МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

ХЕРСОНСЬКА ДЕРЖАВНА МОРСЬКА АКАДЕМІЯ

ФАКУЛЬТЕТ СУДНОВОЇ ЕНЕРГЕТИКИ

КАФЕДРА АНГЛІЙСЬКОЇ МОВИ В СУДНОВІЙ ЕНЕРГЕТИЦІ

ЗАТВЕРДЖЕНО

на засіданні кафедри англійської мови
в судновій енергетиці
протокол № 11 від «21» квітня 2026 р.

Наталя ОГОРОДНИК _____

МЕТОДИЧНІ РЕКОМЕНДАЦІЇ

до проведення практичних занять

З освітньої компоненти	***Морська англійська мова***
Факультет	***Суднової енергетики***
Ступінь вищої освіти	***бакалавр***
Галузь знань	***J Транспорт та послуги***
Спеціальність	***J5 Морський та внутрішній водний транспорт***
Спеціалізація	***J5.02 Управління судновими технічними системами і комплексами***
Форма навчання	***денна***
Курс	***ІСП***

Херсон – 2026

Методичні рекомендації до проведення практичних занять із освітньої компоненти «Морська англійська мова» розробила згідно з робочою навчальною програмою та у відповідності до навчального посібника Modern Propulsion [1] к.п.н., доцент Юрженко А.Ю., 57 с.

Викладач _____ Альона ЮРЖЕНКО

Методичні рекомендації розглянуто та ухвалено на засіданні кафедри англійської мови в судновій енергетиці

Протокол №11 від 21 квітня 2026 р.

Завідувач кафедри
англійської мови в судновій енергетиці _____ Наталя ОГОРОДНИК

Гарант освітньо-професійної програми _____ Олександр АКІМОВ

Опис освітнього компонента

Опис освітнього компонента «Морська англійська мова» складена відповідно до IMO MODEL COURSE №3.17 (Maritime English), охоплюючи наступний контент:

Таблиця 1.1 – Контент IMO MODEL COURSE 3.17 MARITIME ENGLISH

Функція	Компетенція	Підтема
Marine Engineering at the operational level	Maintain a safe engineering watch	• Прийом/передача вахти • Ведення журналу машинного відділення, значення показників • Дії в разі аварій, пожеж, особливо у системах з олією • Перехід від автоматичного до ручного керування системами • Дотримання правил безпеки під час вахти
	Use English in written and oral form	• Читання технічних інженерних публікацій • Усне спілкування з колегами та на борту • Вміння розуміти та передавати повідомлення про стан машин, аварійні ситуації • Використання стандартних морських фраз SMCP у технічному контексті • Вести внутрішні комунікації (reports, зміни в інструкціях)
	Operate main and auxiliary machinery and associated control systems	• Охоплення конструкції і принципів роботи головного двигуна, допоміжних установок (насоси, компресори, вентиляція, холодильні та кондиціонуючі системи) • Робота з автоматичними системами керування • Виявлення несправностей, проведення діагностики • Дотримання інструкцій виробників, мануалів • Дії при відхиленнях від норми (температура, тиск, рушій тощо)

	Operate pumping systems and associated control systems	• Біліжні, баластні, вантажні насосні системи • Системи очищення вод та подібні (oily-water separators) • Принципи роботи трубопроводів і систем контролю потоків та тиску • Безпечна експлуатація, реагування на відхилення • Використання керівництва / мануалів для операцій насосів • Дії у разі витоків або неправильної роботи насосної системи
	Ensure compliance with pollutionprevention requirements	• Знання міжнародних норм (MARPOL та ін.) • Заходи з попередження забруднення (викиди, масло, баластна вода і т.д.) • Операційні пристрої / обладнання для запобігання забрудненню • Дії при порушеннях / аваріях екологічного характеру • Ведення звітності та виконання процедур відповідно до законодавства та суднових правил
	Operate electrical,electronic, and control systems	• Базова конфігурація і принципи роботи електро /електронних /контрольних систем • Пристрої захисту, автоматичні контролі, панелі • Вимірювальні та тестові прилади • Інтерпретація електричних схем і простих електронних діаграм • Безпечне ведення робіт з електричними системами • Дії у випадку несправностей, перевантажень або аварійних ситуацій

	Maintenance and repair at the operational level	• Використання ручного та машинного інструменту, вимірювальних приладів • Демонтаж, ремонт, повторне збирання обладнання • Властивості та обмеження матеріалів (металів, ущільнювачів, прокладок тощо) • Тимчасові / аварійні ремонти • Вживання заходів з безпеки при ремонтах • Читання креслень, інструкцій, діаграм (гідравлічні, пневматичні) • Підтримка обладнання в робочому стані • Перевірка і випробування після ремонту
	Controlling the operation of the ship and care for persons on board at the operational level	• Протидія / запобігання пожежам • Використання рятувальних засобів • Надання першої медичної допомоги на кораблі • Забезпечення стабільності і цілісності судна • Знання законодавства, правил безпеки, охорони морського середовища • Моніторинг дотримання правил і норм під час роботи • Комунікація у надзвичайних ситуаціях • Внутрішні процедури безпеки, пожежогасіння, відповіді на аварії • Забезпечення добробуту персоналу у надзвичайних або ризикових ситуаціях

Таблиця 1.2 - Опис освітнього компонента для денної форми навчання

Термін вивчання дисципліни		Обсяг дисципліни		Розподіл академічних годин за видами занять очної форми навчання					Контроль знань			
				Аудиторні заняття								
Курс	Семестр	Всього академічних годин	Кредити ECTS	Лекції	Практичні заняття	Лабораторні заняття	Семінарські заняття	Самостійна робота	Вид індивідуального завдання	Модульні контрольні роботи	Залік	Іспит
Ісп	**1**	**90**	**3**		**44**			**46**			**+д**	**-**

