMATION	
	DRY BULK CARGOES AND SPECIALIZED CARGOES TRANSPORT TECHNOLOGY
Degree	Bachelor
Semester	Winter
ECTS points	4
Course status	Elective
Course leader	Nermin Hasanspahić, PhD., Assistant professor
Department, room no.	
Phone	nhasanspahic@unidu.hr
e-mail	

COURSE DESCRIPTION
Course content
The course provides the student with knowledge about categories of bulk carriers; stowage plan; calculation of intact and demaged stability criterion; SOLAS convention emphasising chapters VI and VII; codes related to carriage of cargo on these vessels including IMSBC Code, Grain Code, BLU Code, CSS Code, Timber Code, IMDG Code; lashing of unitised cargo on these ships; cargo documents; cargo loading equipment.
Learning outcomes
Students will be able to:•identify the bulk carrier types, layout, sizes and tonnages,•understand inact and demage stability of ships,•understand international regulations regarding carriage of bulk and specialised cargoes.

TEACHING MODE	
☒Lectures	☐Consultations
☐Seminars and workshops	☐Laboratory

☒Exercises ☐Independent assignments ☐Multimedia and internet ☐Distance learning	☐Field work ☐Mentoring ☐Exams

EXAMINATION METHOD	
☐ Oral ☒ Written ☒ Partial exam	Other:

READING

Compulsory reading	
1.	IMSBC Code, Grain Code, BLU Code, CSS Code, Timber Code, IMDG Code
2.	Stowage & Segregation Guide to IMDG- Code, K.O Storck Verlag, Hamburh, 1998
3.	R.E.Thomas, *Thomas Stowage - The properties and stowage of cargoes*, Glasgow, 1983
4.	David J. House, Cargo work for maritime operations, Elsevier Butterworth-Heinemann, 2005.
Optional reading	
1.	Pravila za tehnički nadzor pomorskih brodova, Dio 23: Prijevoz tereta, Hrvatski registar brodova, Split 2009

LIST OF TOPICS

No.		Hours		
		L	**E**	**S**
1.	The history of Dry Bulk Cargoes	**2**	**2**	
2.	Bulk carriers design	**2**	**2**	
3.	International conventions, codes and standards	**2**	**2**	

4.	Loading instruments	**2**	**2**	
5.	Stowage plans and final loading calculations	**2**	**2**	
6.	Effects of change of density on a ship's draft and trim	**2**	**2**	
7.	The International Code for the Safe Carriage of Grain in Bulk	**2**	**2**	
8.	Calculation of stability criteria for grain cargo	**2**	**2**	
9.	The International Maritime Solid Bulk Cargoes Code, calculation of stability criteria	**2**	**2**	
10.	The Code of Practice for the Safe Loading and Unloading of Bulk Carriers	**2**	**2**	
11.	Calculation of BM/SF, sequencing, monitoring	**2**	**2**	
12.	Draft Survey	**2**	**2**	
13.	Stowage and segregation of dangerous cargoes onboard bulk carriers	**2**	**2**	
14.	The Code of Safe Practice for Cargo Stowage and Securing, The Code of Safe Practice for Ships Carrying Timber Deck Cargoes	**2**	**2**	
15.	Bulk cargoes terminals	**2**	**2**	
	TOTAL HOURS		**30**	

OTHER RELEVANT INFORMATION

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COURSE INFORMATION	
	Work on Engine Room Simulator 1
Degree	Bachelor
Semester	winter
ECTS points	3
Course status	Mandatory
Course leader	Dr.sc. Žarko Koboević
Department, room no.	Maritime Department – Marine Engineering
Phone	020 445763
e-mail	zarko.koboevic@unidu.hr

COURSE DESCRIPTION

Course content

Getting to know the functioning of the engine room simulator and its parts.
Getting familiar with the systems (mechanical and electrical) that are displayed on the simulator.
Exercises of starting and stopping of the simulator systems; Steering gear, piston compressors, drinking and fresh water system, bilge pumps, ballast system, fuel and lubricant centrifugal separators, oily water separators, ect.Diessel generator exercises. Diessel generators and related systems (cooling water and sea water, fuel system, lubrication oil system, compressed air system, gear oil system, variable pitch propeller). Works related to power distribution system. Exersises on distribution panels.Works with emergency generators. Synchronization and parallel running of the generators. High-voltage (6600 V) system. 6600 V power distribution, propulsion electromotors, thrusters, air conditioning compressors and other consumers of 6600 V

