University of Kyrenia

Faculty of Maritime Studies

Marine Engineering

Syllabus

Course name: Ataturk's Principles and History of Turkish Revolution II							
Code	**Year**	**Semester**	**Credit**	**ECTS**	**Course application, Hour/Week**		
					Theoretical	**Application**	**Laboratory**
AIT102	II	Spring	2	2	2	0	0
Course type: Compulsory Elective				**Prerequisite: x**		**Language:** English	
% Contribution to the Professional Fundamental Component				**Basic Sciences**	**Engineering Science**	**Engineering Design**	**General Education**
				-	-	-	100
Course Venue and Time				Friday / 13:30 – 15:20			
Instructor information				**Aydoğan Erkan** Faculty of Maritime Studies Friday / 09:00 – 12:00 +90 (392) 650 26 00 / 4060 aydogan.erkan@kyrenia.edu.tr www.kyrenia.edu.tr			

Course Description	This course examines the historical transformation of the Ottoman Empire into the modern Republic of Turkey, focusing on the political, social, economic, and cultural factors that influenced this transition. It covers the reform movements and modernization efforts during the late Ottoman period, the impact of Western cultures, and the challenges faced by the Empire. Special emphasis is placed on the Turkish War of Independence, the leadership of Mustafa Kemal Atatürk, and the establishment of the Republic of Turkey. Students will explore Atatürk's principles and reforms, understanding their historical significance and lasting influence on Turkish society and governance. The course combines historical analysis with primary sources, such as Atatürk's speeches, early Republican decrees, and relevant treaties, to provide a comprehensive understanding of this transformative period.
Course Aims and Objectives	The course aims to provide students with a comprehensive understanding of the historical, political, and social processes that led to the collapse of the Ottoman Empire and the foundation of the Republic of Turkey. It also seeks to introduce students to the principles, reforms, and leadership of Mustafa Kemal Atatürk, emphasizing their significance in shaping modern Turkey. • Explain the key historical, political, economic, and cultural factors that contributed to the decline of the Ottoman Empire. • Analyze the reform movements and modernization efforts during the late Ottoman period. • Describe the events of the Turkish War of Independence and the role of Mustafa Kemal Atatürk in establishing the Republic of Turkey. • Understand and explain Atatürk's principles and reforms, including their historical and contemporary relevance. • Critically evaluate the impact of Western cultural and political influences on the Ottoman Empire and early Turkish Republic. • Interpret primary historical sources, including speeches, treaties, and decrees, to gain insight into the period.

Course Learning Outcomes	**CLO1:** Identify the main political, social, and economic factors that contributed to the decline of the Ottoman Empire. **CLO2:** Explain the impact of Western influence on Ottoman reform movements and modernization efforts. **CLO3:** Analyze the conditions that led to the Turkish National Struggle under Mustafa Kemal Atatürk's leadership. **CLO4:** Evaluate the role of national and international dynamics in the foundation of the Republic of Turkey. **CLO5:** Interpret primary historical sources and documents related to the late Ottoman and early Republican periods. **CLO6:** Discuss the importance of Atatürk's reforms and principles in the establishment of a modern, secular nation-state. **CLO7:** Develop a critical perspective on the transformation from an empire to a republic within the context of world history. **CLO8:** Apply historical knowledge to understand contemporary political and social issues in Turkey.

Content of the Course

Week	*Subject*
1	**Introduction & Course Overview** • Overview of Atatürk's principles and vision • Recap of the establishment of the Republic of Turkey • Importance of reform movements in early Republican period
2	**The Political Reforms I** • Abolition of the Sultanate (1922) and Caliphate (1924) • Formation of a secular political system • Development of multi-party ideas and Republican governance
3	**The Political Reforms II** • Constitution of 1924 and amendments • Legal reforms: adoption of Swiss Civil Code, Italian Penal Code, and other Western models • The role of the judiciary in modernizing Turkey
4	**Social Reforms I** • Changes in family law and women's rights • Adoption of surnames (1934) and civil status reforms • Education reforms: unification of education, establishment of modern schools
5	**Social Reforms II** • Language reform and adoption of the Latin alphabet (1928) • Development of Turkish Language Association • Literacy campaigns and their impact on society
6	**Cultural Reforms I** • Secularization of cultural institutions • Theatre, literature, music, and the promotion of arts in early Republican Turkey • National identity and historical consciousness
7	**Cultural Reforms II** • Dress codes and cultural modernization • Adoption of Western calendar, time, and measurement systems • Promotion of national festivals and commemorations
8	**Economic Reforms I** • Establishment of state-owned enterprises • Agricultural development and modernization programs • Early industrialization efforts
9	**Economic Reforms II** • Banking and financial system reforms • Policies for economic independence and self-sufficiency • Infrastructure development: railways, ports, and communication systems
10	**Foreign Policy and National Defense** • Foreign relations of the Republic in early years • Lausanne Treaty implementation and diplomatic achievements • Military modernization and the role of the armed forces in nation-building
11	**Atatürk's Principles (Kemalism) I** • Republicanism, Nationalism, Populism • Secularism and state-society relations • Reformist and progressive vision

12	**Atatürk's Principles (Kemalism) II** • Statism and state intervention in the economy • Reformism and modernization principles • Implementation and societal impact
13	**Challenges and Opposition** • Social and political opposition to reforms • Regional and ideological resistance • Methods of overcoming challenges and promoting national unity
14	**Evaluation of Atatürk's Legacy** • Last years of Atatürk's leadership (1935–1938) • Consolidation of reforms and national institutions • Reflection on the effectiveness and impact of Atatürk's reforms
15	**Review and Final Assessment** • Comprehensive review of key reforms and principles • Class discussion on Atatürk's vision and contemporary relevance • Oral or written assessment

Methods and Techniques used in the Course

Lectures and Presentations: Theoretical background and key historical events are explained with the support of visual materials and timelines.

Class Discussions and Debates: Students are encouraged to critically discuss reform movements, revolutions, and Atatürk's principles to develop analytical thinking.

Document and Text Analysis: Examination of historical documents, speeches, treaties, and memoirs to understand events from primary sources.

Question–Answer Sessions: Active student participation through problem-based and guiding questions.

Audio-Visual Materials: Use of documentaries, maps, and archival records to support historical understanding.

Comparative Analysis: Evaluation of Ottoman reforms and Turkish modernization within the global context.

Research Assignments and Presentations: Students prepare individual or group projects on specific historical issues and present them to the class.

Sample Questions

Multiple Choice Questions (MCQs)

- Which of the following was a major reason for the decline of the Ottoman Empire?
  a) Industrialization in the Ottoman territories
  b) Political, economic, and social challenges from Western influence
  c) Expansion of Ottoman naval power
  d) Unification of Balkan states
- What was the primary goal of the reform movements in the late Ottoman period?
  a) Expansion of the empire
  b) Modernization and adaptation to Western political and cultural standards
  c) Religious domination in Europe
  d) Establishing colonies in Africa
- When was the Republic of Turkey officially proclaimed?
  a) 1919
  b) 1920
  c) 1923
  d) 1925

Short Answer Questions

- Explain the role of Mustafa Kemal Atatürk in the Turkish War of Independence.
- List and briefly describe three major reform movements undertaken during the late Ottoman period.
- How did Western cultural influences affect the political and social structure of the Ottoman Empire?

Essay Questions

- Analyze the political, economic, and social challenges that led to the collapse of the Ottoman Empire and how they contributed to the emergence of the Turkish Republic.
- Discuss the significance of Atatürk's principles in shaping the modern Turkish state.
- Compare the Ottoman modernization efforts with the reforms carried out after the establishment of the Republic of Turkey.

Materials Used in the Course

Textbooks & References

- Mango, Andrew. *Atatürk: The Biography of the Founder of Modern Turkey.* Overlook Press, 2000.
- Zürcher, Erik J. *Turkey: A Modern History.* I.B. Tauris, 2004.
- Karpat, Kemal H. *The Ottoman Empire and Modern Turkey.* University of Wisconsin Press, 2001.
- Turkish Ministry of National Education, *Atatürk's Principles and History of Turkish Revolution Textbook.*

Academic Articles & Papers

- Articles on the late Ottoman reforms (Tanzimat and Meşrutiyet) from journals such as *Middle Eastern Studies* and *Journal of Modern Turkish Studies.*
- Papers analyzing the Turkish War of Independence and establishment of the Republic.

Multimedia & Visual Aids

- Documentaries on Mustafa Kemal Atatürk and the Turkish War of Independence.
- Historical maps showing the partitioning of the Ottoman Empire and military campaigns during the independence struggle.
- Archival photographs of key events, leaders, and reforms.

Online Resources

- Official websites: Republic of Turkey Ministry of Culture and Tourism, Atatürk Research Center.
- Online digital archives and libraries for historical documents and treaties (e.g., Treaty of Lausanne, Sèvres).
- Educational platforms with lecture notes, summaries, and videos related to Turkish history.

Supplementary Materials

- Timelines of Ottoman decline and Turkish War of Independence.
- Handouts summarizing Atatürk's principles (Kemalism) and major reforms.
- Vocabulary lists for key historical terms in English to support comprehension.

All the above listed books are available at UoK's Grand Library

Program Outcomes Matrix

	Program Outcomes	*Level of Contribution				Targeted Competence Areas
		0	1	2	3	
1	Demonstrate comprehensive knowledge of marine engineering principles, systems, and machinery operations, and effectively apply this knowledge to ensure safe, efficient, and sustainable vessel performance in compliance with IMO and STCW standards.				✓	Technical Knowledge & Applied Sciences
2	Apply advanced engineering design principles to develop, adapt, and optimize mechanical, electrical, and control systems onboard ships and in shore-based industrial contexts, integrating safety, cost-efficiency, and environmental considerations.				✓	Analytical & Computational Skills
3	Perform engineering watchkeeping duties and operational management with professional responsibility, situational awareness, and adherence to international maritime conventions and best practices.				✓	Sustainable Design & Safe Operating
4	Identify, formulate, and analyze complex engineering problems using appropriate theoretical, computational, and experimental techniques to derive sound, data-driven solutions in marine and related engineering domains.			✓		Research & Experimentation
5	Integrate principles of safety culture, risk assessment, and environmental protection into all engineering practices, promoting sustainable operations aligned with IMO conventions such as MARPOL and SOLAS.			✓		Innovation & Digital Competence
6	Employ advanced digital tools, diagnostic systems, and automation technologies for monitoring, control, and performance assessment of marine and industrial systems, in line with the requirements of the evolving maritime digitalization era.				✓	Regulatory Frameworks & Safety
7	Demonstrate competence in planning, executing, and managing engineering projects, including resource allocation, budgeting, and maintenance planning, while ensuring quality, safety, and compliance with regulatory frameworks.				✓	Teamwork & Leadership
8	Function effectively as a leader and member of multidisciplinary and multicultural teams, fostering collaboration, ethical conduct, and efficient communication in dynamic and often high-stress maritime environments.				✓	Project Management & Entrepreneurship
9	Communicate effectively in both written and oral forms with clarity, professionalism, and technical precision in English and other relevant languages within maritime and industrial contexts.			✓		Ethics & Professionalism
10	Adhere to the ethical and professional standards of the engineering and maritime professions, demonstrating accountability, integrity, and a commitment to continuous professional development and lifelong learning.				✓	Lifelong Learning & Adaptability
11	Evaluate and implement sustainable engineering practices and emerging green technologies to minimize the environmental footprint of marine and industrial operations.			✓		Communication Competence
12	Exhibit the flexibility and interdisciplinary mindset required to transfer marine engineering knowledge and skills to diverse sectors, contributing effectively to innovation and technological advancement beyond the maritime industry.			✓		Global Vision & Societal Impact

***0:** No Contribution **1:** Little Contribution **2:** Partial Contribution **3:** Full Contribution

Program Outcomes /Course Learning Outcomes Matrix **Level of Contribution**:**0**-No Contribution **1**-Little Contribution **2**-Partial Contribution **3**-Full Contribution										
PO	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**	**CLO6**	**CLO7**	**CLO8**		
PO1	3	3	3	3	2	2	2	2		
PO2	2	3	3	3	2	2	2	2		
PO3	2	2	3	3	3	3	3	3		
PO4	2	2	3	3	3	3	3	3		
PO5	3	3	3	3	3	3	3	3		
PO6	2	2	2	2	2	2	2	2		
PO7	1	1	2	2	2	2	2	2		
PO8	1	1	1	1	2	2	2	3		
PO9	1	1	1	1	1	1	2	3		
PO10	1	1	1	1	2	2	2	3		
PO11	1	1	2	2	2	2	2	2		
PO12	1	1	2	2	2	2	2	2		