MODERN PROPULSION

Module 1: Marine Diesel Engine Development History

Module: Marine Diesel Engine Development History

Lesson #1

Lesson topic: Internal combustion engines. Types of internal combustion engines

Objective: by the end of the lesson you will be able to list types of internal combustion engines

Vocabulary: induction, exhaust, power, compression

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs Lead-in Ex.1 p. 4	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	induction, exhaust, power, compression 2.2. Drilling 2.3. Checking understanding Ex.2 p. 4 Ex.3, p. 5	T=>Gr Gr, S-S, S1,2 IW S1, S2, S3	3 min 4 min 3 min 3 min	SB
III Activate	Controlled practice 3.1 Ex.4 p. 5 Ex.5 p. 5 Ex.6 p. 6 Semi-controlled practice 3.2 Ex. 7 p. 6	 IW PW IW PW	 4 min 5 min 5 min 5 min	SB
IV Study	Ex. 8 p. 6 Present your variants.	Gr	11 min	SB
V Activate 2	Now you should be able to list types of internal combustion engines	Gr1, Gr 2	16 min	
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		6 min	

Module: Marine Diesel Engine Development History

Lesson #2

Lesson topic: Otto, Diesel, Sabathe/Trinkler cycles

Objective: by the end of the lesson you will be able to compare Otto, Diesel cycles

Vocabulary: few, capable, initiate, devise, particular, apply, rely on

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is Otto, Diesel, Sabathe/Trinkler cycles, by the end of the lesson you will be able to compare Otto, Diesel cycles. Lead-in. Ex.1 p. 7.	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	few, capable, initiate, devise, particular, apply, rely on 2.2. Drilling 2.3. Checking understanding Ex.3 p. 7 Ex.4, p. 7	T=>Gr Gr, S-S, S1,2 IW S1, S2, S3	3 min 4 min 3 min 3 min	SB
III Activate	Controlled practice 3.1 Ex.5 p. 7 Ex.6 p. 8 Semi-controlled practice 3.2 Ex. 7 p. 8	 IW PW PW	 4 min 5 min 5 min 5 min	SB
IV Study	Ex. 8 p. 9 Ex. 9 p. 9 Ex. 10 p. 9-10	IW PW IW	11 min	SB

	Ex. 11 p. 10 Present your variants.	Gr		
V Activate 2	Ex. 12 p. 10 Now you should be able to compare Otto's and Diesel's methods.	Gr1, Gr 2	16 min	SB
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		6 min	

Module: Marine Diesel Engine Development History

Lesson #3

Lesson topic: Sabathe/Trinkler cycle

Objective: by the end of the lesson you will be able to describe Sabathe/Trinkler cycle

Vocabulary: adiabatic | lagging | to claim | isochoric | isobaric | significance

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is Sabathe/Trinkler cycle , by the end of the lesson you will be able to describe Sabathe/Trinkler cycle. Lead-in. Ex.1 p. 11.	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	adiabatic | lagging | to claim | isochoric | isobaric | significance 2.2. Drilling 2.3. Checking understanding Ex.2 p. 11 Ex.3, p. 11	T=>Gr Gr, S-S, S1,2 IW S1, S2, S3	3 min 4 min 3 min 3 min	SB
III Activate	Controlled practice 3.1 Ex.4 p. 12 Semi-controlled practice 3.2 Ex.5 p. 12 Ex. 6 p. 12	 GrW PW PW	 4 min 5 min 5 min 5 min	SB
IV Study	Ex. 7 p. 12 Ex. 8 p.12 Present your variants.	IW PW Gr	11 min	SB

V Activate 2	Now you should be able to describe Sabathe/Trinkler cycle	Gr1, Gr 2	16 min	
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		6 min	

Module: Marine Diesel Engine Development History

Lesson #4

Lesson topic: Engine development. An era of innovation

Objective: by the end of the lesson you will be able to talk about engine development

Vocabulary: efficiency, conventional, overtake, contribute, withdraw

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is Engine development. An era of innovation, by the end of the lesson you will be able to talk about engine development. Lead-in. Ex.1 p. 13 Ex. 2 p. 13	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	efficiency, conventional, overtake, contribute, withdraw 2.2. Drilling 2.3. Checking understanding Ex.3 p. 13	T=>Gr Gr, S-S, S1,2 IW S1, S2, S3	3 min 4 min 3 min 3 min	SB
III Activate	Controlled practice 3.1 Ex.4 p. 13 Semi-controlled practice 3.2 Ex.5 p. 14 Ex. 6 p. 14	 IW,GrW PW PW	 4 min 5 min 5 min 5 min	SB
IV Study	Ex. 7 p. 14 Ex. 8 p.14 Ex. 9 p. 14 Present your variants. Ex. 10 p. 15	IW PW Gr	11 min	SB

V Activate 2	Now you should be able to describe Sabathe/Trinkler cycle. Ex.11 p. 15 Prepare group project on one of the topics below.	Gr1, Gr 2	16 min	
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		6 min	

Module: Marine Diesel Engine Development History

Lesson #5

Lesson topic: Further engine development

Objective: by the end of the lesson you will be able to describe Hercules project.

Vocabulary: long-term, leading, wide, academic

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is Further engine development, by the end of the lesson you will be able to describe Hercules project. Lead-in. Ex.1 p. 15 Ex. 2 p. 15	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	long-term, leading, wide, academic 2.2. Drilling 2.3. Checking understanding Ex.3 p. 16	T=>Gr Gr, S-S, S1,2 IW S1, S2, S3	3 min 4 min 3 min 3 min	SB
III Activate	Controlled practice 3.1 Ex.4 p. 16 Semi-controlled practice 3.2 Ex.5 p. 17 Ex. 6 p. 17	 IW,GrW PW PW	 4 min 5 min 5 min 5 min	SB Quizlet
IV Study	Ex. 7 p. 17 Ex. 8 p.18 Ex. 9 p. 18 Present your variants. Ex. 10 p. 19	IW PW Gr	11 min	SB

V Activate 2	Now you should be able to describe Hercules project. Ex. 11 p. 19 Make up a summary about Hercules project.	Gr1, Gr 2	16 min	
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		6 min	

Module: Marine Diesel Engine Development History

Lesson #6

Lesson topic: Exhaust gas onboard. Exhaust gas onboard utilization

Objective: by the end of the lesson you will be able to talk about exhaust gas onboard utilization.