Learning outcomes

Students acquire the skills and practical application of theoretical knowledge learned in a class.Students are trained to manage main and auxiliary engines, ship engine room systems.Students can gain selfconfidence in managing controll and maintenance of motors, systems and devices and other equipment that is installed in an Engine Room and can be displayed on the simulator

TEACHING MODE	
☒Lectures ☐Seminars and workshops ☒Exercises ☒Independent assignments ☒Multimedia and internet ☐Distance learning	☒Consultations ☐Laboratory ☐Field work ☒Mentoring ☒Exams

EXAMINATION METHOD	
☒ Oral ☐ Written ☐ Partial exam	Other: Exercices task and problem solving on Engine Room Simulator

READING	
Compulsory reading	
1.	Kongsberg Engine Room DE Cruise Vsl Simulator User Manual, 2013
Optional reading	

LIST OF TOPICS

No.		Hours		
		L	**E**	**S**
1.	Getting to know the simulator. Arrangement of installations (tanks, valves, pipings, pumps, filters, heat exchangers, propulsion systems, generators, boilers.	**1**	**2**	
2.	Getting to know the simulator. Arrangement of power machinery, equipment, main distribution board, emergency generator distribution board.	**1**	**2**	

3.	Getting to know the simulator. Control consoles. Operational procedures, organization of work and routines in the engine room (simulator).	**1**	**2**	
4.	Start-up and Control Procedures of Auxiliary Systems: seawater system, central cooling system, high temperature cooling system.	**1**	**2**	
5.	Start-up and control procedures of auxiliary systems: compressed air system - control and, starting air system, lubricatiing oil system, fuel oil system.	**1**	**2**	
6.	Start-up and control procedures of auxiliary systems: steam and condensate system, boiler feed water system.	**1**	**2**	
7.	Start-up and control procedures of auxiliary systems: ballast system, bilge water system, sludge and waste oil system.	**1**	**2**	
8.	Start-up and control procedures for propulsion machinery systems shafting system, steering gear system, propulsion engines cooling system.	**1**	**2**	
9.	Start-up and control of auxiliary engines: diessel generators system, emergency generator system.	**1**	**2**	
10.	Startup and control procedures for auxiliary systems: air conditioning system, air condition compressors, air condition heat exchangers .	**1**	**2**	
11.	Procedures for using electrical, electronic and control equipment	**1**	**2**	
12.	Diesel generator startup procedures, manual and automatic synchronization, generators and power network load distribution	**1**	**2**	
13.	Communication procedures with command bridge. Transfer of control from bridge – engine room control cabin and engine room control cabin - local control station. Use of the ship telegraph and	**1**	**2**	
14.	Start-up and control procedures for propulsion motors, bow and stern thrusters and other high voltage consumers.	**1**	**2**	
15.	Start and control procedures for propulsion electromotors, emergency stop prorocedures and emergency propulsion. Procedures before taking the watch in the engine room	**1**	**2**	
	TOTAL HOURS	**15**	**30**	

OTHER RELEVANT INFORMATION

Engine room simulator software, display layout, drawings, ect. is in English language only and it is imposible to do teaching and perform excersizes in Croatian language only. The best for students is attending this course in English language only.

COURSE INFORMATION	
	Maritime English Language I-2
Degree	Bachelor
Semester	Spring
ECTS points	4
Course status	Compulsory
Course leader	M.A. Lia Dragojevič, prof.
Department, room no.	Čira Carića 4 A-31
Phone	445-867
e-mail	lia@unidu.hr

COURSE DESCRIPTION

Course content

The content of the university course Maritime English Language I-2 spring term is a sequel of the content of the first semester and the student is led through the knowledge required for merchant marine officers in national and international traffic.Grammatical structures of modal verbs, passive voice of all tenses and Conditional Sentences in addition to Direct as well as Indirect Speech. The papers dealing with loading the cargo, leaving the dock and sailing are being taken into consideration. The topics covering respective terminology regarding inward and outward vessels' procedures are taken into consideration. At the same time, adverse weather conditions are beingdiscussed as well as anchoring and berthing.Furthermore, the introduction into navigation, electronic aids to navigation, celestial and electronic navigation and marine radar are being dealt with.