Course Learning Outcomes/ Evaluation Method		
CLO	**Teaching Method**	**Assessment Method**
CLO1 – Decline of the Ottoman Empire	Lecture, Historical Analysis Sessions, Multimedia Presentations	Quizzes, Assignments, Midterm Exam
CLO2 – Western Influence & Reform Movements	Lecture, Document Analysis, Class Discussions	Assignments, Quizzes, Written Exams
CLO3 – Turkish National Struggle	Lecture, Case Studies, Primary Source Analysis	Midterm Exam, Assignments, Short Essays
CLO4 – Foundation of the Republic	Lecture, Debates, Comparative Analysis Activities	Assignments, Quizzes, Written Exams
CLO5 – Historical Source Interpretation	Document Study Workshops, Archival Material Analysis, Tutorials	Source Analysis Reports, Assignments, Quizzes
CLO6 – Atatürk's Reforms & Principles	Lecture, Group Discussions, Multimedia Presentations	Quizzes, Assignments, Midterm Exam
CLO7 – Empire–Republic Transformation Analysis	Seminar Sessions, Critical Thinking Activities, Case Studies	Essays, Assignments, Participation
CLO8 – Applying Historical Knowledge to Contemporary Issues	Discussions, Problem-Based Learning, Contemporary Case Evaluations	Assignments, Presentations, Final Exam

ECTS / Workload Table			
Activities	**Number**	**Duration (Hours)**	**Total Workload**
Preparation for lectures	**15**	**1**	**15**
Lectures	**15**	**2**	**30**
Midterm Exam	**1**	**3**	**3**
Preparation for Midterm Exam	**1**	**20**	**20**
Final Exam	**1**	**3**	**3**
Preparation for Final Exam	**1**	**20**	**20**
Presentation(s)	-	-	-
Preparation for Presentation(s)	-	-	-
Research for Project(s)/Essay(s)	-	-	-
Project Writing	-	-	-
Group Work	-	-	-
In-class Discussion(s)	-	-	-
Quiz(es)	-	-	-
Preparation for Quiz(es)	-	-	-
Laboratory	-	-	-
Assignment(s)/Homework/Class Works	-	-	-
Micro-Teaching Sessions	-	-	-
Lesson Planning	-	-	-
Materials Adaptation	-	-	-
Material Development	-	-	-
Draft Preparation	-	-	-
Drawing	-	-	-
Essay Writing	-	-	-
Tutorial(s)	-	-	-
Portfolio Preparation	-	-	-
Portfolio Presentation	-	-	-
Total Workload			**91**
ECTS Credit			**2**

Evaluation System		
Semester Requirements	**Number**	**Percentage of Grade**
Attendance/Participation	-	-
Laboratory	-	-
Application	-	-
Field Work	-	-
Special Course Internship (Work Placement)	-	-
Homework/Assignments	-	-
Providing reliability and motivation of the individual homework completion and Submission	-	-
Presentation/Jury	-	-
Project	-	-
Quiz	-	-
Midterms/Oral Exams	1	40
Final/Oral Exams	1	60
Total	**2**	**100**

	Percentage	**Course Grade**	**Coefficient**
Grading Policy	90-100	AA	4.0
	85-89	BA	3.5
	80-84	BB	3.0
	75-79	CB	2.5
	70-74	CC	2.0
	60-69	DC	1.5
	50-59	DD	1.0
	49 and below	FF	0.0
	Less than 70% attendance	NA	-
Course Requirements and Policies	• Alerted attendance at the lectures is essential! • Students are expected to check frequently the instructor's web page for the course announcements. • University of Kyrenia honor code will be strictly enforced regarding any issues concerning cheating.		

University of Kyrenia

Faculty of Maritime Studies

Marine Engineering

Syllabus

Course name: Manufacturing Technology							
Code	**Year**	**Semester**	**Credit**	**ECTS**	**Course application, Hour/Week**		
					Theoretical	**Application**	**Laboratory**
MEC202	II	Spring	3	3	2	2	0
Department: Marine Engineering							
Course type: Elective				**Prerequisite: x**		**Language:** English	
% Contribution to the Professional Fundamental Component				**Basic Sciences**	**Engineering Science**	**Engineering Design**	**General Education**
				20	30	30	20
Course Venue and Time				Wednesday 09.30-12.20			
Instructor information				**Chf. Eng. Volkan Varışlı** Faculty of Maritime Studies Wednesday / 09:00 - 12:00 +90 (392) 650 26 00 / 4095 volkan.varisli@kyrenia.edu.tr www.kyrenia.edu.tr			

Course Description	The *Manufacturing Technology* course provides a comprehensive introduction to the fundamental principles, processes, and technologies used in modern manufacturing. The course begins with an overview of the role of manufacturing in engineering and industrial production, emphasizing the classification of manufacturing processes and the mechanical behavior of materials under different conditions. Students explore traditional and modern manufacturing techniques, including casting, welding, metal forming, machining, and additive manufacturing. Throughout the course, special attention is given to the scientific principles underlying each process—such as material flow, heat transfer, and stress–strain relationships—as well as process design considerations like quality control and defect prevention. Advanced topics include rolling, forging, extrusion, sheet metal forming, and joining technologies, along with a discussion of process selection in modern production systems. By the end of the course, students will have a solid foundation in the theory and practical aspects of manufacturing processes, preparing them for further study and professional application in materials engineering, production, and mechanical design.
Course Aims and Objectives	The primary aim of this course is to provide students with a fundamental understanding of the principles, processes, and technologies involved in manufacturing engineering. The course focuses on developing the ability to analyze, evaluate, and select appropriate manufacturing methods for various materials and engineering applications. • Introduce the basic concepts and classifications of manufacturing processes and their role in modern engineering systems. • Explain the mechanical and physical behavior of materials during different manufacturing operations. • Examine the fundamental principles, equipment, and parameters of key manufacturing processes such as casting, welding, forming, and machining. • Develop students' analytical skills to assess process efficiency, accuracy, and quality control in manufacturing.

	• Familiarize students with the emerging trends and innovations in manufacturing technologies, including additive manufacturing and automation. • Encourage an integrated understanding of design, materials, and production to optimize manufacturing systems. • Prepare students for advanced coursework and professional practice in manufacturing, mechanical design, and industrial engineering.
Course Learning Outcomes	**CLO1 – Understand Fundamental Manufacturing Concepts** Define the fundamental concepts and classifications of manufacturing processes and explain their role in engineering applications. Describe the mechanical behavior of materials under various manufacturing conditions, including deformation, heat transfer, and phase transformations. **CLO2 – Explain Manufacturing Processes and Techniques** Explain the principles, tools, and techniques used in major manufacturing processes such as casting, welding, forming, machining, and additive manufacturing. Demonstrate awareness of modern developments in sustainable and digital manufacturing technologies. **CLO3 – Analyze Process Parameters and Material Behavior** Analyze the effects of process parameters on product quality, material properties, and manufacturing efficiency. Compare and evaluate different manufacturing methods based on material type, design requirements, and economic considerations. **CLO4 – Interpret Data and Solve Manufacturing Problems** Interpret process-related data and apply problem-solving approaches to identify and mitigate defects in manufacturing operations. **CLO5 – Apply Knowledge in Case Studies and Practical Situations** Apply theoretical knowledge to practical examples and case studies related to production systems and process selection. **CLO6 – Integrate Design, Material, and Process Knowledge** Integrate design, material, and process knowledge to make informed decisions in manufacturing planning and product realization.

Content of the Course

Week	*Subject*
1	Introduction to Manufacturing and its Role in Engineering
2	Classification of Manufacturing Processes
3	Overview of Material Behavior in Manufacturing
4	Casting Processes: Fundamentals and Techniques
5	Casting Processes: Molding, Solidification, and Defects
6	Welding and Joining Processes: Principles and Type
7	Midterm Exam
8	Metal Forming: Fundamentals and Stress–Strain Relationships
9	Metal Forming: Rolling and Forging
10	Metal Forming: Extrusion, Drawing, and Sheet Metal Forming
11	Machining and Cutting Mechanics
12	Additive Manufacturing: Concepts and Techniques
13	Other Manufacturing Processes
14	Modern Manufacturing Systems and Process Selection
15	Final Exam

Methods and Techniques Used in the Course

Lectures and Multimedia Presentations:

Core theoretical concepts are delivered through structured lectures supported by visual aids, videos, and digital animations to illustrate complex manufacturing processes such as casting, welding, and metal forming.

Interactive Discussions and Problem-Solving Sessions:

Students are encouraged to participate in classroom discussions and engage in analytical problem-solving activities to enhance conceptual understanding and critical thinking.

Case Studies and Industrial Examples:

Real-world case studies and examples from contemporary manufacturing industries are examined to bridge the gap between theory and practice.

Laboratory Demonstrations and Simulations:

Demonstrations of manufacturing processes and the use of computer-based simulations provide practical insights into process mechanics, parameter control, and defect analysis.

Assignments and Technical Reports:

Students prepare written assignments and technical reports focused on specific manufacturing processes, enabling them to develop technical writing and analytical skills.

Midterm and Final Examinations:

These assessments evaluate students' comprehension of theoretical principles, analytical capabilities, and ability to apply knowledge to solve engineering problems.

Supplementary Readings and Research Reviews:

Selected academic papers and reference materials are assigned to promote independent learning and awareness of emerging manufacturing technologies.

Sample Questions

Theoretical Questions

- Define manufacturing and explain its role in modern engineering design and production systems.
- Describe the major categories of manufacturing processes and provide examples of each.
- Explain the solidification process in metal casting and discuss the factors affecting casting defects.
- Compare and contrast the different types of welding and joining processes used in the manufacturing industry.
- Explain the stress–strain relationship in metal forming and how it affects process selection.

Analytical / Problem-Solving Questions

- A steel casting has a volume of 0.02 m^3 and a density of 7800 kg/m^3. Calculate the total solidification time if the mold constant $C_m = 4.0 \times 10^{-4} s/mm^2$ and the ratio $(V/A)^2 = 1200 mm^2$.
- Determine the rolling load for a 2-high rolling mill with known material properties, roll diameter, and reduction percentage.
- A sheet metal part undergoes drawing and extrusion. Discuss the major stresses acting during each process and methods to minimize defects.
- In a given welding process, analyze the heat input and predict how it influences the microstructure and mechanical properties of the welded joint.

Conceptual / Application Questions

- Discuss the advantages and limitations of additive manufacturing compared to conventional machining.
- Explain how modern manufacturing systems integrate computer-aided design (CAD) and computer-aided manufacturing (CAM) technologies.
- Identify common causes of defects in casting and welding operations and propose preventive measures.
- Evaluate the environmental and economic implications of process selection in manufacturing systems.

Case Study / Discussion Questions

- Analyze a real-world example of process failure in a casting or welding operation. What corrective actions could have been taken?
- Discuss the future of sustainable and automated manufacturing technologies in the context of Industry 4.0.

Materials Used in the Course

Main Textbooks

- Kalpakjian, S., Schmid, S. R. (2020). *Manufacturing Engineering and Technology* (8th Edition). Pearson Education.
- Groover, M. P. (2021). *Fundamentals of Modern Manufacturing: Materials, Processes, and Systems* (8th Edition). Wiley.

Supplementary References

- Degarmo, E. P., Black, J. T., & Kohser, R. A. (2019). *Materials and Processes in Manufacturing* (12th Edition). Wiley.
- Rao, P. N. (2013). *Manufacturing Technology: Foundry, Forming and Welding* (Vol. 1). McGraw-Hill Education.
- Schey, J. A. (2000). *Introduction to Manufacturing Processes.* McGraw-Hill.
- Budinski, K. G., & Budinski, M. K. (2010). *Engineering Materials: Properties and Selection.* Prentice Hall.

Lecture and Course Materials

- Instructor-prepared lecture notes and digital slides.
- Technical drawings and process diagrams for various manufacturing techniques.
- Case studies and research papers on current manufacturing technologies.
- Process videos and simulations for metal forming, casting, and additive manufacturing.

Laboratory and Practical Resources

- Sample materials for machining, casting, and welding demonstrations.
- Access to manufacturing laboratories equipped with machine tools, 3D printers, and metrology instruments.
- Software tools for computer-aided design (CAD) and computer-aided manufacturing (CAM).