Vocabulary: Incinerator, Main engine, Common rail, Auxiliary engine, Exhaust manifold, Silencer, Crankshaft, Expansion joint, Emergency engine

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is Exhaust gas onboard. Exhaust gas onboard utilization, by the end of the lesson you will be able to talk about exhaust gas onboard utilization. Lead-in. Ex.1 p. 19	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	Incinerator, Main engine, Common rail, Auxiliary engine, Exhaust manifold, Silencer, Crankshaft, Expansion joint, Emergency engine 2.2. Drilling 2.3. Checking understanding Ex.2 p. 19 Ex.3 p. 19-20	T=>Gr Gr, S-S, S1,2 IW S1, S2, S3	3 min 4 min 3 min 3 min	SB Miro
III Activate	Controlled practice 3.1 Ex.4 p. 20 Ex. 5 p. 20 Semi-controlled practice 3.2 Ex.6 p. 21 Share your ideas	 IW,GrW PW PW Gr	 4 min 5 min 5 min 5 min	SB
IV Study	Ex. 7 p. 22	IW	11 min	SB

	Ex. 8 p.22 Present your variants.	PW Gr		
V Activate 2	Now you should be able to talk about exhaust gas onboard utilization.	Gr1, Gr 2	16 min	
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		6 min	

Check Your Competency

Module 1 Marine Diesel Engine Development History

1. What types of internal combustion engines do you know?
2. Who is Rudolph Diesel? What do you know about him and his invention?
3. What is Otto's method? Describe it.
4. Compare Otto's and Diesel's methods.
5. What is dual combustion cycle?
6. Describe Sabathe/Trinkler cycle.
7. What do you know about further engine development?
8. Comment on Hercules project.
9. What do you know about exhaust gas onboard utilization?
10. What are IMO/SECA regulations about exhaust gas emissions?
11. How do you understand "SOx regulatory compliance"?
12. How can ship owners achieve it?
13. What do you suggest the best way to achieve SOx regulatory compliance?
14. What do you know about scrubbers?
15. What are the types of loop scrubber systems? Compare them.
16. What components of wet scrubbers do you know? Describe them.
17. Comment on Hybrid loop scrubber system.

MODERN PROPULSION

Module 2: Safe Engineering Watch

Module: Safe Engineering Watch

Lesson #7

Lesson topic: Watchkeeping arrangement

Objective: by the end of the lesson you will be able to discuss standard watchkeeping arrangement, standard tasks to be performed

Vocabulary: safe, charge, equal, two, regular, measures, watches, type

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is Watchkeeping arrangement, by the end of the lesson you will be able to discuss standard watchkeeping arrangement, standard tasks to be performed Lead-in. Ex.a) p. 41	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	safe, charge, equal, two, regular, measures, watches, type 2.2. Drilling 2.3. Checking understanding Ex.b) p. 42 Ex.c) p. 42	T=>Gr Gr, S-S, S1,2 IW S1, S2, S3	3 min 4 min 3 min 3 min	SB Miro
III Activate	Controlled practice 3.1 Ex.a) p. 42 Semi-controlled practice 3.2 Ex. b) p. 43 Share your ideas	 IW,GrW PW Gr	 4 min 5 min 5 min 5 min	SB WordWall
IV Study	Ex. e) p. 44 Ex. a) p.44 Present your variants.	IW PW Gr	11 min	SB
V Activate 2	Now you should be able to discuss standard watchkeeping	Gr1, Gr 2	16 min	

	arrangement, standard tasks to be performed			
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		6 min	

Module: Safe Engineering Watch

Lesson #8

Lesson topic: Understanding UMS.

Objective: by the end of the lesson you will be able to define UMS and name circumstances when going UMS is prohibited

Vocabulary: to attend, to show up, to visit, to appear, to be at, to be present, to be there

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is Understanding UMS, by the end of the lesson you will be able to define UMS and name circumstances when going UMS is prohibited Lead-in. Miro task	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB Miro
II Engage	to attend, to show up, to visit, to appear, to be at, to be present, to be there 2.2. Drilling 2.3. Checking understanding Ex.a) p. 44 Ex.b) p. 45	T=>Gr Gr, S-S, S1,2 IW S1, S2, S3	3 min 4 min 3 min 3 min	SB
III Activate	Controlled practice 3.1 Ex.a) p. 45 Semi-controlled practice 3.2 Ex. b) p. 45 Share your ideas	 IW,GrW PW Gr	 4 min 5 min 5 min 5 min	SB Mentimeter
IV Study	Ex. a) p. 46 Ex. b) p.46 Ex. c) p. 46 Ex. d) p. 46 Present your variants.	IW PW Gr Gr	11 min	SB

V Activate 2	Ex. a) p. 47 Ex. b) p. 48 Ex. c) p. 48 Ex. d) p. 48	IW PW Gr Gr1, Gr 2	16 min	SB
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		6 min	Moodle

Module: Safe Engineering Watch

Lesson #9

Lesson topic: UMS. Vol. 2

Objective: by the end of the lesson you will be able to define requirements for UMS ships

Vocabulary: difference, service life, complied, rules and regulations, survey, safeguards, seaworthiness, unmanned, alarm

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is UMS. Vol. 2, by the end of the lesson you will be able to define requirements for UMS ships. Lead-in. Ex. a) p. 49	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	to attend, to show up, to visit, to appear, to be at, to be present, to be there 2.2. Drilling 2.3. Checking understanding Ex.b) p. 49	T=>Gr Gr, S-S, S1,2 S1, S2, S3	3 min 4 min 6 min	SB Slido
III Activate	Controlled practice 3.1 Ex.a) p. 50 Ex. b) p. 50 Semi-controlled practice 3.2 Ex. c) p. 50 Share your ideas	 IW, GrW PW Gr	 4 min 5 min 5 min 5 min	SB
IV Study	Ex. a) p. 51 Ex. b) p.51 Present your variants.	IW PW	11 min	SB
V Activate 2	Now you should be able to define requirements for UMS ships.	Gr1, Gr 2	16 min	SB

VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		6 min	Moodle

Module: Safe Engineering Watch

Lesson #10

Lesson topic: UMS. Volume 3.