Learning outcomes

Upon the end of the 2nd spring semester, the student of the first year Nautical Department will obtain linguistic competences in understanding, writing, speaking and translating in the following fields: Loading cargo – lexical items from respective field in English ; Leaving dock, vocabulary in English, Vessel in sailing – terminology in English; Weather conditions and patterns – structures in English; Arrival at a Port – words and phrases upon entering inward in English; Anchoring – verbs regarding anchoring and collocations regarding "anchor" (nouns and verbs in English); Vessels berthing – adequate terms in English; Introduction into Navigation – types of navigation; specific terms; Navigational Bridge – terms; Navigational Charts – terms; Position of a vessel –

terms, abbreviations and expressions; Celestial Navigation – marine terminology; Marine Radar – Acronym – production of new vocabulary in Maritime English

TEACHING MODE	
☒Lectures ☐Seminars and workshops ☒Exercises ☒Independent assignments ☒Multimedia and internet ☐Distance learning	☐Consultations ☐Laboratory ☐Field work ☐Mentoring ☒Exams

EXAMINATION METHOD	
☒ Oral ☒ Written ☒ Partial exam	Other: Work in classes.

READING	
Compulsory reading	
1.	See Maritime English Language I-1
Optional reading	

LIST OF TOPICS

No.		Hours		
		L	**E**	**S**
1.	Loading a Vessel	**2**	**2**	
2.	Leaving the Dock	**2**	**2**	

3.	Under Way	**2**	**2**	
4.	Meeting Heavy Weather	**2**	**2**	
5.	Arriving at a Port	**2**	**2**	
6.	At Anchor	**2**	**2**	
7.	Berthing	**2**	**2**	
8.	An Introduction to Navigation	**2**	**2**	
9.	Electronic Aids to Navigation	**2**	**2**	
10.	Sea Charts	**2**	**2**	
11.	Obtaining a Ship's Position	**2**	**2**	
12.	Astronomical Navigation	**2**	**2**	
13.	The Marine Radar	**2**	**2**	
14.	Integrated Navigation Systems	**2**	**2**	
15.	Collision Rules	**2**	**2**	
	TOTAL HOURS	**30**	**30**	

OTHER RELEVANT INFORMATION

e-learning equipment necessary for both students and professor.

COURSE INFORMATION	
	Maritime English Language II-2
Degree	Bachelor
Semester	Spring
ECTS points	4
Course status	Compulsory
Course leader	M.A. Lia Dragojevič, prof.
Department, room no.	Čira Carića 4 A-31
Phone	445-867
e-mail	lia@unidu.hr

COURSE DESCRIPTION

Course content

Maritime English Language course II-1 encompasses materials published in e-manuals MarEng and MarEng Plus published as a result of an International European Project Leonardo da Vinci.The content is suitable for seafarers for their university level competences as well as self-studying during their service at sea both in inner as well as international waters.The content of the course has been approved by the experts in Maritime English from professionals of European Union Member States (Spain, Portugal, Finland, Poland, Latvia, Belgium,Croatia)

Learning outcomes

Having finished university level course Maritime English Language II-1 (winter semester), the candidates are capable to communicate at sea in written language as well as in oral especially from the following areas: ports, port management, loading a modern container vessel, modern vessel, leaving the port, navigation in a fairway, heavy weather, distress, crew and its tasks, changing the watch, survival in an emergency, helicopter rescue, encounter with the coastguard. Besides that, the competence in listening, speaking, writing and translating are

being intensively mastered to achieve the best results in service in compliance with Croatian legislation, STCW Convention as well as IMO requirements. LECTURES:

TEACHING MODE	
☒Lectures ☒Seminars and workshops ☒Exercises ☐Independent assignments ☒Multimedia and internet ☐Distance learning	☒Consultations ☐Laboratory ☐Field work ☒Mentoring ☒Exams

EXAMINATION METHOD	
☒ Oral ☒ Written ☒ Partial exam	Other: In class excersices and exams

READING	
Compulsory reading	
1.	References quoted in the third winter semester
2.	
Optional reading	

LIST OF TOPICS				
No.		**Hours**		
		L	**E**	**S**
1.	Port Operations	**2**	**2**	