Online and Digital Resources

- Supplementary multimedia resources and animations from textbook publishers.
- Relevant academic databases (ScienceDirect, IEEE Xplore, ASME Digital Library) for research on modern manufacturing trends.
- Online tutorials and technical documentation related to manufacturing processes and materials.

All the above listed books are available at UoK's Grand Library

Program Outcomes Matrix

	Program Outcomes	*Level of Contribution				Targeted Competence Areas
		0	1	2	3	
1	Demonstrate comprehensive knowledge of marine engineering principles, systems, and machinery operations, and effectively apply this knowledge to ensure safe, efficient, and sustainable vessel performance in compliance with IMO and STCW standards.				✓	Technical Knowledge & Applied Sciences
2	Apply advanced engineering design principles to develop, adapt, and optimize mechanical, electrical, and control systems onboard ships and in shore-based industrial contexts, integrating safety, cost-efficiency, and environmental considerations.				✓	Analytical & Computational Skills
3	Perform engineering watchkeeping duties and operational management with professional responsibility, situational awareness, and adherence to international maritime conventions and best practices.				✓	Sustainable Design & Safe Operating
4	Identify, formulate, and analyze complex engineering problems using appropriate theoretical, computational, and experimental techniques to derive sound, data-driven solutions in marine and related engineering domains.			✓		Research & Experimentation
5	Integrate principles of safety culture, risk assessment, and environmental protection into all engineering practices, promoting sustainable operations aligned with IMO conventions such as MARPOL and SOLAS.			✓		Innovation & Digital Competence
6	Employ advanced digital tools, diagnostic systems, and automation technologies for monitoring, control, and performance assessment of marine and industrial systems, in line with the requirements of the evolving maritime digitalization era.				✓	Regulatory Frameworks & Safety
7	Demonstrate competence in planning, executing, and managing engineering projects, including resource allocation, budgeting, and maintenance planning, while ensuring quality, safety, and compliance with regulatory frameworks.				✓	Teamwork & Leadership
8	Function effectively as a leader and member of multidisciplinary and multicultural teams, fostering collaboration, ethical conduct, and efficient communication in dynamic and often high-stress maritime environments.				✓	Project Management & Entrepreneurship
9	Communicate effectively in both written and oral forms with clarity, professionalism, and technical precision in English and other relevant languages within maritime and industrial contexts.			✓		Ethics & Professionalism
10	Adhere to the ethical and professional standards of the engineering and maritime professions, demonstrating accountability, integrity, and a commitment to continuous professional development and lifelong learning.				✓	Lifelong Learning & Adaptability
11	Evaluate and implement sustainable engineering practices and emerging green technologies to minimize the environmental footprint of marine and industrial operations.			✓		Communication Competence
12	Exhibit the flexibility and interdisciplinary mindset required to transfer marine engineering knowledge and skills to diverse sectors, contributing effectively to innovation and technological advancement beyond the maritime industry.			✓		Global Vision & Societal Impact

***0:** No Contribution **1:** Little Contribution **2:** Partial Contribution **3:** Full Contribution

Program Outcomes /Course Learning Outcomes Matrix **Level of Contribution**:**0**-No Contribution **1**-Little Contribution **2**-Partial Contribution **3**-Full Contribution						
	CLO1	**CLO2**	**CLO3**	**CLO4**	**CLO5**	**CLO6**
PO1	3	3	3	3	2	3
PO2	1	3	2	3	3	3
PO3	2	3	3	3	3	3
PO4	1	3	1	3	3	2
PO5	1	2	3	3	3	3
PO6	1	2	3	3	2	3
PO7	1	1	1	2	2	3
PO8	1	1	2	2	2	3
PO9	1	1	2	3	2	3
PO10	-	-	-	-	-	-
PO11	-	-	-	-	-	-
PO12	-	-	-	-	-	-

Course Learning Outcomes/ Evaluation Method		
CLO	**Teaching Method**	**Assessment Method**
CLO1	Lecture, Multimedia Presentation	Midterm Exam, Final Exam
CLO2	Lecture, Demonstration, Case Studies	Midterm Exam, Final Exam
CLO3	Lecture, Demonstration, Laboratory Activities	Midterm Exam, Lab Report, Final Exam
CLO4	Lecture, Problem-Solving Sessions	Midterm Exam, Assignments, Final Exam
CLO5	Lecture, Case Studies, Group Discussion	Assignment, Midterm Exam, Final Exam
CLO6	Lecture, Case Studies, Project-Based Learning	Project / Assignment, Final Exam

ECTS / Workload Table			
Activities	**Number**	**Duration (Hours)**	**Total Workload**
Preparation for lectures	**15**	**1**	**15**
Lectures	**15**	**4**	**60**
Midterm Exam	**1**	**1**	**1**
Preparation for Midterm Exam	**1**	**4**	**4**
Final Exam	**1**	**1**	**1**
Preparation for Final Exam	**1**	**4**	**4**
Presentation(s)	-	-	-
Preparation for Presentation(s)	-	-	-
Case Studies / Critical Thinking	-	-	-
Project Writing	**1**	**4**	**4**
Group Work	**1**	**4**	**4**
In-class Discussion(s)	-	-	-
Quiz(es)	-	-	-
Preparation for Quiz(es)	-	-	-
Laboratory / Practical Applications	**2**	**4**	**8**
Assignment(s)/Homework/Class Works	**4**	**4**	**16**
Micro-Teaching Sessions	-	-	-
Lesson Planning	-	-	-
Materials Adaptation	-	-	-
Material Development	-	-	-
Draft Preparation	-	-	-
Drawing	-	-	-
Essay Writing	-	-	-
Tutorial(s)	-	-	-
Portfolio Preparation	-	-	-
Portfolio Presentation	-	-	-
Total Workload			**117**
ECTS Credit			**3**

Evaluation System		
Semester Requirements	**Number**	**Percentage of Grade**
Attendance/Participation	-	-
Laboratory	-	-
Application	2	20
Field Work	1	5
Special Course Internship (Work Placement)	-	-
Homework/Assignments	4	10
Providing reliability and motivation of the individual homework completion and Submission	-	-
Presentation/Jury	-	-
Project	1	5
Quiz	-	-
Midterms/Oral Exams	1	30
Final/Oral Exams	1	30
Total	**10**	**100**

	Percentage	**Course Grade**	**Coefficient**
Grading Policy	90-100	AA	4.0
	85-89	BA	3.5
	80-84	BB	3.0
	75-79	CB	2.5
	70-74	CC	2.0
	60-69	DC	1.5
	50-59	DD	1.0
	49 and below	FF	0.0
	Less than 70% attendance	NA	-
Course Requirements and Policies	• Alerted attendance at the lectures is essential! • Students are expected to check frequently the instructor's web page for the course announcements. • University of Kyrenia honor code will be strictly enforced regarding any issues concerning cheating.		

University of Kyrenia

Faculty of Maritime Studies

Marine Engineering

Syllabus

Course name: Dynamics							
Code	**Year**	**Semester**	**Credit**	**ECTS**	**Course application, Hour/Week**		
					Theoretical	**Application**	**Laboratory**
MEC204	II	Spring	3	5	3	0	0
Course type: Compulsory				**Prerequisite: x**		**Language:** English	
% Contribution to the Professional Fundamental Component				**Basic Sciences**	**Engineering Science**	**Engineering Design**	**General Education**
				20	20	20	40
Course Venue and Time				Wednesday 09.30-12.20			
Instructor information				**Chf. Eng. Volkan Varışlı** Faculty of Maritime Studies Wednesday / 09:00 - 12:00 +90 (392) 650 26 00 / 4095 volkan.varisli@kyrenia.edu.tr www.kyrenia.edu.tr			

Course Description	The **Dynamics** course provides an in-depth study of the motion of particles and rigid bodies under the influence of forces, emphasizing the fundamental principles of classical mechanics. Building upon the foundations of statics, this course explores kinematics and kinetics of motion in both linear and rotational systems. Students will examine velocity, acceleration, and force relationships through Newton's Laws of Motion, applying these to various physical systems. Key topics include linear and circular motion, work and energy principles, conservation of energy, impulse and momentum, and the analysis of collisions. Through theoretical lectures, graphical methods, and problem-solving exercises, students will develop the ability to model and analyze real-world dynamic systems. Practical examples from marine and mechanical engineering applications are integrated throughout the course to enhance comprehension and technical application. By the end of the course, students will possess the analytical and computational skills necessary to evaluate and predict the dynamic behavior of mechanical systems, preparing them for more advanced studies in mechanical, marine, and structural engineering.
Course Aims and Objectives	The primary aim of this course is to provide students with a comprehensive understanding of the fundamental laws governing the motion of particles and rigid bodies, enabling them to analyze and solve dynamic problems encountered in engineering systems. The course seeks to strengthen students' ability to connect theoretical mechanics with practical applications, particularly within marine and mechanical engineering contexts. **Objectives:** • To introduce the fundamental concepts of kinematics and kinetics of particles and rigid bodies. • To develop the ability to apply **Newton's Laws of Motion** to solve real-world engineering problems involving motion. • To analyze linear and rotational motion using mathematical and graphical approaches. • To explain and apply the **work-energy** and **impulse-momentum** principles in solving dynamic problems. • To investigate the concepts of **power**, **efficiency**, and **energy conservation** in moving systems. • To understand and analyze **collisions** and their effects on mechanical systems. • To provide the analytical framework necessary for the design and evaluation of dynamic components in marine, automotive, and mechanical systems.

	• To cultivate problem-solving skills and critical thinking through theoretical derivations, simulations, and practical case studies.
Course Learning Outcomes	**CLO1 – Fundamental Principles of Dynamics** Define and explain the fundamental concepts of dynamics, including kinematics and kinetics of particles and rigid bodies, and differentiate among linear, curvilinear, and rotational motion. **CLO2 – Kinematics of Motion** Describe and analyze the relationships among displacement, velocity, and acceleration; construct and interpret motion graphs for particles and rigid bodies in various types of motion. **CLO3 – Newton's Laws and Force–Motion Analysis** Apply Newton's Laws of Motion to solve engineering problems involving forces and motion in one, two, and three dimensions, using mathematical models for dynamic system behavior. **CLO4 – Work, Energy, and Power** Analyze and solve problems involving work, energy, and power, applying the principle of conservation of energy to practical mechanical and marine engineering systems. **CLO5 – Impulse, Momentum, and Impact** Evaluate impulse and momentum for particle and rigid body systems, and apply these principles to collision, impact, and transient dynamic scenarios. **CLO6 – Applied Dynamic Analysis & Professional Skills** Integrate theoretical, computational, and graphical methods to perform dynamic analyses; work effectively in teams to conduct simulations, interpret real-world dynamic phenomena, and communicate technical solutions in written and oral form.

Content of the Course

Week	*Subject*
1	Introduction, course overview
2	Velocity and acceleration, graphs
3	Linear motion
4	Linear motion
5	Circular motion
6	Second law of Newton's
7	Second law of Newton's
8	Mid-term Exam
9	Dynamics of a body
10	Work and Energy, Conservation of energy
11	Work and Energy, Conservation of energy
12	Impulse and Momentum
13	Impulse and Momentum
14	Collusion
15	Final Exams

Methods and Techniques Used in the Course

Lectures and Interactive Discussions:

Fundamental principles of dynamics are introduced through structured lectures supported by visual aids, derivations, and real-world examples. Interactive discussions encourage student participation and conceptual clarity.

Problem-Based Learning (PBL):

Students engage with complex, open-ended problems that require the application of Newton's laws, energy methods, and momentum principles to realistic engineering and marine systems.

Analytical and Computational Exercises:

Regular exercises emphasize the formulation and solution of dynamic equations using both analytical and numerical methods. MATLAB or equivalent computational tools may be utilized for simulation and analysis.

Graphical Analysis Workshops:

Students learn to interpret and construct velocity, acceleration, and motion graphs for linear and rotational systems, reinforcing their understanding of kinematics and kinetics relationships.

Case Studies and Engineering Applications:

Selected case studies from marine, mechanical, and aerospace engineering are analyzed to demonstrate the application of dynamic principles in real-world contexts such as ship motion, propulsion systems, and machinery vibration.

Laboratory Demonstrations and Virtual Simulations:

Where applicable, physical demonstrations and computer-based simulations are used to visualize dynamic responses and validate theoretical models.