Objective: by the end of the lesson you will be able to define safety precautions required to be observed before/after going UMS

Vocabulary: header tank, mist, secure, fire loop, sealed, rag, stow away

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is UMS. Volume 3, by the end of the lesson you will be able to define safety precautions required to be observed before/after going UMS. Lead-in. Ex. a) p. 53 Ex. b) p. 53	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	header tank, mist, secure, fire loop, sealed, rag, stow away 2.2. Drilling 2.3. Checking understanding Ex.a) p. 54 Ex. b) p. 54	T=>Gr Gr, S-S, S1,2 S1, S2, S3	3 min 4 min 6 min	SB Wordle
III Activate	Controlled practice 3.1 Ex.a) p. 55 Ex. b) p. 55 Semi-controlled practice 3.2 Ex. c) p. 56 Share your ideas	 IW, GrW PW Gr	 4 min 5 min 5 min 5 min	SB
IV Study	Ex. a) p. 56 Ex. b) p.56 Ex. c) p. 56 Present your variants.	IW PW	11 min	SB

V Activate 2	Ex. a) p. 57 Now you should be able to define safety precautions required to be observed before/after going UMS	IW Gr1, Gr 2	16 min	SB
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		6 min	Moodle

Module: Safe Engineering Watch

Lesson #11

Lesson topic: Deadman alarm familiarization

Objective: by the end of the lesson you will be able to speak about operation of DMA system; system's peculiarities

Vocabulary: marine accident, buzzer, external, pushbutton, pilot light, alarm system, unmanned, summon, flashing beacon, escalate

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is Deadman alarm familiarization, by the end of the lesson you will be able to speak about operation of DMA system; system's peculiarities. Lead-in. Ex. a) p. 58 Ex. b) p. 58 Ex. c) p. 58	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	Ex. e) p. 59 marine accident, buzzer, external, pushbutton, pilot light, alarm system, unmanned, summon, flashing beacon, escalate 2.2. Drilling 2.3. Checking understanding Ex.a) p. 59	T=>Gr Gr, S-S, S1,2 S1, S2, S3	3 min 4 min 6 min	SB Video
III Activate	Controlled practice 3.1 Ex.b) p. 59 Ex. c) p. 60 Semi-controlled practice 3.2 Ex. d) p. 60	 IW, GrW PW	 4 min 5 min 5 min	SB

	Share your ideas	Gr	5 min	
IV Study	Ex. a) p. 61 Ex. b) p.61 Ex. c) p. 62 Ex. d) p. 62 Present your variants.	IW PW	14 min	SB
V Activate 2	Ex. a) p. 63 Ex. b) p. 64 Now you should be able to speak about operation of DMA system; system's peculiarities	IW Gr1, Gr 2	15 min	SB
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		4 min	Moodle

Module: Safe Engineering Watch

Lesson #12

Lesson topic: Checklists

Objective: by the end of the lesson you will be able to discuss periodic safety routines and safety checklists requirements

Vocabulary: Emergency generator, Emergency fire pump, CO2 cylinder storage room, Smoke detectors, Fire pushbutton alarms, Machinery space ventilators /skylights, Fire extinguishers, Fire hoses and nozzles

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is Checklists, by the end of the lesson you will be able to discuss periodic safety routines and safety checklists requirements Lead-in. Ex. a) p. 64 Ex. b) p. 64	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	Ex. a) p. 65 Ex. b) p. 65 Emergency generator, Emergency fire pump, CO2 cylinder storage room, Smoke detectors, Fire pushbutton alarms, Machinery space ventilators /skylights, Fire extinguishers, Fire hoses and nozzles 2.2. Drilling 2.3. Checking understanding Ex.c) p. 65	T=>Gr IW Gr, S-S, S1,2 S1, S2, S3	3 min 4 min 6 min	SB LearningApps
III Activate	Controlled practice 3.1 Ex.d) p. 65 Ex. e) p. 66	 IW, GrW	 4 min 5 min	SB Prezi

	Semi-controlled practice 3.2 Create three true/false sentences about the periodic safety routines. Share your ideas	IW Gr	5 min 5 min	
IV Study	Ex. a) p. 66 Ex. b) p.67 Ex. c) p. 67 Present your variants.	IW PW IW	14 min	SB
V Activate 2	Ex. a) p. 68 Now you should be able to discuss periodic safety routines and safety checklists requirements	IW Gr1, Gr 2	15 min	SB
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		4 min	Moodle

Module: Safe Engineering Watch

Lesson #13

Lesson topic: Watch duties.

Objective: by the end of the lesson you will be able to discuss watch duties/actions to be carried out under certain circumstances

Vocabulary: bottom, emergency, bilge, expansion, clear, doubt, external, sign

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is Checklists, by the end of the lesson you will be able to discuss watch duties/actions to be carried out under certain circumstances Lead-in. Ex. a) p. 71 Ex. b) p. 71	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	bottom, emergency, bilge, expansion, clear, doubt, external, sign 2.2. Drilling 2.3. Checking understanding Ex.a) p. 72 Ex. b) p. 73	T=>Gr IW Gr, S-S, S1,2 S1, S2, S3	3 min 4 min 6 min	SB Prezi
III Activate	Controlled practice 3.1 p.74 Semi-controlled practice 3.2 Create three true/false sentences about the periodic safety routines. Share your ideas	 IW, GrW IW Gr	 4 min 5 min 5 min 5 min	SB
IV Study	Ex. a) p. 75 Ex. b) p.75 Ex. c) p. 75 Ex. d) p. 76	IW PW IW IW	15 min	SB

	Present your variants.	Gr		
V Activate 2	Ex. a) p. 77 Ex.b) p.77 Ex. c) p. 77 Now you should be able to discuss watch duties/actions to be carried out under certain circumstances	IW Gr1, Gr 2 IW	15 min	SB
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		3 min	Moodle

Module: Safe Engineering Watch

Lesson #14

Lesson topic: Watch duties. Vol. 2

Objective: by the end of the lesson you will be able to discuss watch duties/actions to be carried out under certain circumstances.