2.	Shipping and Maritime Management	**2**	**2**	
3.	Cargo Handling	**2**	**2**	
4.	Vessel Types	**2**	**2**	
5.	The Engine Room	**2**	**2**	
6.	Cargo Space	**2**	**2**	
7.	Port State Control	**2**	**2**	
8.	SMCP 1	**2**	**2**	
9.	SMCP 2	**2**	**2**	
10.	Vessel Traffic Services (VTS)	**2**	**2**	
11.	Ice Navigation	**2**	**2**	
12.	Weather	**2**	**2**	
13.	Radio Communication 1	**2**	**2**	
14.	Radio Communication 2	**2**	**2**	
15.	Radio Medical	**2**	**2**	
	TOTAL HOURS	**30**	**30**	

COURSE INFORMATION	
Course name	**Communication in Maritime**
Semester	Winter
ECTS points	4
Course status	Compulsory
Course leader	Srećko Krile
Department, room no.	Electrotechnic and computing, D 16
Phone	385-20-445739
e-mail	srecko.krile@unidu.hr
Course assistant/associate	Maro Car
Department, room no.	
Phone	Click here to enter text.
e-mail	Click here to enter text.

COURSE DESCRIPTION

Course content

Telecommunication systems in maritime. Computing networks and Internet. New services and counting in context of NGN (New Generation Network).
The role of functional networks in maritime. Radio-communication networks: global and local coverage. Radio-wave propagation for VHF, MF, HF bands, communication on distance, approach to multiple access, modulation techniques, transceivers and antennas. For all three forms of communications operational procedures are described, both for routine and for emergency communications. Required range between ships or ship and coast. Ship positioning in distress as well as the use of these devices when abandoning the ship, ensuring a power source to them, etc.
Cellular radio networks GSM-a i UMTS. Satellite mobile networks. Basics of satellite channel. Inmarsat network. Relation between LES and TK operator (LESO). Traffic characteristics of Inmarsat. Broadcasting systems. Alternative satellite networks

Learning outcomes

On completion of course the student will be able to understand and demonstrate knowledge of communication systems on the ship. Also they will able to troubleshot the different devices and to maintenance them on appropriate technical level. Main goal is to enhance the exploitation and to reduce the expenses. This knowledge is sufficient to get General Radio - operator Certificate (IMO)

TEACHING MODE

☒Lectures	☒Consultations
☐Seminars and workshops	☒Laboratory
☐Exercises	☐Field work
☐Independent assignments	☒Mentoring
☒Multimedia and internet	☒Exams
☒Distance learning	

EXAMINATION METHOD

☒ Oral	Other:
☒ Written	Click here to enter text.
☐ Partial exam	

READING

Compulsory reading

1.	Krile S., Komunikacijski sustavi u pomorstvu - Mobilne radiomreže, Sveučilište u Dubrovniku, 2011.

2.	Krile S., Elektroničke komunikacije u pomorstvu - Mobilne satelitske veze, Sveučilište u Dubrovniku, 2004.
3.	Čerić V., Varga, M., Poslovno računarstvo:, Element, 2004., ISBN: 953-197-640-6
4.	Dodd A., Telecommunication, Algoritam, Zagreb, 2002.
5.	ITU (UIT), *Manual for Use by the Maritime Mobile and Maritime Mobile-Satellite Services*, Geneve, 2015/16.
Optional reading	
1.	ITU (UIT), *Manual for Use by the Maritime Mobile and Maritime Mobile-Satellite Services*, Geneve, 2015/16.
2.	Hydrographer of the Navy, *Admiralty List of Radio Signals*, Vol. 1 - 6, Taunton, Somerset, 2010/11.
3.	Roddy D., Satellite Communications, McGraw-Hill Professional Publishing, 2001.
4.	Click here to enter text.
5.	Click here to enter text.