Collaborative Learning and Group Projects:

Students work in teams to solve dynamic analysis problems, prepare reports, and present findings—enhancing communication, teamwork, and critical evaluation skills.

Continuous Assessment and Feedback:

Quizzes, midterm exams, and homework assignments are used to reinforce learning outcomes, while formative feedback helps students identify areas for improvement.

Sample Questions

Linear and Circular Motion

- A particle moves along a straight line with an acceleration given by $a = 6t - 2\text{m/s}^2$.
  (a) Determine its velocity and displacement as functions of time.
  (b) Find the total distance traveled between $t = 0\text{s}$ and $t = 4\text{s}$.

- A body moves in a circular path of radius 2 m with a constant angular acceleration of 4 rad/s².
  Determine the tangential and normal components of acceleration at the instant when the angular velocity reaches 6 rad/s.

Newton's Laws of Motion

- A block of mass 20 kg is pulled on a horizontal surface with a force of 100 N at an angle of 30° above the horizontal. If the coefficient of friction is 0.25, determine the acceleration of the block and the normal reaction force.

- A 50-kg mass is suspended by two cables making angles of 40° and 60° with the horizontal. Determine the tension in each cable using the equilibrium conditions.

Work and Energy Methods

- A 500-kg marine hatch cover is lifted vertically by a winch. If the winch applies a constant power of 5 kW, determine the velocity of the hatch after it has been raised 3 meters, assuming it started from rest.

- A 2000-kg ship model slides down an inclined plane of 20° with a coefficient of friction of 0.1. Determine the velocity of the model after sliding 5 meters using the work-energy theorem.

Impulse and Momentum

- A 3-kg projectile moving at 100 m/s strikes a stationary target and embeds itself in it. The combined mass after impact is 10 kg. Determine the final velocity immediately after impact and the percentage loss of kinetic energy.

- A 50,000-ton vessel is moving at 10 knots when its engines are suddenly reversed, producing a constant opposing thrust. Using the principle of impulse and momentum, estimate the time required to bring the ship to rest if the thrust force is known.

Collision and Impact

- Two smooth spheres, A (3 kg) and B (2 kg), collide head-on. Before impact, A moves with a velocity of 8 m/s and B with 4 m/s in the opposite direction. If the coefficient of restitution is 0.75, determine the velocities of both spheres after collision.

- A marine piston (mass = 5 kg) strikes a stationary cylinder head with an initial velocity of 2 m/s. If 60% of the kinetic energy is lost during the impact, calculate the rebound velocity of the piston.

Comprehensive Problem (Integration of Concepts)

- A flywheel of moment of inertia 40 kg\cdotpm^2 accelerates uniformly from rest to 300 rpm in 10 seconds.
  (a) Determine the angular acceleration.
  (b) Calculate the torque required to produce this motion.
  (c) Determine the total work done on the flywheel during acceleration.

Materials Used in the Course

Primary Textbooks and References

- Hibbeler, R. C. (2021). *Engineering Mechanics: Dynamics*, 15th Edition. Pearson Education.
- Meriam, J. L., Kraige, L. G., & Bolton, J. N. (2020). *Engineering Mechanics: Dynamics*, 9th Edition. Wiley.
- Beer, F. P., Johnston, E. R., & Cornwell, P. J. (2018). *Vector Mechanics for Engineers: Dynamics*, 12th Edition. McGraw-Hill Education.
- Bedford, A., & Fowler, W. (2015). *Engineering Mechanics: Dynamics*. Pearson.

These texts provide the theoretical background, mathematical formulations, and engineering examples necessary to develop a deep understanding of dynamics principles and their real-world applications in mechanical and marine systems.

Supplementary References

- Tongue, B. H. (2016). *Principles of Engineering Mechanics: Dynamics—The Analysis of Motion*. Springer.
- Kane, T. R., & Levinson, D. A. (1985). *Dynamics: Theory and Applications*. McGraw-Hill.
- Gere, J. M., & Goodno, B. J. (2013). *Mechanics of Materials and Dynamics Applications in Engineering*. Cengage Learning.
- Class notes, instructor-prepared summaries, and selected academic papers on marine and mechanical motion dynamics.

Laboratory and Simulation Resources

- **Computer-Aided Tools:**
  - MATLAB / Simulink for solving motion equations and simulating dynamic systems.
  - ANSYS Mechanical or SolidWorks Motion for dynamic modeling and stress visualization.
  - Tracker Video Analysis for motion analysis and experimental verification.
- **Laboratory Equipment (where applicable):**
  - Linear and rotational motion apparatus
  - Flywheel energy measurement setup
  - Pendulum motion devices
  - Force and acceleration sensors

Online and Digital Resources

- Access to digital learning platforms such as *Pearson Mastering Engineering*, *WileyPLUS*, or *McGraw-Hill Connect*.
- Multimedia materials including dynamic system simulations, recorded lectures, and interactive animations illustrating Newton's laws, energy transformations, and impact phenomena.
- Research databases (ScienceDirect, SpringerLink, IEEE Xplore) for current academic publications related to applied dynamics and marine engineering.

Additional Study Materials

- Lecture notes and weekly problem sets provided by the instructor.
- Sample quizzes and exam preparation booklets focusing on problem-solving strategies.
- Case studies on dynamic behavior in marine propulsion systems and mechanical linkages.

All the above listed books are available at UoK's Grand Library

Program Outcomes Matrix

	Program Outcomes	*Level of Contribution				Targeted Competence Areas
		0	1	2	3	
1	Demonstrate comprehensive knowledge of marine engineering principles, systems, and machinery operations, and effectively apply this knowledge to ensure safe, efficient, and sustainable vessel performance in compliance with IMO and STCW standards.				✓	Technical Knowledge & Applied Sciences
2	Apply advanced engineering design principles to develop, adapt, and optimize mechanical, electrical, and control systems onboard ships and in shore-based industrial contexts, integrating safety, cost-efficiency, and environmental considerations.				✓	Analytical & Computational Skills
3	Perform engineering watchkeeping duties and operational management with professional responsibility, situational awareness, and adherence to international maritime conventions and best practices.				✓	Sustainable Design & Safe Operating
4	Identify, formulate, and analyze complex engineering problems using appropriate theoretical, computational, and experimental techniques to derive sound, data-driven solutions in marine and related engineering domains.			✓		Research & Experimentation
5	Integrate principles of safety culture, risk assessment, and environmental protection into all engineering practices, promoting sustainable operations aligned with IMO conventions such as MARPOL and SOLAS.			✓		Innovation & Digital Competence
6	Employ advanced digital tools, diagnostic systems, and automation technologies for monitoring, control, and performance assessment of marine and industrial systems, in line with the requirements of the evolving maritime digitalization era.				✓	Regulatory Frameworks & Safety
7	Demonstrate competence in planning, executing, and managing engineering projects, including resource allocation, budgeting, and maintenance planning, while ensuring quality, safety, and compliance with regulatory frameworks.				✓	Teamwork & Leadership
8	Function effectively as a leader and member of multidisciplinary and multicultural teams, fostering collaboration, ethical conduct, and efficient communication in dynamic and often high-stress maritime environments.				✓	Project Management & Entrepreneurship
9	Communicate effectively in both written and oral forms with clarity, professionalism, and technical precision in English and other relevant languages within maritime and industrial contexts.			✓		Ethics & Professionalism
10	Adhere to the ethical and professional standards of the engineering and maritime professions, demonstrating accountability, integrity, and a commitment to continuous professional development and lifelong learning.				✓	Lifelong Learning & Adaptability
11	Evaluate and implement sustainable engineering practices and emerging green technologies to minimize the environmental footprint of marine and industrial operations.			✓		Communication Competence
12	Exhibit the flexibility and interdisciplinary mindset required to transfer marine engineering knowledge and skills to diverse sectors, contributing effectively to innovation and technological advancement beyond the maritime industry.			✓		Global Vision & Societal Impact

***0:** No Contribution **1:** Little Contribution **2:** Partial Contribution **3:** Full Contribution

Program Outcomes /Course Learning Outcomes Matrix **Level of Contribution**:**0**-No Contribution **1**-Little Contribution **2**-Partial Contribution **3**-Full Contribution						
PO	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**	**CLO6**
PO1	1	2	2	2	3	2
PO2	2	3	3	3	3	3
PO3	1	2	2	2	2	2
PO4	1	2	2	2	2	2
PO5	3	1	1	1	1	2
PO6	1	1	1	1	1	2
PO7	1	1	1	1	1	2
PO8	1	1	1	1	1	2
PO9	1	1	1	1	1	1
PO10	0	2	2	2	2	3
PO11	2	1	1	1	1	2
PO12	3	1	1	1	1	2

Course Learning Outcomes/ Evaluation Method		
CLO	**Teaching Method**	**Assessment Method**
CLO1 – Understand fundamental principles of dynamics, including kinematics and kinetics.	Lectures, Interactive Discussion, Concept Demonstrations	Quizzes, Midterm Exam
CLO2 – Analyze displacement, velocity, acceleration, and interpret motion graphs.	Lectures, Problem-Solving Sessions, Graphing Exercises	Assignments, Quizzes, Midterm Exam
CLO3 – Apply Newton's Laws to force–motion problems in 1D, 2D, and 3D.	Lectures, Worked Examples, Computational Tutorials	Midterm Exam, Final Exam
CLO4 – Solve work, energy, and power problems using energy principles.	Lectures, Workshops, Case Studies	Assignments, Midterm Exam, Final Exam
CLO5 – Evaluate impulse, momentum, collision, and impact scenarios.	Lectures, Simulation Exercises, Problem-Solving Workshops	Quizzes, Assignments, Final Exam
CLO6 – Perform applied dynamic analyses and present results effectively.	Group Projects, Presentations, Simulation-Based Learning	Project Report, Presentation, Final Exam

ECTS / Workload Table			
Activities	**Number**	**Duration (Hours)**	**Total Workload**
Preparation for lectures	**15**	**2**	**30**
Lectures	**15**	**3**	**45**
Midterm Exam	**1**	**3**	**3**
Preparation for Midterm Exam	**1**	**10**	**10**
Final Exam	**1**	**3**	**3**
Preparation for Final Exam	**1**	**10**	**10**
Presentation(s)	-	-	-
Preparation for Presentation(s)	-	-	-
Case Studies / Critical Thinking	-	-	-
Project Writing	**2**	**10**	**20**
Group Work	-	-	-
In-class Discussion(s)	-	-	-
Quiz(es)	-	-	-
Preparation for Quiz(es)	-	-	-
Laboratory / Practical Applications	-	-	-
Assignment(s)/Homework/Class Works	**4**	**10**	**40**
Micro-Teaching Sessions	-	-	-
Lesson Planning	-	-	-
Materials Adaptation	-	-	-
Material Development	-	-	-
Draft Preparation	-	-	-
Drawing	-	-	-
Essay Writing	-	-	-
Tutorial(s)	-	-	-
Portfolio Preparation	-	-	-
Portfolio Presentation	-	-	-
Total Workload			**161**
ECTS Credit			**5**

Evaluation System		
Semester Requirements	**Number**	**Percentage of Grade**
Attendance/Participation	-	-
Laboratory	-	-
Application	-	-
Field Work	-	-
Special Course Internship (Work Placement)	-	-
Homework/Assignments	4	20
Providing reliability and motivation of the individual homework completion and Submission	-	-
Presentation/Jury	-	-
Project	2	10
Quiz	-	-
Midterms/Oral Exams	1	30
Final/Oral Exams	1	40
Total	**10**	**100**

	Percentage	**Course Grade**	**Coefficient**
Grading Policy	90-100	AA	4.0
	85-89	BA	3.5
	80-84	BB	3.0
	75-79	CB	2.5
	70-74	CC	2.0
	60-69	DC	1.5
	50-59	DD	1.0
	49 and below	FF	0.0
	Less than 70% attendance	NA	-
Course Requirements and Policies	• Alerted attendance at the lectures is essential! • Students are expected to check frequently the instructor's web page for the course announcements. • University of Kyrenia honor code will be strictly enforced regarding any issues concerning cheating.		