Vocabulary: Loose items, Oil tanks level, Air bottle, Deck plating, Standby machinery, ME and AE sumps level, Low sea suction, Standby filter

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is Checklists, by the end of the lesson you will be able to discuss watch duties/actions to be carried out under certain circumstances. Lead-in. Ex. a) p. 78	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	Loose items, Oil tanks level, Air bottle, Deck plating, Standby machinery, ME and AE sumps level, Low sea suction, Standby filter 2.2. Drilling 2.3. Checking understanding Ex.a) p. 79	T=>Gr IW Gr, S-S, S1,2 S1, S2, S3	3 min 4 min 6 min	SB Prezi
III Activate	Controlled practice 3.1 Ex. a) p. 79 Semi-controlled practice 3.2 Ex. b) p. 80 Ex. c) p. 80 Share your ideas	 IW, GrW IW Gr	 4 min 5 min 5 min 5 min	SB
IV Study	Ex. a) p. 82 Ex. b) p.82 Present your variants.	IW PW Gr	14 min	SB

V Activate 2	Ex. a) p. 83 Now you should be able to discuss watch duties/actions to be carried out under certain circumstances.	IW Gr1, Gr 2	15 min	SB
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		4 min	Moodle

Check Your Competency

Module 2 Safe engineering watch

1. Departments on board. Levels of responsibility. Watch participants.
2. Duties of watch participants when operating UMS.
3. Requirements for UMS ships.
4. Safety precautions required to be observed before/after going UMS.
5. DMA system characteristics, location, operation.
6. Application of checklists in ER, their purposes and table of contents.
7. Procedure for preparing ME from cold for a sea service.
8. ER documents, their purposes, table of contents and records to be entered.
9. Procedure for taking over an engineering watch.
10. Procedure to be observed when taking over responsibility for ER when operating under UMS condition. Reasons for calling CEO when keeping watch.
11. Actions to be taken by EOW upon discovering high-level bilges.
12. Actions to be taken to ensure safe, complete bunkering operation.
13. Fuel oil system components and actions to be taken when transferring fuel oil on board.
14. On board fuel storage, handling and treatment.
15. Tank sounding procedures and means.
16. Manual tank sounding, tools and methods, frequency.
17. Responsibilities of EOW under stand-by and regular maintenance conditions.
18. Responsibilities of EOW under adverse/emergency conditions.
19. MLC: purpose, table of contents.
20. Fatigue: causes, symptom, preventive measures.

MODERN PROPULSION

Module 3: Ship Systems

Module: Ship Systems

Lesson #15

Lesson topic: Bilge system aboard the vessel

Objective: by the end of the lesson you will be able to demonstrate awareness of how ship service systems can affect work at sea and prevention of the pollution

Vocabulary: bilge, emergency, accumulate, cofferdam, flooding, hull, condensation

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is Bilge system aboard the vessel, by the end of the lesson you will be able to demonstrate awareness of how ship service systems can affect work at sea and prevention of the pollution Lead-in. Ex.a) p. 122	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	bilge, emergency, accumulate, cofferdam, flooding, hull, condensation 2.2. Drilling 2.3. Checking understanding Ex.a) p. 122 Ex.b) p. 123	T=>Gr Gr, S-S, S1,2 IW S1, S2, S3	3 min 4 min 3 min 3 min	SB Quizlet
III Activate	Controlled practice 3.1 Ex.c) p. 123 Ex. d) p. 124 Ex. e) p. 124 Semi-controlled practice 3.2 Create three questions to the text. Ask and answer	 IW,GrW PW IW PW Gr	 4 min 5 min 5 min 5 min	SB
IV Study	Ex. a) p. 124	IW	11 min	SB

	Ex. b) p.124 Present your variants.	PW Gr		
V Activate 2	Ex. a) p. 125 Ex. b) p. 125 Ex. c) p. 125 Ex. d) p. 126 Now you should be able to demonstrate awareness of how ship service systems can affect work at sea and prevention of the pollution	Gr1, Gr 2 IW PW IW	16 min	
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		6 min	

Module: Ship Systems

Lesson #16

Lesson topic: Bilge pumping systems

Objective: by the end of the lesson you will be able to describe expected standards of operation and maintenance

Vocabulary: leak, irregular, centrifugal, lower, suck, medium, high

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is Bilge pumping systems, by the end of the lesson you will be able to describe expected standards of operation and maintenance Lead-in. Ex.a) p. 126 Ex. b) p. 126	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	leak, irregular, centrifugal, lower, suck, medium, high 2.2. Drilling 2.3. Checking understanding Ex.a) p. 127	T=>Gr Gr, S-S, S1,2 IW S1, S2, S3	3 min 4 min 6 min	SB Miro
III Activate	Controlled practice 3.1 Ex.b) p. 127 Ex. c) p. 128 Ex. d) p. 128 Semi-controlled practice 3.2 Create three true/false sentences. Share your ideas.	 IW,GrW PW IW PW Gr	 4 min 5 min 5 min 5 min	SB
IV Study	Ex. a) p. 129 Ex. b) p.129 Ex. c) p. 130 Present your variants.	IW PW Gr	11 min	SB

V Activate 2	Ex. a) p. 130 Now you should be able to describe expected standards of operation and maintenance	Gr1, Gr 2 IW	16 min	
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		6 min	