LIST OF TOPICS

No.		Hours		
		L	**E**	**S**
1.	SOLAS International Regulations (GMDSS). Basics of radio and telecommunication systems. Types and uses of maritime teleservices. Way of switching: channels, messages and packets with switched and leased connections. Types of public networks.	3	3	
2.	Generation and propagation of electromagnetic waves, frequency plan and distribution conditions. Propagation on VHF, MF / HF and in satellite links. Interference effects and protection methods. Channels and ways of communication: simplex, duplex	3	3	
3.	Introduction to radiotelephony. Call sign and radio traffic. Ways of correspondence and meeting international norms. International Literary Code (INTERCO).Forms of alerting and communication for SAR needs on VHF MF / HF. Confirmation of receipt and further communication.	3	3	
4.	Commercial connections. International ITU channels. Traffic lists. Keeping a radio diary. Billing services. Basics of DSC. Transmitting an alarm in a dangerous situation via DSC. Format content. Validation procedure and DSC confirmation format. Exact position.	3	3	
5.	Forwarding on DSC by ship or coastal radio station (ORP). Answer the confirmation and switch to the appropriate frequencies. Forwarding by ORP. Application of DSC in other levels of danger, urgency and safety. Application of AIS for locating and identification.	3	3	
6.	Application of working ITU channels and transition to radiotelephony and radiotelex.Specifics in the working areas of VHF and MF / HF. Use of professional literature on board (ITU, ALRS). Antenna adjustment stage adjustment problems. Handheld radios. Maintenance.	3	3	
7.	Fundamentals of Radiotelex (NBDP). Operating frequencies of this type of emissions. Channel reception and scanning procedures. Methods of transmission protection: ARQ and FEC, and application for certain types of communications. Formation of written content.	3	3	
8.	Securing admission according to ORPs. Calling with ARQ. Selective number and cover. Commercial ship-to-land connection via coastal radio station (CRS). Use of	3	3	

	abbreviations in telex correspondence. Traffic lists and other working data on ORP. Ensuring the receipt of MSI messages.			
9.	Functional satellite networks and Inmarsat organization. Satellite areas. Types of communication standards and mobile terminals (MES). Handling devices in the Inmarsat system and connecting them to other land-based telecommunications networks. Types of voice and data services.	3	3	
10.	Types of satellite dishes and adjustment to the desired satellite.Telephony via Inmarsat. Calling to another MES or to the mainland. Coastal Earth Station (LES) selection. A call in peril and safety. Special assistance services via the coastal station (LES)	3	3	
11.	Direct and indirect satellite services (Store and Forward). Services through Inmarsat-C. Log-in and log-out to NCS. Alert and send security messages. Distress Priority Message. Special assistance services via the coastal station (LES).	3	3	
12.	Commercial connections via Inmarsat-C. Conversion of services to different users on land, telex and fax. Land access via Internet (e-mail).Other data services; eg SMS. Connection from the mainland to the ship's Inmarsat-C terminal. MES - MES connection.	3	3	
13.	Ensuring the receipt of information important for safety of navigation (EGC): FleetNet and SafetyNet. Organization of distribution of MSI messages via satellite. The problem of the correct position. Other Inmarsat standards (M / Mini-M / Fleet). Benefits of packet transmission.	3	3	
14.	COSPAS / SARSAT-EPIRB for the purpose of marking the place of danger. The difference between the usual systems. EPIRB for area A1. Marking the scene of an accident using SART and AIS SART. Air TRON for aircraft communication. Proper handling of these buoys in emergency.	3	3	
15.	Other satellite systems and their impact on maritime communications, introduction of new services. Comparison of communication possibilities and costs between individual systems. The importance of satellite connections for the purposes of danger and security.	3	3	
	TOTAL HOURS	**45**	**45**	

OTHER RELEVANT INFORMATION
This knowledge is sufficient to get General Radiooperator Certificate (IMO)
Click here to enter text.

MASTER / GRADUATE LEVEL

WINTER SEMESTER

COURSE INFORMATION	
	BUSINESS COMMUNICATION IN SHIPPING 1
Degree	Master
Semester	Winter
ECTS points	6
Course status	Elective
Course leader	Nives Vidak, MSc, Senior Lecturer
Department, room no.	Maritime Department, room A 27
Phone	445-895
e-mail	nives.vidak@unidu.hr

COURSE DESCRIPTION
Course content
Business communication forms and styles. Basics of written and oral communication. Main business communication systems in shipping: within the company/ship, between company/ship and third parties. Writing – compilation, analysis and discussion of texts in the shipping business (letter-writing, e-mails, report-writing, protests, memo-writing, notices). Oral communication: orders, prohibitions, permissions, meetings, advices, instructions, notifications (vocabulary, emphasis, sentence structure). Specifics of the official language in maritime communication: vocabulary, grammar and communication phrases.
Learning outcomes
Students will acquire business communication skills in the specific field of shipping and build on the acquired knowledge. Examples from original business communication in shipping will be used to help the students compile, read

and understand business letters, messages, reports, etc. as well as to develop active oral communication in maritime English in occupational situations by improving self-expression. Essentials of clear and effective expository writing will be mastered and the students will be well prepared for independent and efficient oral communication and exchange of information avoiding misunderstandings. The course will enable students to give coherent and concise presentation of thoughts and ideas through usage of specific language structures and terminology.