University of Kyrenia

Faculty of Maritime Studies

Marine Engineering

Syllabus

Course name: Thermodynamics II							
Code	**Year**	**Semester**	**Credit**	**ECTS**	**Course application, Hour/Week**		
					Theoretical	**Application**	**Laboratory**
MEC208	II	Spring	3	5	3	0	0
Course type: Compulsory Elective				**Prerequisite: x**		**Language:** English	
% Contribution to the Professional Fundamental Component				**Basic Sciences**	**Engineering Science**	**Engineering Design**	**General Education**
				-	50	30	20
Course Venue and Time				Wednesday 09.30-12.20			
Instructor information				**Prof. Dr. Şenol Başkaya** Faculty of Maritime Studies Wednesday / 09:00 - 12:00 +90 (392) 650 26 00 / 4060 senol.baskaya@kyrenia.edu.tr www.kyrenia.edu.tr			

Course Description	The course is designed for fourth semester engineering students. The objective of the course is to give students the ability to analyze power and cooling cycles, determine thermodynamic properties, solve engineering problems related to the processes of psychrometric applications and chemical and phase balances in combustion processes.
Course Aims and Objectives	Thermodynamic relations, fundamental relations for simple compressible system, mixtures of pure substances, some power refrigeration cycles, vapor power cycles, air-standard power cycles, air standard refrigeration cycles, chemical reactions, combustion process, enthalpy of formation, enthalpy of combustion, higher and lower heating values of fuels, theoretical reaction temperature, adiabatic flame temperature, chemical equilibrium, equilibrium constant.
Course Learning Outcomes	LO1: Learn the methods used to calculate states and performance parameters for power and refrigeration cycles. LO2: Gain the ability to determine the relations among thermodynamic properties. LO3: Gain the ability to use equations, tables and diagrams to determine the states of gas mixtures. LO4: Learn engineering knowledge about air conditioning systems. LO5: Learn the methods to analyze systems involving combustion processes and to determine equilibrium states for chemically reacting systems.

Content of the Course

Week	*Subject*
1	Introduction
2	Introduction to Power Cycles
3	Gas Power Cycles
4	Vapor Cycles
5	Combined Power Cycles
6	Introduction to Refrigeration Cycles
7	Refrigeration Cycle Applications
8	Thermodynamic Property Relations
9	Gas Mixtures
10	Gas-Vapor Mixtures
11	Introduction to Air-Conditioning
12	Air-Conditioning Applications
13	Introduction to Chemical Reactions
14	Chemical Reaction Analysis
15	Chemical and Phase Equilibrium

Methods and Techniques Used in the Course

Lectures – Structured presentations covering fundamental concepts, laws, and theoretical frameworks of thermodynamics.

Problem-Solving Sessions – Step-by-step analysis of quantitative problems, including energy balances, entropy calculations, and exergy analysis.

Case Studies – Application of thermodynamic principles to real-world engineering systems, including marine propulsion, HVAC, and energy conversion systems.

Computer-Assisted Simulations – Use of simulation tools to model thermodynamic processes, analyze cycles, and visualize energy transformations.

Group Discussions – Interactive sessions to promote critical thinking and collaborative learning in solving complex thermodynamic scenarios.

Homework Assignments – Reinforcement of theoretical knowledge through structured exercises and applied calculations.

Quizzes and Concept Checks – Regular short assessments to monitor understanding and identify areas requiring additional focus.

Analytical and Conceptual Exercises – Encouraging the development of reasoning skills to assess system efficiency, irreversibility, and energy utilization.

Sample Questions

Conceptual Questions

- Define energy, work, and heat, and explain the differences between them.
- Explain the physical meaning of entropy and its relevance to the second law of thermodynamics.
- Discuss the concept of exergy and how it relates to energy efficiency in engineering systems.

Analytical / Calculation Problems

- A closed system undergoes a cyclic process. Given the heat interactions and work done, calculate the net change in internal energy.
- Analyze a steady-flow open system and determine the energy transfer using the first law of thermodynamics.
- Calculate the entropy change of a substance undergoing a reversible isothermal expansion.

Applied / Case Study Problems

- A marine engine operates between two temperature reservoirs. Determine its maximum theoretical efficiency and compare it with actual engine performance.
- Given a refrigeration cycle, calculate the exergy destruction in each component and suggest ways to improve system efficiency.
- Evaluate the effect of irreversibility on the availability of energy in a thermal power plant.

Short Answer / Reasoning Questions

- Explain why no real process can be completely reversible.
- Describe the differences between closed and open system analyses in thermodynamic applications.
- Discuss the role of thermodynamic properties in the design of energy systems, such as turbines or heat exchangers.

Materials Used in the Course

Textbooks and Reference Books

- Çengel, Y.A., Boles, M.A., Kanoğlu, M., Thermodynamics: An Engineering Approach, 9th Ed., McGraw-Hill, 2020.
- Sonntag, R. E., Borgnakke, C., & Van Wylen, G. J., *Fundamentals of Thermodynamics*, 9th Edition, Wiley.
- Moran, M.J., Shapiro, H.N., Boettner, D.D., Bailey, M.B., Fundamentals of Engineering Thermodynamics, 7th Ed., John Wiley & Sons, 2011.
- Van Wylen, G. J., & Sonntag, R. E., *Classical Thermodynamics*, 3rd Edition, Wiley.

Lecture Notes and Course Materials

- Weekly lecture slides and annotated notes prepared by the instructor.
- Supplementary problem sets and solution manuals for practice.
- Case studies and example calculations relevant to marine engineering systems.

Software and Simulation Tools

- MATLAB or Python for thermodynamic calculations and plotting property diagrams.
- EES (Engineering Equation Solver) for energy, entropy, and exergy analyses.
- Thermodynamic property software/databases (e.g., NIST REFPROP).

Online Resources

- Educational videos and tutorials on thermodynamic cycles and principles.
- Interactive online platforms for thermodynamic simulations and exercises.

Laboratory Materials (if applicable for demonstration purposes)

- Demonstration setups for heat transfer, work, and energy experiments.
- Measurement instruments: pressure gauges, thermocouples, flow meters.
- Steam tables, Mollier diagrams, and psychrometric charts for practical exercises.

All the above listed books are available at UoK's Grand Library

Program Outcomes	
PO1	Ability to demonstrate strong technical competence in mechanical system design, solid mechanics, thermodynamics, fluid mechanics, heat transfer, and control systems.
PO2	Ability to apply mathematics, physics, and engineering principles to identify, formulate, and solve complex mechanical engineering problems.
PO3	Ability to use modern engineering tools, CAD software, simulation environments (FEA/CFD), and manufacturing-related software effectively.
PO4	Ability to design mechanical components, processes, and systems that meet performance, safety, and sustainability requirements.
PO5	Ability to communicate effectively and apply teamwork, leadership, and project management skills in multidisciplinary engineering environments.
PO6	Ability to utilize knowledge of materials science, advanced manufacturing processes, machine design, and maintenance technologies.
PO7	Ability to perform experimental work, collect and interpret data, and use laboratory and measurement techniques effectively.
PO8	Ability to adopt engineering practices aligned with relevant standards, regulations, and industrial quality/safety requirements.
PO9	Ability to internalize ethical engineering behavior, professional responsibility, and awareness of societal and environmental impacts of engineering solutions.
PO10	Ability to recognize the need for lifelong learning and follow international technological, industrial, and academic advancements.
PO11	Ability to integrate Industry 4.0 concepts, automation systems, digital manufacturing, and AI-based tools into mechanical engineering applications.

Program Outcomes /Course Learning Outcomes Matrix **Level of Contribution**:**0**-No Contribution **1**-Little Contribution **2**-Partial Contribution **3**-Full Contribution						
PO	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**	**CLO6**
PO1	3	3	3	3	3	-
PO2	2	2	2	2	2	-
PO3	0	0	0	0	0	-
PO4	2	2	2	2	2	-
PO5	0	0	0	0	0	-
PO6	1	1	1	1	1	-
PO7	0	0	0	0	0	-
PO8	1	1	1	1	1	-
PO9	1	1	1	1	1	-
PO10	2	2	2	2	2	-
PO11	0	0	0	0	0	-

Course Learning Outcomes/ Evaluation Method		
CLO	**Teaching Method**	**Assessment Method**
CLO1	Theoretical lecture	Midterm examinations and final exam
CLO2	Theoretical lecture	Midterm examinations and final exam
CLO3	Theoretical lecture	Midterm examinations and final exam
CLO4	Theoretical lecture	Midterm examinations and final exam
CLO5	Theoretical lecture	Midterm examinations and final exam

ECTS / Workload Table			
Activities	**Number**	**Duration (Hours)**	**Total Workload**
Preparation for lectures	**15**	**4**	**60**
Lectures	**15**	**3**	**45**
Midterm Exam	**2**	**1,5**	**3**
Preparation for Midterm Exam	**2**	**12**	**24**
Final Exam	**1**	**2**	**2**
Preparation for Final Exam	**1**	**15**	**15**
Presentation(s)	-	-	-
Preparation for Presentation(s)	-	-	-
Case Studies / Critical Thinking	-	-	-
Project Writing	-	-	-
Group Work	-	-	-
In-class Discussion(s)	-	-	-
Quiz(es)	-	-	-
Preparation for Quiz(es)	-	-	-
Laboratory / Practical Applications	-	-	-
Assignment(s)/Homework/Class Works	-	-	-
Micro-Teaching Sessions	-	-	-
Lesson Planning	-	-	-
Materials Adaptation	-	-	-
Material Development	-	-	-
Draft Preparation	-	-	-
Drawing	-	-	-
Essay Writing	-	-	-
Tutorial(s)	-	-	-
Portfolio Preparation	-	-	-
Portfolio Presentation	-	-	-
Total Workload			**149**
ECTS Credit			**5**

Evaluation System		
Semester Requirements	**Number**	**Percentage of Grade**
Attendance/Participation	-	-
Laboratory	-	-
Application	-	-
Field Work	-	-
Special Course Internship (Work Placement)	-	-
Homework/Assignments	-	-
Providing reliability and motivation of the individual homework completion and Submission	-	-
Presentation/Jury	-	-
Project	-	-
Quiz	-	-
Midterms/Oral Exams	2	60
Final/Oral Exams	1	40
Total	**3**	**100**

	Percentage	**Course Grade**	**Coefficient**
Grading Policy	90-100	AA	4.0
	85-89	BA	3.5
	80-84	BB	3.0
	75-79	CB	2.5
	70-74	CC	2.0
	60-69	DC	1.5
	50-59	DD	1.0
	49 and below	FF	0.0
	Less than 70% attendance	NA	-
Course Requirements and Policies	• Alerted attendance at the lectures is essential! • Students are expected to check frequently the instructor's web page for the course announcements. • University of Kyrenia honor code will be strictly enforced regarding any issues concerning cheating.		

University of Kyrenia

Faculty of Maritime Studies

Marine Engineering

Syllabus

Course name: Marine Auxiliary Machinery II							
Code	**Year**	**Semester**	**Credit**	**ECTS**	**Course application, Hour/Week**		
					Theoretical	**Application**	**Laboratory**
MED202	II	Spring	3	3	2	2	0
Course type: Elective				**Prerequisite: x**		**Language:** English	
% Contribution to the Professional Fundamental Component				**Basic Sciences**	**Engineering Science**	**Engineering Design**	**General Education**
				20	30	30	20
Course Venue and Time				Wednesday 09.30-12.20			
Instructor information				**Chf. Eng. Volkan Varışlı** Faculty of Maritime Studies Wednesday / 09:00 - 12:00 +90 (392) 650 26 00 / 4095 volkan.varisli@kyrenia.edu.tr www.kyrenia.edu.tr			

Course Description	*Marine Auxiliary Machinery II* provides students with an advanced understanding of the principles, design, operation, maintenance, and repair of shipboard auxiliary machinery systems. The course emphasizes pumping theory, liquid and gas circuit lines, and piping system design with flow and capacity considerations. Students will analyze the design and performance aspects of pumps, compressors, and associated transfer equipment, including parallel operations and integrated systems. Practical focus is placed on the physical survey of machinery, measurement, performance evaluation, reporting, and repair methods for pumps, compressors, and piping systems. Maintenance planning, spare parts management, and troubleshooting strategies form an essential component of the course. Case studies on ship piping, heating and cooling systems, lubrication, separation, and retrofitting highlight real-world applications. By integrating theory with hands-on practices, students will gain the technical competence required to evaluate, maintain, repair, and improve marine auxiliary machinery systems, ensuring their efficiency, safety, and sustainability in maritime operations.
Course Aims and Objectives	The course aims to equip students with advanced knowledge and practical skills in the operation, maintenance, repair, and performance evaluation of marine auxiliary machinery. It focuses on fostering the ability to integrate theoretical principles with practical applications for efficient, safe, and sustainable shipboard auxiliary systems management. • Understand advanced principles of pumping theory, liquid and gas circuit systems, and piping design. • Analyze the design, operation, and performance of pumps, compressors, and associated auxiliary machinery. • Conduct physical surveys, measurements, and evaluations of running machinery systems. • Plan and perform maintenance and repair operations for pumps, compressors, and piping lines. • Identify critical components, manage spare parts, and apply troubleshooting strategies effectively.