Module: Ship Systems

Lesson #17

Lesson topic: Bilge injection

Objective: by the end of the lesson you will be able to describe maintenance of the valves

Vocabulary: main seawater injection valve, emergency bilge injection valve, main seawater pump, doubler, sea chest

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is Bilge injection, by the end of the lesson you will be able to describe expected standards of operation and maintenance Lead-in. Ex.a) p. 130 Ex. b) p. 131	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	main seawater injection valve, emergency bilge injection valve, main seawater pump, doubler, sea chest 2.2. Drilling 2.3. Checking understanding Ex.a) p. 131	T=>Gr Gr, S-S, S1,2 IW S1, S2, S3	3 min 4 min 6 min	SB
III Activate	Controlled practice 3.1 Ex.b) p. 131 Ex. c) p. 131 Semi-controlled practice 3.2 Ex. d) p. 131 Ex. e) p. 132 Share your ideas.	 IW,GrW PW IW PW Gr	 4 min 5 min 5 min 5 min	SB Miro
IV Study	Ex. a) p. 132 Present your variants.	IW PW	11 min	SB

V Activate 2	Ex. a) p. 133 Ex. b) p. 133 Now you should be able to describe maintenance of the valves	Gr1, Gr 2 IW	16 min	
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		6 min	

Module: Ship Systems

Lesson #18

Lesson topic: Oil pollution

Objective: by the end of the lesson you will be able to describe the ways to eliminate the risk of oil pollution

Vocabulary: measurement, paint coatings, an inspection, overboard, the OWS, control, discharge pipes

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is Oil pollution, by the end of the lesson you will be able to describe the ways to eliminate the risk of oil pollution Lead-in. Ex.a) p. 133 Ex. b) p. 133	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	measurement, paint coatings, an inspection, overboard, the OWS, control, discharge pipes 2.2. Drilling 2.3. Checking understanding Ex.c) p. 135	T=>Gr Gr, S-S, S1,2 IW S1, S2, S3	3 min 4 min 6 min	SB
III Activate	Controlled practice 3.1 Ex.d) p. 135 Semi-controlled practice 3.2 Create three true/false sentences. Share your ideas.	 IW,GrW PW IW PW Gr	 4 min 5 min 5 min 5 min	SB Miro
IV Study	Ex. a) p. 135 Ex. b) p. 136 Ex. c) p. 136 Present your variants.	IW PW IW Gr	11 min	SB
V Activate 2	Ex. a) p. 137	Gr1, Gr 2	16 min	

	Ex. b) p. 137 Ex. c) p. 138 Now you should be able to describe the ways to eliminate the risk of oil pollution	IW		
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		6 min	

Check Your Competency

Module 3 Ship Systems

1. What is a bilge?
2. What is the importance of proper bilge system operation aboard the vessel?
3. What ship's procedures are connected with efficient bilge system operation?
4. What elements and machinery require your attention and service to operate bilge system properly? Why?
5. What safety practices do you use when operate the system?
6. What are the particular features of the bilge pumps?
7. What situations can you use a bilge pump in?
8. What are main applications of self-priming pumps?
9. What is the purpose of the vacuum priming system?
10. What are "air pockets"?
11. What recommendation can you name to operate the bilge valve?
12. What equipment can an Engineer maintain according to Annex 1?
13. What information can be kept in the appropriate documents?
14. What must a crew member do to prevent or stop oil spill spread?
15. What firefighting systems can be applied on board the vessel?
16. What do you know about CO2 use on board the vessel?
17. What is the application of inert gas system?
18. What is ballast water system arrangement on board?
19. What documents shall be carried out and in place to ensure the compliance?
20. What ballast water treatment systems can you name?

MODERN PROPULSION

Module 4: Refrigeration

Module: Refrigeration

Lesson #19

Lesson topic: Introduction into Thermodynamics

Objective: by the end of the lesson you will be able to characterize refrigeration, stages of vapor-compression cycle

Vocabulary: thermodynamics, reversible process, irreversible process, expansion, isothermal expansion/compression, absorption, isentropic expansion/compression

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is Introduction into Thermodynamics, by the end of the lesson you will be able to characterize refrigeration, stages of vapor-compression cycle Lead-in. Ex.a) p. 185 Ex. b) p. 185 Ex. c) p. 185 Ex. d) p. 185	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	thermodynamics, reversible process, irreversible process, expansion, isothermal expansion/compression, absorption, isentropic expansion/compression 2.2. Drilling 2.3. Checking understanding Ex.a) p. 186	T=>Gr Gr, S-S, S1,2 IW S1, S2, S3	3 min 4 min 6 min	SB
III Activate	Controlled practice 3.1 Ex.c) p. 187 Semi-controlled practice 3.2 Ex. d) p. 188	 IW,GrW PW IW PW	 4 min 5 min 5 min	SB video

	Share your ideas.	Gr	5 min	
IV Study	Ex. a) p. 188 Ex. b) p. 188 Ex. c) p. 189 Ex. d) p. 189 Ex. e) p. 190 Present your variants.	IW PW IW Gr IW	14 min	SB
V Activate 2	Ex. a) p. 190 Ex. b) p. 190 Ex. c) p. 190 Now you should be able to characterize refrigeration, stages of vapor-compression cycle	Gr1, Gr 2 IW PW	15 min	
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		4 min	

Module: Refrigeration

Lesson #20

Lesson topic: Laws of Thermodynamics

Objective: by the end of the lesson you will be able to explain the Laws of Thermodynamics

Vocabulary: disorder, entropy, sink, equilibrium, irreversible, implication, rigid, randomness, spontaneous