TEACHING MODE

☒Lectures	☒Consultations
☒Seminars and workshops	☐Laboratory
☒Exercises	☒Field work
☒Independent assignments	☐Mentoring
☒Multimedia and internet	☒Exams
☒Distance learning	

EXAMINATION METHOD

☐ Oral	Other:
☐ Written	Ppt presentation
☐ Partial exam	

READING

Compulsory reading

1.	D. Cotton, D. Falvey, S. Kent: Market Leader – Intermediate Business English, Pearson Elt, 2006
2.	A. Ashley: Oxford Handbook of Commercial Correspondence, 2005
3.	Business Writing - http://owl.english.purdue.edu/owl/resource/653/01/
4.	Handouts

Optional reading

1.	IMO Standard Marine Communication Phrases (IMO SMCP 2001)

LIST OF TOPICS

No.		**Hours**

		L	E	S
1.	Basics of business communication (definition, significance, characteristics)	2	2	
2.	Business communication forms	2	2	
3.	Communication process	2	2	
4.	Formal and informal communication	2	2	
5.	Basic systems in business communication in shipping	2	2	
6.	Basic characteristics of business language in shipping; terminology and sentence structure in English for specific purposes	2	2	
7.	Oral communication; advantages and limitations	2	2	
8.	Meetings, group discussions, orders, prohibitions, instructions, notices	2	2	
9.	Written communication; advantages and limitations	2	2	
10.	Short messages	2	2	
11.	Drafting and composing business letters (requests, notices, offers, orders)	2	2	
12.	Drafting and composing reports	2	2	
13.	Presentations	2	2	
14.	Information flow in shipping (business information protocol)	2	2	
15.	Feedback	2	2	

TOTAL HOURS	**30**	**30**	

OTHER RELEVANT INFORMATION
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SUMMER SEMESTER

COURSE INFORMATION	
	BUSINESS COMMUNICATION IN SHIPPING 2
Degree	Master
Semester	Winter
ECTS points	6
Course status	Elective
Course leader	Nives Vidak, MSc, Senior Lecturer
Department, room no.	Maritime Department, room A 27
Phone	445-895
e-mail	nives.vidak@unidu.hr

COURSE DESCRIPTION
Course content
1. Rules of efficient business communication. Communication strategies. 2. Problems in communication; situational communication; communication in crisis. 3. Implications of technological advances in business communication.

4. Negotiating and signing contracts.

5. Presentation, compilation, analysis and discussion of texts from business communication in shipping (business letters, e-mails, reports, protests, notices, decisions, rules, business policies).

6. Oral communication: orders, prohibitions, permissions, meetings, negotiations, advices, instructions, Notifications (vocabulary, emphasis, sentence structure).

7. Specifics of the vocabulary, grammar and communication phrases in business and finances.

Learning outcomes

Students will acquire business communication skills in the specific field of shipping and build on the acquired knowledge. Examples from original business communication in shipping will be used to help the students compile, read and understand business letters, messages, reports, contracts etc., also to help in business negotiation and in developing active oral communication in maritime English in occupational situations by improving self-expression. Essentials of clear and effective expository writing will be mastered and the students will be well prepared for independent and efficient oral communication and exchange of information avoiding misunderstandings. The course will enable students to give coherent and concise presentation of thoughts and ideas through usage of specific language structures and terminology.