	• Evaluate system performance, identify deficiencies, and propose improvements. • Apply knowledge gained to case studies simulating real shipboard auxiliary machinery operations.
Course Learning Outcomes	**CLO1 – Understand and apply pumping and piping principles** Explain liquid and gas circuit systems, flow theory, pump/compressor fundamentals, and perform basic capacity and performance calculations used in marine auxiliary systems. **CLO2 – Analyze auxiliary machinery performance** Evaluate the operational efficiency, reliability, and safety of pumps, compressors, and associated piping systems using engineering calculations and performance indicators. **CLO3 – Perform maintenance and repair operations** Plan, execute, and document maintenance, repair, and overhaul activities on pumps, compressors, valves, fittings, and piping components according to marine engineering standards. **CLO4 – Inspect and measure auxiliary machinery components** Conduct machinery surveys, perform precise measurements, assess component conditions, and interpret inspection results for operational suitability. **CLO5 – Troubleshoot operational problems and propose solutions** Identify failures in auxiliary systems, apply diagnostic techniques, select appropriate corrective actions, and recommend preventive maintenance strategies. **CLO6 – Integrate theory with practical applications and technical reporting** Apply engineering principles to case studies and real-life scenarios, propose system improvements for reliability and sustainability, and prepare clear technical reports and documentation.

Content of the Course

Week	*Subject*
1	Fundamentals of pumping theory, liquid/gas circuit lines
2	Principles of piping system design, flow theory and capacity calculations
3	Design aspects of transfer equipment: Pumps and compressor development, improvements in existing systems, parallel operations and connected system
4	Physical survey of the running parts of transfer equipment, measurement and reporting
5	Maintenance aspects of transfer machinery, spare part requirements, critical parts
6	Repair methods of lines, pumps, pump elements and alternative methods
7	Repair methods of lines, compressors and alternative methods
8	Mid-term Application (Maintenance& repair principles of auxiliaries)
9	Performance evaluation of marine auxiliaries' machinery systems and reporting
10	Case study 1 Ship main & auxiliary piping systems performance
11	Case Study 2 Heating and cooling system performance evaluation
12	Case study 3 Fuel and oil system, lubrication and separation performance
13	Case study 4 Retrofitting and renewal of system, comparison & adaptation
14	Principles of improvement of marine auxiliary machinery fitness
15	Final Exam Application (Understanding of performance-based troubleshooting)

Methods and Techniques Used in the Course

Lectures and Interactive Discussions – Detailed theoretical sessions covering principles of pumping, piping systems, flow theory, and auxiliary machinery operations, reinforced with interactive Q&A and discussions.

Laboratory/Workshop Applications – Hands-on exercises on pumps, compressors, piping systems, and auxiliary machinery to reinforce practical understanding.

Case Studies – Real-world scenarios and performance analysis exercises to simulate shipboard auxiliary system troubleshooting and maintenance challenges.

Assignments and Homework – Problem-solving tasks, research, and calculations to strengthen theoretical knowledge and applied skills.

Group Projects – Collaborative projects for designing, evaluating, and proposing improvements for auxiliary machinery systems.

Simulation Exercises – Use of software or simulation tools to model fluid and gas transfer, auxiliary machinery performance, and retrofitting strategies.

Mid-Term and Final Evaluations – Assessment of both theoretical knowledge and practical application through written exams and applied exercises.

Demonstrations and Technical Measurements – Training in the use of measurement devices, inspection tools, and reporting methods for system performance and machinery condition.

Sample Questions

Theoretical Questions

- Explain the basic principles of pumping theory and describe the main types of pumps used in marine auxiliary systems.
- Describe the considerations in designing a marine piping system, including flow theory, pressure drop, and capacity calculations.
- What are the critical maintenance aspects of compressors on board a ship, and how do they differ from liquid pumps?
- Explain the principles of parallel operation for pumps and compressors and discuss the advantages and potential risks.
- Discuss the importance of safety procedures and proper documentation in auxiliary machinery maintenance.

Practical / Application Questions

- Given a performance chart of a shipboard pump, calculate the flow rate, head, and efficiency under specific operating conditions.
- Identify and describe the steps required to perform a physical survey of a pump or compressor running part.
- Propose a maintenance plan for a marine auxiliary system, including periodic inspections, replacement of critical parts, and emergency procedures.
- Analyze a hypothetical failure in a lubrication or cooling system and recommend corrective actions based on standard maintenance procedures.

Case Study / Problem-Solving

- A ship's fuel transfer pump is showing reduced efficiency and abnormal vibration. Outline the steps you would take to diagnose, document, and correct the issue.
- Evaluate a heating and cooling system in an auxiliary machinery setup and propose improvements to increase efficiency and reliability.
- Compare the retrofitting of an existing auxiliary system versus full replacement. Discuss technical, safety, and cost considerations.

Materials Used in the Course

Textbooks and Reference Books

- "Marine Auxiliary Machinery" – D.A. Taylor
- "Marine Engineering" – R. G. Lamb
- IMO and SOLAS guidelines on ship auxiliary systems

Technical Manuals and Manufacturer Guides

- Pump, compressor, and piping system manuals
- Auxiliary machinery operation and maintenance guides

Simulation and Digital Resources

- Marine engineering simulation software for auxiliary machinery (if available)
- Digital charts, schematics, and diagrams for piping and machinery systems
- Online platforms for performance calculations and system monitoring

Laboratory Tools and Equipment

- Pumps, compressors, valves, and fittings for hands-on practice
- Measurement tools: flow meters, pressure gauges, thermometers, and manometers
- Tools for inspection and repair, including spanners, wrenches, and assembly tools

Documentation and Reporting Materials

- Logbooks and maintenance record templates
- Checklists for inspections, planned maintenance (PMS), and repair procedures
- Case study handouts and worksheets

Standards and Regulations

- SOLAS, MARPOL, and classification society requirements relevant to auxiliary machinery
- National and international safety and maintenance regulations

All the above listed books are available at UoK's Grand Library

Program Outcomes Matrix

	Program Outcomes	*Level of Contribution				Targeted Competence Areas
		0	1	2	3	
1	Demonstrate comprehensive knowledge of marine engineering principles, systems, and machinery operations, and effectively apply this knowledge to ensure safe, efficient, and sustainable vessel performance in compliance with IMO and STCW standards.				✓	Technical Knowledge & Applied Sciences
2	Apply advanced engineering design principles to develop, adapt, and optimize mechanical, electrical, and control systems onboard ships and in shore-based industrial contexts, integrating safety, cost-efficiency, and environmental considerations.				✓	Analytical & Computational Skills
3	Perform engineering watchkeeping duties and operational management with professional responsibility, situational awareness, and adherence to international maritime conventions and best practices.				✓	Sustainable Design & Safe Operating
4	Identify, formulate, and analyze complex engineering problems using appropriate theoretical, computational, and experimental techniques to derive sound, data-driven solutions in marine and related engineering domains.			✓		Research & Experimentation
5	Integrate principles of safety culture, risk assessment, and environmental protection into all engineering practices, promoting sustainable operations aligned with IMO conventions such as MARPOL and SOLAS.			✓		Innovation & Digital Competence
6	Employ advanced digital tools, diagnostic systems, and automation technologies for monitoring, control, and performance assessment of marine and industrial systems, in line with the requirements of the evolving maritime digitalization era.				✓	Regulatory Frameworks & Safety
7	Demonstrate competence in planning, executing, and managing engineering projects, including resource allocation, budgeting, and maintenance planning, while ensuring quality, safety, and compliance with regulatory frameworks.				✓	Teamwork & Leadership
8	Function effectively as a leader and member of multidisciplinary and multicultural teams, fostering collaboration, ethical conduct, and efficient communication in dynamic and often high-stress maritime environments.				✓	Project Management & Entrepreneurship
9	Communicate effectively in both written and oral forms with clarity, professionalism, and technical precision in English and other relevant languages within maritime and industrial contexts.			✓		Ethics & Professionalism
10	Adhere to the ethical and professional standards of the engineering and maritime professions, demonstrating accountability, integrity, and a commitment to continuous professional development and lifelong learning.				✓	Lifelong Learning & Adaptability
11	Evaluate and implement sustainable engineering practices and emerging green technologies to minimize the environmental footprint of marine and industrial operations.			✓		Communication Competence
12	Exhibit the flexibility and interdisciplinary mindset required to transfer marine engineering knowledge and skills to diverse sectors, contributing effectively to innovation and technological advancement beyond the maritime industry.			✓		Global Vision & Societal Impact

***0:** No Contribution **1:** Little Contribution **2:** Partial Contribution **3:** Full Contribution

Program Outcomes /Course Learning Outcomes Matrix **Level of Contribution**:**0**-No Contribution **1**-Little Contribution **2**-Partial Contribution **3**-Full Contribution						
PO	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**	**CLO6**
PO1	3	2	2	2	3	2
PO2	2	3	3	3	3	3
PO3	2	3	3	3	2	2
PO4	2	2	3	3	2	2
PO5	1	2	3	3	3	2
PO6	1	1	3	3	3	2
PO7	1	1	2	3	3	2
PO8	1	1	2	3	3	2
PO9	1	1	2	3	3	2
PO10	2	2	3	2	2	3
PO11	2	2	3	2	2	3
PO12	2	2	3	2	2	3

Course Learning Outcomes/ Evaluation Method		
CLO	**Teaching Method**	**Assessment Method**
CLO1	Lecture, conceptual explanation, board work, demonstrations	Midterm exam, quizzes, short written assessments
CLO2	Problem-solving sessions, guided examples, structured exercises	Midterm exam, homework assignments, quizzes
CLO3	Laboratory demonstrations, hands-on practice with pump/compressor systems	Practical exam, lab reports
CLO4	Workshops on measurement techniques, tool-use demonstrations	Practical assessment, skill-based evaluation
CLO5	Case-based learning, troubleshooting simulations, failure analysis tasks	Case study reports, troubleshooting exam
CLO6	Integrated practice sessions, scenario-based learning	Final exam, performance evaluation, technical report

ECTS / Workload Table			
Activities	**Number**	**Duration (Hours)**	**Total Workload**
Preparation for lectures	**15**	**1**	**15**
Lectures	**15**	**4**	**60**
Midterm Exam	**1**	**1**	**1**
Preparation for Midterm Exam	**1**	**4**	**4**
Final Exam	**1**	**1**	**1**
Preparation for Final Exam	**1**	**4**	**4**
Presentation(s)	-	-	-
Preparation for Presentation(s)	-	-	-
Case Studies / Critical Thinking	-	-	-
Project Writing	**1**	**4**	**4**
Group Work	**1**	**4**	**4**
In-class Discussion(s)	-	-	-
Quiz(es)	-	-	-
Preparation for Quiz(es)	-	-	-
Laboratory / Practical Applications	**2**	**4**	**8**
Assignment(s)/Homework/Class Works	**4**	**4**	**16**
Micro-Teaching Sessions	-	-	-
Lesson Planning	-	-	-
Materials Adaptation	-	-	-
Material Development	-	-	-
Draft Preparation	-	-	-
Drawing	-	-	-
Essay Writing	-	-	-
Tutorial(s)	-	-	-
Portfolio Preparation	-	-	-
Portfolio Presentation	-	-	-
Total Workload			**117**
ECTS Credit			**3**

Evaluation System		
Semester Requirements	**Number**	**Percentage of Grade**
Attendance/Participation	-	-
Laboratory	-	-
Application	2	20
Field Work	1	5
Special Course Internship (Work Placement)	-	-
Homework/Assignments	4	10
Providing reliability and motivation of the individual homework completion and Submission	-	-
Presentation/Jury	-	-
Project	1	5
Quiz	-	-
Midterms/Oral Exams	1	30
Final/Oral Exams	1	30
Total	**10**	**100**

	Percentage	**Course Grade**	**Coefficient**
Grading Policy	90-100	AA	4.0
	85-89	BA	3.5
	80-84	BB	3.0
	75-79	CB	2.5
	70-74	CC	2.0
	60-69	DC	1.5
	50-59	DD	1.0
	49 and below	FF	0.0
	Less than 70% attendance	NA	-
Course Requirements and Policies	• Alerted attendance at the lectures is essential! • Students are expected to check frequently the instructor's web page for the course announcements. • University of Kyrenia honor code will be strictly enforced regarding any issues concerning cheating.		