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is Laws of Thermodynamics, by the end of the lesson you will be able to explain the Laws of Thermodynamics. Lead-in. Ex.a) p. 192 Ex. b) p. 193	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	disorder, entropy, sink, equilibrium, irreversible, implication, rigid, randomness, spontaneous 2.2. Drilling 2.3. Checking understanding Ex.c) p. 193	T=>Gr Gr, S-S, S1,2 IW S1, S2, S3	3 min 4 min 6 min	SB Mentimeter
III Activate	Controlled practice 3.1 Ex.c) p. 194 Ex. d) p. 195 Semi-controlled practice 3.2 Ex. e) p. 196 Share your ideas.	 IW,GrW PW IW PW Gr	 4 min 5 min 5 min 5 min	SB Video
IV Study	Ex. a) p. 196 Ex. b) p. 196 Present your variants.	IW PW IW	14 min	SB

		Gr IW		
V Activate 2	Ex. a) p. 197 Ex. b) p. 198 Now you should be able to explain the Laws of Thermodynamics	Gr1, Gr 2 IW	15 min	
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		4 min	

Module: Refrigeration

Lesson #21

Lesson topic: Refrigeration plant layout

Objective: by the end of the lesson you will be able to describe refrigeration plant components, their operation

Vocabulary: friendly, reasonable, loss, banned, compatibility, sealed, application, cost, corrosive, environmental

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is Refrigeration plant layout, by the end of the lesson you will be able to describe refrigeration plant components, their operation. Lead-in. Ex.a) p. 198 Ex. b) p. 199	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	friendly, reasonable, loss, banned, compatibility, sealed, application, cost, corrosive, environmental 2.2. Drilling 2.3. Checking understanding Ex.c) p. 199	T=>Gr Gr, S-S, S1,2 IW S1, S2, S3	3 min 4 min 6 min	SB Kahoot!
III Activate	Controlled practice 3.1 Ex.a) p. 200 Ex. b) p. 200 Semi-controlled practice 3.2 Ex. c) p. 201 Ex. d) p. 203 Ex. e) p. 203 Share your ideas.	 IW,GrW PW IW PW Gr IW	 4 min 5 min 5 min 5 min	SB

IV Study	Ex. e) p. 204 Ex. f) p. 205 Present your variants.	IW PW Gr	14 min	SB
V Activate 2	Ex. a) p. 206 Ex. e) p. 208 Now you should be able to describe refrigeration plant components, their operation	Gr1, Gr 2 IW	15 min	
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		4 min	

Module: Refrigeration

Lesson #22

Lesson topic: Refrigeration cycle

Objective: by the end of the lesson you will be able to describe the refrigeration cycle

Vocabulary: 1. Compression of hot gas 2. Cooling 3. Condensing 4. Subcooling 5. Expansion 6. Evaporation 7. Super heating

Lesson Procedure

Stages	Activities	Interaction	Time	Training aids
I Starter	Interview Qs. Checking homework. The topic of our lesson is Refrigeration cycle, by the end of the lesson you will be able to describe the refrigeration cycle. Lead-in. Ex.a) p. 209	T=>Gr S1,S2,S3	15 min	LMS MOODLE, SB
II Engage	1. Compression of hot gas 2. Cooling 3. Condensing 4. Subcooling 5. Expansion 6. Evaporation 7. Super heating 2.2. Drilling 2.3. Checking understanding Ex.a) p. 209	T=>Gr Gr, S-S, S1,2 IW S1, S2, S3	4 min 4 min 6 min	SB
III Activate	Controlled practice 3.1 Highlight the most important sentence\idea in the text. Semi-controlled practice 3.2 Create three questions to the text. Share your ideas.	 IW,GrW PW Gr	 5 min 5 min 5 min	SB Kahoot!
IV Study	Ex. a) p. 211 Ex. b) p. 211	IW PW	16 min	SB

	Ex. c) p. 212 Present your variants.	Gr		
V Activate 2	Ex. a) p. 213 Ex. b) p. 214 Now you should be able to describe the refrigeration cycle	Gr1, Gr 2 IW	16 min	
VI Closure	Home task: to answer two Interview Qs in Moodle Feedback		4 min	

Check Your Competency

Module 4 Refrigeration

1. On what ships are refrigeration plants used for refrigeration of cargo?
2. For what must gas be compressed when transported?
3. What's the difference between LPG and LNG ships?
4. What shape does LPG ship have?
5. What types of tanks are fully refrigerated ships classified on?
6. What principle of operation is non-cyclic refrigeration based on?
7. What is a subliming process?
8. How does cyclic refrigeration work?
9. How is the heat extracted from low-temperature space in cyclic refrigeration?
10. What classes of cyclic refrigeration do you know?
11. What are the peculiars of vapour-compression cycle?
12. What gas is used as a refrigerant in this system?
13. What happens with Freon in compressor?
14. What happens with compressed Freon in condenser?
15. What for does liquid Freon move through the expansion valve?
16. Where does a mixture of half vapour / half liquid proceed after the expansion valve?
17. What happens to this mixture in the evaporator?
18. What are the types of compressors?
19. What valves are mounted on a compressor?
20. What are the main common parts we can find in a compressor and a diesel engine?
21. How is a compressor usually lubricated?
22. What are the main parts (and their constituents) of tube and shell condenser?
23. Where are internal and external equalized valves usually used?
24. What's the destination of actuator?
25. What of does an evaporator consist?

Засоби діагностики та питання для проведення

підсумкового контролю знань

Іспденної форми навчання та Іспзаочної форми навчання

З метою поточного контролю знань здобувачів вищої освіти засобами діагностики являються контрольні роботи після кожної вивченого модулю (Stop & Check) та агрегатні контрольні роботи (Progress Test) на платформі Moodle. Наприкінці семестру здобувачі вищої освіти отримують підсумкову оцінку у вигляді диференційованого заліку.

1. Comparison of 2-stroke vs 4-stroke engines: maintenance, parts, valve mechanism, energy efficiency, lubrication, power, cost, weight, etc.

2. Comparison of Diesel's and Otto's engines: energy efficiency, cost, maintenance, common faults, parts, means of combustion.