TEACHING MODE

☒Lectures	☒Consultations
☐Seminars and workshops	☐Laboratory
☒Exercises	☐Field work
☒Independent assignments	☒Mentoring
☒Multimedia and internet	☒Exams
☐Distance learning	

EXAMINATION METHOD

☐ Oral	Other:
☐ Written	PPT presentation
☐ Partial exam	

READING

Compulsory reading	
1.	A. Ashley: Oxford Handbook of Commercial Correspondence, 2005
2.	D. Cotton, D. Falvey, S. Kent: Market Leader – Intermediate Business English, Pearson Elt, 2006
3.	Business Writing - http://owl.english.purdue.edu/owl/resource/653/01/
4.	Handouts
Optional reading	
1.	IMO Standard Marine Communication Phrases (IMO SMCP 200

LIST OF TOPICS

No.		Hours		
		L	**E**	**S**
1.	Basics of efficient communication	**2**	**1**	
2.	Communication strategies, development and application	**2**	**1**	
3.	Interview, speaking in public	**2**	**1**	
4.	Problems in communication (language, obstacles); communication breakdown	**2**	**1**	
5.	How to avoid misunderstandings	**2**	**1**	
6.	Language and terminology of contracts in shipping	**2**	**1**	
7.	Negotiations and making agreements	**2**	**1**	
8.	Rules and regulations, policies	**2**	**1**	
9.	Language and terminology in communication with financial institutions	**2**	**1**	
10.	The impact of technology (communication tools)	**2**	**1**	

11.	Representing a company; publishing reports	**2**	**1**	
12.	Greetings, reminders	**2**	**1**	
13.	Informal communication	**2**	**1**	
14.	Multimedia	**2**	**1**	
15.	Feedback	**2**	**1**	
	TOTAL HOURS	**30**	**15**	

OTHER RELEVANT INFORMATION
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COURSE INFORMATION	
Course name	**Inteligent Transport Systems**
Semester	Spring
ECTS points	5
Course status	Compulsory
Course leader	Srećko Krile
Department, room no.	Electical and computing, D 16
Phone	385 20 445 739
e-mail	srecko.krile@unidu.hr
Course assistant/associate	Danko Kezic
Department, room no.	Maritime University of Split
Phone	Click here to enter text.
e-mail	danko.kezic@pfst.hr

COURSE DESCRIPTION

Course content

Tasks of Intelligent Transport Systems. ITS in road, air, river and maritime transport. Structure in the task of VTS traffic control and management system. The role of information and communication systems (ICT) in maritime affairs and their role in business. Different applications of intelligent systems for different types of ships.

Decision support systems. Fundamentals of optimization procedures. Discrete models of the maritime transport system. Basic network programming algorithms. Fundamentals of Petri nets. Transport system modeling using Petri nets. Analysis of the maritime transport system with regard to conflicts and congestion. Synthesis of sector supervisors and intersection supervisors. Determining optimal travel and savings.

Introduction to expert systems. Fundamentals of artificial intelligence in transport systems. Decision-making systems based on knowledge and learning. Methods of production logic: forward and backward. Drawing a decision tree diagram. Expert systems design technique. Programming in CLIPS. Fundamentals of Bayesian networks.

Learning outcomes

Classify decision support systems that are standardly used on board ships and in ports.
Present the work of intelligent transport electronic systems on which modern shipping business is based.
Create a discrete model of the maritime transport system.
Master simulation and optimization techniques.
Analyze the maritime transport system by applying discrete event theory and Petri nets.
Detect the existence of conflicts, delays and limitations of the maritime transport system, primarily related to available capacities and safety.
Recommend a way to improve traffic management monitoring systems with regard to conflicts, congestion, restrictions and safety.

TEACHING MODE

☒Lectures	☒Consultations
☐Seminars and workshops	☒Laboratory
☒Exercises	☐Field work
☐Independent assignments	☒Mentoring
☒Multimedia and internet	☒Exams
☒Distance learning	

EXAMINATION METHOD

☒ Oral	Other:

☒ Written ☐ Partial exam	Click here to enter text.