University of Kyrenia

Faculty of Maritime Studies

Marine Engineering

Syllabus

Course name: Differential Equations							
Code	**Year**	**Semester**	**Credit**	**ECTS**	**Course application, Hour/Week**		
					Theoretical	**Application**	**Laboratory**
MTH201	II	Spring	4	6	4	0	0
Course type: Compulsory				**Prerequisite: x**		**Language:** English	
% Contribution to the Professional Fundamental Component				**Basic Sciences**	**Engineering Science**	**Engineering Design**	**General Education**
				20	20	20	40
Course Venue and Time				Wednesday 09.30-12.20			
Instructor information				**Chf. Eng. Volkan Varışlı** Faculty of Maritime Studies Wednesday / 09:00 - 12:00 +90 (392) 650 26 00 / 4095 volkan.varisli@kyrenia.edu.tr www.kyrenia.edu.tr			

Course Description	The **Differential Equations** course introduces students to the fundamental concepts, analytical techniques, and practical applications of ordinary and partial differential equations that are essential for understanding and modeling dynamic systems in engineering and applied sciences. The course begins with the classification and formation of differential equations, followed by analytical and numerical approaches to their solution. Students will first explore **first-order differential equations**, including separable, linear, Bernoulli, and exact equations, along with methods for solving initial-value and boundary-value problems. The course then progresses to **higher-order linear differential equations**, focusing on homogeneous and nonhomogeneous forms, constant coefficients, and solution methods such as **undetermined coefficients**, **variation of parameters**, and the **Cauchy–Euler equation**. A significant portion of the course emphasizes the **Laplace Transform** and its application in solving linear differential equations with constant coefficients, convolution integrals, and inverse transformations. Students also study **power series solutions**, including the **method of Frobenius**, to solve equations near ordinary and singular points. Further, the course introduces **systems of linear differential equations**, their representation in normal form, and solution techniques using operator methods and matrix algebra. Finally, foundational concepts of **partial differential equations** are introduced through applications such as the **heat equation** and **Fourier series**, which demonstrate how differential equations model real-world phenomena in thermal, mechanical, and electrical systems. By the end of the course, students will have developed a strong theoretical foundation and problem-solving ability for analyzing linear dynamic systems, preparing them for advanced courses in engineering mathematics, control theory, and applied mechanics.
Course Aims and Objectives	**Course Aims** • To introduce the fundamental concepts, types, and classifications of ordinary and partial differential equations. • To develop the ability to model physical systems and engineering problems mathematically using differential equations. • To provide students with analytical methods and computational techniques for solving first-order and higher-order differential equations. • To enhance understanding of linear systems and their behavior through the application of Laplace Transforms, power series, and operator methods. • To bridge theory and practice by applying differential equation techniques to real-world engineering problems. **Course Objectives** By the end of this course, students should be able to:

	• Identify, classify, and formulate various types of differential equations encountered in engineering and applied sciences. • Solve first-order differential equations using separation of variables, integrating factors, and exact equation techniques. • Apply appropriate methods for solving higher-order linear differential equations with constant and variable coefficients. • Use the **Laplace Transform** for solving initial-value problems and linear systems efficiently. • Employ **power series** and **Frobenius methods** to find solutions near ordinary and singular points. • Analyze and solve **systems of linear differential equations** using matrix and operator methods. • Interpret the physical meaning of solutions in the context of mechanical, thermal, and electrical systems. • Apply learned concepts to model and solve simple **partial differential equations**, including the **heat equation** and related problems. • Develop analytical reasoning and problem-solving skills necessary for advanced studies in applied mathematics, mechanics, and control systems.
Course Learning Outcomes	**CLO1 – Classification & Formulation of Differential Equations** Identify, classify, and formulate ordinary and partial differential equations (linear/nonlinear, homogeneous/non-homogeneous) from real-world engineering and physical problems. **CLO2 – First-Order Differential Equation Methods** Solve first-order differential equations using analytical methods such as separation of variables, integrating factors, exact equations, and Bernoulli equations, and interpret their physical meaning. **CLO3 – Higher-Order Linear Differential Equations** Apply analytical techniques to solve higher-order linear differential equations with constant or variable coefficients, including Laplace Transform methods for initial value problems. **CLO4 – Series Solutions & Systems of Differential Equations** Use power series and Frobenius methods to obtain solutions near ordinary and singular points, and analyze systems of linear differential equations using matrix algebra and operator methods. **CLO5 – Modeling, Stability, and Applications** Apply differential equations to model and analyze engineering and scientific systems—such as mechanical vibrations, heat transfer, and population dynamics—and evaluate system stability using qualitative methods. **CLO6 – Computational Tools & Mathematical Communication** Use computational/symbolic software (e.g., MATLAB, Maple) to support analysis of differential equation solutions, and communicate mathematical reasoning effectively in written and oral form.

Content of the Course

Week	*Subject*
1	Differential Equations and Their Solutions: Classification of Differential equations; their Origin and Applications Solutions Initial-Value Problems, Boundary-Value Problems, the Existence and Uniqueness Theorem
2	First-Order Equations for which Exact Solutions are Obtainable: Separable Differential Equations and Differential Equations Reducible to this form Linear and Bernoulli Equations
3	Exact Differential Equations Special Integrating Factor
4	Explicit Methods of Solving Higher-Order Linear Differential Equations 4.1 Basic Theory of Linear Differential Equations The Homogeneous Linear Equations with Constant Coefficients The Method of Undetermined Coefficients
5	Midterm Exam
6	Variation of Parameters The Cauchy-Euler Equations
7	Laplace Transform Definition, Existence, and Basic Properties of the Laplace Transform
8	The Inverse Transform and the Convolution Laplace Transform Solution of Linear Differential Equations with Constant Coefficients
9	Series Solutions of Linear Differential Equations Power Series Solutions about an Ordinary Point Solutions about Singular Point; the Method of Frobenius
10	System of Linear Differential Equations Differential Operators and an Operator Method Basic Theory of Linear Systems in normal form; two equations in two unknown functions
11	Orthonormal Bases; Gram-Schmidt Process
12	Homogenous Linear Systems with Constant Coefficients: two equations in two unknown functions
13	Introduction and Basic Definitions, Classification of the Heat Equation, Fourier Series
14	General Overview
15	Final Exam

Methods and Techniques Used in the Course

Lectures and Theoretical Explanations:

Core mathematical concepts, solution methods, and theorems are introduced and explained through structured lectures supported by visual aids and board work.

Problem-Solving Sessions:

Regular in-class problem-solving exercises are conducted to reinforce analytical techniques and develop systematic approaches to solving differential equations.

Interactive Discussions:

Students are encouraged to actively participate in discussions to enhance conceptual understanding and exchange solution strategies.

Tutorials and Guided Practice:

Weekly tutorials provide additional support for challenging topics, allowing students to apply learned methods to a variety of equation types and initial/boundary value problems.

Use of Computational Tools:

Software such as **MATLAB**, **Maple**, or **Mathematica** is integrated into the course to demonstrate numerical methods, visualize solutions, and verify analytical results.

Assignments and Homework:

Problem sets are regularly assigned to help students develop independent analytical thinking and apply course concepts to practical scenarios.

Quizzes and Midterm/Final Examinations:

Periodic assessments are used to evaluate comprehension, problem-solving skills, and the ability to apply theoretical concepts effectively.

Applied Case Studies:

Selected engineering and physical science problems are modeled using differential equations to illustrate practical applications of mathematical techniques.

Collaborative Learning:

Group activities and peer discussions are encouraged to promote teamwork, communication, and deeper conceptual engagement.

Sample Questions

1. **Conceptual Questions**
   - Define a differential equation and explain the difference between *ordinary* and *partial* differential equations.
   - What is the distinction between *initial-value* and *boundary-value* problems?
   - Explain the conditions required for the existence and uniqueness of a solution to a first-order differential equation.
2. **Analytical Problems**
   - Solve the following first-order differential equation:

     $$\frac{dy}{dx} + 3y = 6e^{-2x}$$

     Find the general and particular solutions.
   - Determine whether the following equation is *exact*. If it is not, find an integrating factor and solve:

     $$(2xy + y^2)dx + (x^2 + 2xy)dy = 0$$
   - Use the **method of separation of variables** to solve:

     $$\frac{dy}{dx} = xy^2$$
3. **Higher-Order Differential Equations**
   - Solve the homogeneous differential equation with constant coefficients:

     $$y'' - 4y' + 4y = 0$$

     Find the general solution and interpret the result.
   - Find the particular solution of:

     $$y'' + 9y = \cos(3x)$$

     using the **method of undetermined coefficients.**

4. Laplace Transform Applications

- Compute the Laplace Transform of $f(t) = t^2 e^{-3t}$.
- Solve the initial-value problem using the Laplace Transform:

$$y'' + 2y' + 5y = 0, \quad y(0) = 1, \quad y'(0) = 0$$

5. Series Solutions and Systems of Equations

- Find the first three terms of the power series solution to the differential equation:

$$y'' - xy = 0$$

about $x = 0$.

- Solve the system of differential equations:

$$\begin{cases} \frac{dx}{dt} = 3x + 4y \\ \frac{dy}{dt} = -4x + 3y \end{cases}$$

using the eigenvalue method.

6. Applied/Modeling Questions

- A tank initially contains 100 liters of pure water. Brine containing 2 grams of salt per liter enters at a rate of 5 L/min, and the mixture leaves at the same rate. Formulate and solve the differential equation representing the amount of salt in the tank at any time t.
- The motion of a mass-spring-damper system is governed by the equation:

$$m\ddot{x} + c\dot{x} + kx = 0$$

Determine the nature of motion (overdamped, underdamped, or critically damped) for given constants m, c, k.

All the above listed books are available at UoK's Grand Library

Program Outcomes Matrix

	Program Outcomes	*Level of Contribution				Targeted Competence Areas
		0	1	2	3	
1	Demonstrate comprehensive knowledge of marine engineering principles, systems, and machinery operations, and effectively apply this knowledge to ensure safe, efficient, and sustainable vessel performance in compliance with IMO and STCW standards.				✓	Technical Knowledge & Applied Sciences
2	Apply advanced engineering design principles to develop, adapt, and optimize mechanical, electrical, and control systems onboard ships and in shore-based industrial contexts, integrating safety, cost-efficiency, and environmental considerations.				✓	Analytical & Computational Skills
3	Perform engineering watchkeeping duties and operational management with professional responsibility, situational awareness, and adherence to international maritime conventions and best practices.				✓	Sustainable Design & Safe Operating
4	Identify, formulate, and analyze complex engineering problems using appropriate theoretical, computational, and experimental techniques to derive sound, data-driven solutions in marine and related engineering domains.			✓		Research & Experimentation
5	Integrate principles of safety culture, risk assessment, and environmental protection into all engineering practices, promoting sustainable operations aligned with IMO conventions such as MARPOL and SOLAS.			✓		Innovation & Digital Competence
6	Employ advanced digital tools, diagnostic systems, and automation technologies for monitoring, control, and performance assessment of marine and industrial systems, in line with the requirements of the evolving maritime digitalization era.				✓	Regulatory Frameworks & Safety
7	Demonstrate competence in planning, executing, and managing engineering projects, including resource allocation, budgeting, and maintenance planning, while ensuring quality, safety, and compliance with regulatory frameworks.				✓	Teamwork & Leadership
8	Function effectively as a leader and member of multidisciplinary and multicultural teams, fostering collaboration, ethical conduct, and efficient communication in dynamic and often high-stress maritime environments.				✓	Project Management & Entrepreneurship
9	Communicate effectively in both written and oral forms with clarity, professionalism, and technical precision in English and other relevant languages within maritime and industrial contexts.			✓		Ethics & Professionalism
10	Adhere to the ethical and professional standards of the engineering and maritime professions, demonstrating accountability, integrity, and a commitment to continuous professional development and lifelong learning.				✓	Lifelong Learning & Adaptability
11	Evaluate and implement sustainable engineering practices and emerging green technologies to minimize the environmental footprint of marine and industrial operations.			✓		Communication Competence
12	Exhibit the flexibility and interdisciplinary mindset required to transfer marine engineering knowledge and skills to diverse sectors, contributing effectively to innovation and technological advancement beyond the maritime industry.			✓		Global Vision & Societal Impact