3. Wartsila dual-fuel engine: working operation, energy efficiency, maintenance, common faults, parts, fuel types.

4. The dual combustion cycle: operations, peculiarities, application, energy efficiency, comparison of diesel cycle and dual cycle.

5. Pollutants: regulations addressing them, abatement technologies.

6. Gas engines: peculiarities, application, energy efficiency, maintenance, parts, cost.

7. Combustion process: combustion elements, fuels on board, ignition sources, flashpoint, fire point, self-ignition temperature, atomization, turbulence, penetration.

8. Dual-fuel engines: modes of operation, safety devices, maintenance, operational requirements, emissions, common faults.

9. Comparison of 2-stroke vs 4-stroke DF engines: combustion cycles, parts, operation, maintenance, energy efficiency, safety devices, lubrication, power, cost, weight, etc.

10.ME-GI fuel and ME-LGI fuel types: delivery condition, supply pressure, supply temperature, fuels characteristics.

11.MAN L35/44DF: operation, maintenance, fuel types, parts, energy efficiency, advantages, challenges, compliance.

12.Energy efficiency: innovative technologies, requirements, compliant engines, future perspectives.

13.Slow steaming: modes of operation, application, benefits, challenges, fuel consumption, emissions.

14.CRS: operation, maintenance, parts, benefits, challenges, operational characteristics.

15.Engines with Cat CR: operation, energy efficiency, benefits, challenges, maintenance, fuel types, parts, safety devices, emissions.

16.Departments on board. Levels of responsibility. Watch participants.

17.Duties of watch participants when operating UMS.

18.Requirements for UMS ships.

19.Safety precautions required to be observed before/after going UMS.

20.DMA system characteristics, location, operation.

21.Application of checklists in ER, their purposes and table of contents.

22.Procedure for preparing ME from cold for a sea service.

23.ER documents, their purposes, table of contents and records to be entered.

24.Procedure for taking over an engineering watch.

25.Procedure to be observed when taking over responsibility for ER when operating under UMS condition. Reasons for calling CEO when keeping watch.

26.Actions to be taken by EOW upon discovering high-level bilges.

27.Actions to be taken to ensure safe, complete bunkering operation.

28.Fuel oil system components and actions to be taken when transferring fuel oil on board.

29.On board fuel storage, handling and treatment.

30.Tank sounding procedures and means.

31.Manual tank sounding, tools and methods, frequency.

32.Responsibilities of EOW under standby and regular maintenance conditions.

33.Responsibilities of EOW under adverse/emergency conditions.

34.MLC: purpose, table of contents.

35.Fatigue: causes, symptom, preventive measures.

36.What is a bilge?

37.What is the importance of proper bilge system operation aboard the vessel?

38.What ship’s procedures are connected with efficient bilge system operation?

39.What elements and machinery require your attention and service to operate bilge system properly? Why?

40.What safety practices do you use when operate the system?

41.What are the particular features of the bilge pumps?

42.What situations can you use a bilge pump in?

43.What are main applications of self-priming pumps?

44.What is the purpose of the vacuum priming system?

45.What are “air pockets”?

46.What recommendation can you name to operate the bilge valve?

47.What equipment reequipments can an Engineer maintain according to Annex 1?

48.What information can be kept in the appropriate documents?

49.What must a crew member do to prevent or stop oil spill spread?

50.What firefighting systems can be applied on board the vessel?

51.What do you know about CO2 use on board the vessel?

52.What is the application of inert gas system?

53.Overview of refrigeration: definition, application on board.

54.Stages of vapor-compression cycle.

55.Laws of thermodynamics: application in refrigeration.

56.Refrigerant plant arrangement: parts, operation.

57.Refrigerant: types, characteristics.

58.Characterize liquid receiver, suction accumulator and oil separator.

59.Characterize metering devices: types, application, operation.

60.Compressor: types, application in the plant, operation, parts, characteristics.

61.Compressor test equipment.

62.Refrigeration plant control devices: classifications, operation, purpose.

63.Superheat in TEV: state of refrigerant, starving evaporator, sensible heat, measuring.

64.Subcooling and superheating: flow of heat energy.

65.Heat exchanger: structure, operation.

66.Condenser: types, operation, parts.

67.Leak detection: methods, warnings.

68.Charging refrigeration system: steps, tools, warnings.

69.Charging compressor oil: steps, tools, warnings.

70.Refrigeration plant troubleshooting: common faults, indications, causes, solutions.

71.Refrigeration system checkpoints.

72.Gas carriers: types, construction, cargo characteristics, precautions.

Рекомендована література

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2. MARPOL Convention. – London: International Maritime Organization. – 2011.– 286 p.
3. SOLAS Convention. – London: International Maritime Organization. – 2001.– 368 p.
4. STCW Convention with the Manila Amendments. – London: International Maritime Organization. – 2011.– 368 p.
5. Maritime English Model Course 3.17. - London. – IMO, 2000. – 138 p.
6. Energy efficient operation of ships Model Course 4.05. - London. – IMO, 2014. – 138 p.
7. Engine Room Simulator IMO Model Course 2.07 - London. – IMO, 2002. – 138 p.
8. Officer in charge of an engineering watch Model Course 7.04. - London. – IMO, 2014. – 138 p.
9. International Code For Ships Operating In Polar Waters – RESOLUTION MSC.385(94) (adopted on 21 November 2014) – 59 p.
10. The IMDG Code, 2018 Edition (inc. Amendment 39-18) - London. – IMO, 2018.
11. Yurzhenko, A., Diahyleva, O., Kononova, O. Mentimeter's Effect on Cadet Participation and Learning Outcomes in Maritime English. In 2nd online scientific conference ICT in Life Book of Abstracts; ISBN 978-953-8371-27-1, Editors: Ivana Đurđević Babić and Vjekoslav Galzina. Osijek, Croatia, 17 May 2024. – Faculty of Education, Josip Juraj Strossmayer University of Osijek and Croatian Academy of Science and Arts, Center for Scientific Work in Vinkovci, Republic of Croatia. – 2024. – P. 9.