READING	
Compulsory reading	
6.	Čerić, V, Varga, M. & all, Informacijska tehnologija u poslovanju, ISBN: 953-197640-6, Element, d.o.o., Zagreb, 2004.
7.	Antonić, R. , Automatizacija broda II, skripta, Visoka pomorska škola u Splitu, Split, 2007.,
8.	Fossen, T.I. , MARINE CONTROL SYSTEMS - GUIDANCE, NAVIGATION AND CONTROL OF SHIPS, RIGS AND UNDERWATER VEHICLES, Marine Cybernetics, Trondheim, Norway, 2002.,
9.	Krile S., Komunikacijski sustavi u pomorstvu - Mobilne radiomreže, Sveučilište u Dubrovniku, 2011.
10.	
Optional reading	
6.	M. Blanke i dr. , Diagnosis and Fault-Tolerant Control ISBN: 978-3-662-47942-1, Springer, Berlin, 2003.,
7.	Krile, S., Optimization Approach in Multi-stop Routing of Small Islands, doi: 10.17402/28, str. 9-16, Scientific Journals Of The Maritime University Of Szczecin (p-ISSN: 1733-8670, e-ISSN: 2392-0378), 2018., str. 9-16
8.	Chládek, P., Smetanová, D., Krile, S., On Some Aspects of Graph Theory for Optimal Transport Among Marine Ports, doi: doi: https://doi.org, , Scientific Journal of Silesian University of Technology - Series Transport (ISSN: 0209-3324), 2018., str. 37-45
9.	Stopka, O., Krile, S., Stopkova, M. Luptak, V. , Application Of The Chosen Multi-Criteria Decision-Making Methods To Identify The Autonomous Train Sy, , Transport Problems, Vol. 15, No. 2 (ISSN: 1896-0596) , 2020., str. 45-57
10.	Kovačić, Z.,Bogdan, S., Krajči, V., Osnove robotike , Graphis, Zagreb, 2002.,
11.	Peruško, U., Digitalni sustavi, Školska knjiga, Zagreb, 2005.,

LIST OF TOPICS

No.		Hours		
		L	E	S
4.	Tasks of Intelligent Transport Systems. ITS in road, air, river and maritime transport. Definition of optimal route. Structure in the task of VTS maritime traffic control and management system. VTS services.	2	2	
5.	Data storage, processing and processing off-line and on-line (real-time). On-board computer local area network (LAN). Industrial buses on board in the role of automation. Sensor networks.	2	2	
6.	Decision support systems. Mathematical models. Optimization process. Types of optimization: LP and NLP. Dynamic and network programming. Heuristic algorithms.	2	2	
7.	Minimum spanning tree and maximum flow algorithms, and determination of the shortest path. Transport problem. An example of multi-commodity transport optimization, where the shortest path algorithm was used.	2	2	
8.	An example of an intelligent transport system in the transport of containers and the supply of drinking (fresh) water to ships. Fundamentals of fuzzy logic. Application of inference methods. Stages in the emergence of such systems.	2	2	
9.	Example of route optimization on a route with multiple loading and unloading ports, how to develop a mathematical model, selecting an algorithm and creating an application. Testing the effectiveness of the tool on real examples.	2	2	

10.	Basic features of a system with discrete events. General, temporal, continuous and hybrid Petri nets. Petri nets, Petri network state transition equation.	2	2	
11.	Traffic modeling using Petri nets. Basic and structural characteristics (P-invariant, trap siphons). Analysis of the maritime transport system with respect to conflicts and delays using Petri nets.	2	2	
12.	Fundamentals of surveillance systems theories based on ARPA radar and AIS. Onshore surveillance system integrated in VTS system. Fundamentals of supervisor synthesis to avoid conflicts and traffic congestion.	2	2	
13.	Sector supervisor functioning algorithm. Petri net of permitted and actual traffic conditions. Network comparison and alarm generation. Crossover monitor operation algorithm. Supervisor crossing routes without priorities, with priorities and with routes of increased importance.	2	2	
14.	Fundamentals of artificial intelligence in transport systems. Decision-making systems based on knowledge and learning. Introduction to expert systems. Methods of production logic: forward and backward. Drawing a decision tree diagram.	2	2	
15.	Methods of production logic: forward (deduction) and backward (induction). Drawing a decision tree diagram. Introduction of probability. Reliability assessment by fault tree (FTA) and event tree (ETA).	2	2	
16.	Expert systems design technique. Programming in CLIPS. Considering problems when building your own application.	2	2	
17.	Types of information systems on board. Cargo handling tools (loading and stacking). Optimal travel and savings. Inventory and aftermarket management systems, and ship maintenance management (MMS).	2	2	
18.	Using the Matlab-Simulink tool in the presentation and simulation of the management system Example of calculation and simulation of sector supervisors and crossing supervisors for the Singapore Passage.	2	2	
	TOTAL HOURS	**30**	**30**	

OTHER RELEVANT INFORMATION
Click here to enter text.