***0:** No Contribution **1:** Little Contribution **2:** Partial Contribution **3:** Full Contribution

Program Outcomes /Course Learning Outcomes Matrix **Level of Contribution**:**0**-No Contribution **1**-Little Contribution **2**-Partial Contribution **3**-Full Contribution						
PO	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**	**CLO6**
PO1	3	3	3	3	3	1
PO2	1	3	3	3	3	1
PO3	1	1	2	3	3	1
PO4	1	1	3	3	3	1
PO5	1	1	3	3	3	3
PO6	1	1	3	3	3	3
PO7	0	0	1	1	1	3
PO8	0	0	1	1	1	3
PO9	0	0	1	1	1	3
PO10	1	1	3	3	3	3
PO11	1	2	1	1	1	3
PO12	1	2	1	1	1	3

Course Learning Outcomes/ Evaluation Method		
CLO	**Teaching Method**	**Assessment Method**
CLO1	Lectures, guided discussions, concept-based teaching	Quizzes, midterm exam, short written explanations
CLO2	Problem-solving sessions, worked examples, practice exercises	Homework assignments, quizzes, midterm exam
CLO3	Analytical demonstrations, step-by-step solution workshops	Midterm exam, final exam, problem-based assessments
CLO4	Laplace Transform and series-solutions workshops, computational demonstrations	Homework, quizzes, midterm & final exams
CLO5	Applied modeling sessions, real-world case studies, engineering applications	Project/report, homework assignments, final exam
CLO6	MATLAB/Maple labs, computational simulations, group activities	Lab reports, project presentation, oral/written assessment

ECTS / Workload Table			
Activities	**Number**	**Duration (Hours)**	**Total Workload**
Preparation for lectures	**15**	**2**	**30**
Lectures	**15**	**3**	**45**
Midterm Exam	**1**	**3**	**3**
Preparation for Midterm Exam	**1**	**10**	**10**
Final Exam	**1**	**3**	**3**
Preparation for Final Exam	**1**	**10**	**10**
Presentation(s)	-	-	-
Preparation for Presentation(s)	-	-	-
Case Studies / Critical Thinking	-	-	-
Project Writing	**2**	**10**	**20**
Group Work	-	-	-
In-class Discussion(s)	-	-	-
Quiz(es)	-	-	-
Preparation for Quiz(es)	-	-	-
Laboratory / Practical Applications	-	-	-
Assignment(s)/Homework/Class Works	**4**	**10**	**40**
Micro-Teaching Sessions	-	-	-
Lesson Planning	-	-	-
Materials Adaptation	-	-	-
Material Development	-	-	-
Draft Preparation	-	-	-
Drawing	-	-	-
Essay Writing	-	-	-
Tutorial(s)	-	-	-
Portfolio Preparation	-	-	-
Portfolio Presentation	-	-	-
Total Workload			**161**
ECTS Credit			**6**

Evaluation System		
Semester Requirements	**Number**	**Percentage of Grade**
Attendance/Participation	-	-
Laboratory	-	-
Application	-	-
Field Work	-	-
Special Course Internship (Work Placement)	-	-
Homework/Assignments	4	20
Providing reliability and motivation of the individual homework completion and Submission	-	-
Presentation/Jury	-	-
Project	2	10
Quiz	-	-
Midterms/Oral Exams	1	30
Final/Oral Exams	1	40
Total	**10**	**100**

	Percentage	**Course Grade**	**Coefficient**
Grading Policy	90-100	AA	4.0
	85-89	BA	3.5
	80-84	BB	3.0
	75-79	CB	2.5
	70-74	CC	2.0
	60-69	DC	1.5
	50-59	DD	1.0
	49 and below	FF	0.0
	Less than 70% attendance	NA	-
Course Requirements and Policies	• Alerted attendance at the lectures is essential! • Students are expected to check frequently the instructor's web page for the course announcements. • University of Kyrenia honor code will be strictly enforced regarding any issues concerning cheating.		

University of Kyrenia

Faculty of Maritime Studies

Marine Engineering

Syllabus

Course name: Numerical Analysis for Engineers							
Code	**Year**	**Semester**	**Credit**	**ECTS**	**Course application, Hour/Week**		
					Theoretical	**Application**	**Laboratory**
MTH301	II	Spring	3	5	3	0	0
Course type: Compulsory				**Prerequisite: x**		**Language:** English	
% Contribution to the Professional Fundamental Component				**Basic Sciences**	**Engineering Science**	**Engineering Design**	**General Education**
				20	20	20	40
Course Venue and Time				Wednesday 09.30-12.20			
Instructor information				**Chf. Eng. Volkan Varışlı** Faculty of Maritime Studies Wednesday / 09:00 - 12:00 +90 (392) 650 26 00 / 4095 volkan.varisli@kyrenia.edu.tr www.kyrenia.edu.tr			

Course Description	The course **Numerical Analysis for Engineers** provides students with a comprehensive understanding of numerical methods and their application in solving engineering problems. The course begins with methods for solving nonlinear equations, including bracketing methods such as the **Bisection** and **False Position** methods, as well as open methods like **Fixed-Point Iteration**, **Newton-Raphson**, and **Secant** methods. Emphasis is placed on convergence criteria, error analysis, and practical implementation for engineering applications. The course then addresses methods for solving linear systems, focusing on both direct and iterative techniques, including **Jacobi** and **Gauss-Seidel** methods. Students learn to assess the efficiency and stability of these methods when applied to engineering problems. In the latter part of the course, students explore **interpolation and polynomial approximation** techniques, including **Maclaurin and Taylor series expansions**, and **curve fitting** methods to model experimental or discrete data. The course also covers **numerical differentiation and integration**, providing tools to approximate derivatives and integrals when analytical solutions are difficult or impossible. Through a combination of theoretical discussions, practical examples, and computational exercises, students develop the ability to implement numerical methods effectively in engineering contexts, preparing them for advanced analysis and simulation tasks in their respective fields.
Course Aims and Objectives	The aim of this course is to equip engineering students with the knowledge and practical skills required to solve mathematical problems numerically when analytical solutions are difficult or impossible. Students will gain a solid understanding of the fundamental principles of numerical methods and their application in engineering analysis, problem-solving, and modeling. The course emphasizes both the theoretical foundations and computational implementation of numerical techniques to ensure students can apply these methods to real-world engineering scenarios. • Understand the principles of numerical methods and the role of approximations in engineering problem-solving. • Apply various techniques to solve nonlinear equations, including bisection, false position, fixed-point iteration, Newton-Raphson, and secant methods. • Solve systems of linear equations using both direct and iterative methods, including Jacobi and Gauss-Seidel techniques. • Implement interpolation and polynomial approximation methods for data fitting and function estimation. • Use numerical differentiation and integration to approximate derivatives and integrals of engineering functions.

	• Analyze the convergence, stability, and error propagation of numerical methods. • Apply numerical analysis techniques using computational tools to solve practical engineering problems effectively.
Course Learning Outcomes	**CLO1** Identify, formulate, and classify engineering problems that require numerical solutions, recognizing when analytical methods are insufficient. **CLO2** Apply numerical techniques—including root-finding algorithms (Bisection, False Position, Fixed-Point, Newton–Raphson, Secant) and methods for solving linear systems (direct and iterative approaches such as Jacobi and Gauss-Seidel)—to obtain approximate solutions. **CLO3** Construct interpolation functions, perform polynomial approximations, and apply numerical differentiation and integration techniques to analyze engineering data and solve applied problems. **CLO4** Evaluate the accuracy, convergence, stability, and error behavior of numerical methods, comparing alternative approaches for suitability in engineering contexts. **CLO5** Use computational tools and programming/simulation software to implement numerical solutions, verify results, and solve practical engineering problems. **CLO6** Interpret numerical outputs, assess their physical and engineering relevance, and communicate findings to support informed technical decision-making.

Content of the Course

Week	*Subject*
1	Methods for Solving Nonlinear Problems Preliminary Discussion
2	Bisection Method, False Position Method
3	One-Point Iterative Method, Fixed-Point Method
4	Newton-Raphson Method, Secant Method
5	Methods for Solving Linear Problems
6	Midterm Exam
7	Iterative Method, Jacobi Method, Gauss-Seidel
8	Interpolation and Polynomial Approximation Maclaurin and Taylor Series
9	Curve Fitting
10	Curve Fitting
11	Numerical Differentiation
12	Numerical Differentiation
13	Numerical Integration
14	Numerical Integration
15	Final Exam

Methods and Techniques Used in the Course

Lectures and Conceptual Discussions

- Explanation of numerical methods principles and derivations.
- Discussion of applicability and limitations of each method.

Problem-Solving Sessions

- Step-by-step practice of solving nonlinear and linear equations.
- Hands-on exercises on interpolation, differentiation, and integration.

Computational Exercises

- Use of software tools (e.g., MATLAB, Python, or other engineering computational tools) to implement numerical algorithms.
- Programming iterative methods for linear systems and root-finding problems.

Case Studies and Engineering Applications

- Application of numerical methods to real-world engineering problems.
- Analysis of results and interpretation of numerical solutions.

Quizzes and Interactive Discussions

- In-class assessments to reinforce concepts and techniques.
- Peer discussions to compare solution strategies and error analysis.

Midterm and Final Exams

- Integration of theoretical knowledge and practical application of numerical methods.

Sample Questions

1. **Nonlinear Equations**
   - Solve the equation $f(x) = x^3 - 2x - 5 = 0$ using the Bisection Method. Perform two iterations and show all steps.
   - Apply the Newton-Raphson Method to find a root of $f(x) = \cos(x) - x$. Start with $x_0 = 0.5$ and perform three iterations.
2. **Linear Systems**
   - Solve the following system using the Jacobi Iterative Method up to two iterations:

$$\begin{cases} 4x + y - z = 7 \\ 2x - 3y + z = -4 \\ -x + 2y + 5z = 9 \end{cases}$$

   - Compare the solution obtained using Gauss-Seidel Method with the Jacobi Method for the same system.
3. **Interpolation and Polynomial Approximation**
   - Use Lagrange interpolation to find the value of a function at $x = 2.5$ given the points: $(1, 1), (2, 4), (3, 9)$.
   - Construct a second-degree polynomial approximation using Newton's Divided Difference method for the data: $(0, 1), (1, e), (2, e^2)$.
4. **Curve Fitting and Regression**
   - Fit a straight line $y = ax + b$ to the following data using the least-squares method:

x	1	2	3	4
y	2	4.1	6.05	8.2

5. **Numerical Differentiation and Integration**
   - Compute the derivative of $f(x) = \ln(x)$ at $x = 2$ using the central difference formula with $h = 0.1$.
   - Approximate the integral $\int_0^1 e^{-x^2} dx$ using the Trapezoidal Rule with $n = 4$.
6. **Series and Approximation**
   - Use the first three terms of the Maclaurin series to approximate $\sin(0.5)$.
   - Apply the Taylor series expansion of $f(x) = e^x$ about $x_0 = 0$ to estimate $f(0.2)$ using two terms.

All the above listed books are available at UoK's Grand Library

Program Outcomes Matrix

	Program Outcomes	*Level of Contribution				Targeted Competence Areas
		0	1	2	3	
1	Demonstrate comprehensive knowledge of marine engineering principles, systems, and machinery operations, and effectively apply this knowledge to ensure safe, efficient, and sustainable vessel performance in compliance with IMO and STCW standards.				✓	Technical Knowledge & Applied Sciences
2	Apply advanced engineering design principles to develop, adapt, and optimize mechanical, electrical, and control systems onboard ships and in shore-based industrial contexts, integrating safety, cost-efficiency, and environmental considerations.				✓	Analytical & Computational Skills
3	Perform engineering watchkeeping duties and operational management with professional responsibility, situational awareness, and adherence to international maritime conventions and best practices.				✓	Sustainable Design & Safe Operating
4	Identify, formulate, and analyze complex engineering problems using appropriate theoretical, computational, and experimental techniques to derive sound, data-driven solutions in marine and related engineering domains.			✓		Research & Experimentation
5	Integrate principles of safety culture, risk assessment, and environmental protection into all engineering practices, promoting sustainable operations aligned with IMO conventions such as MARPOL and SOLAS.			✓		Innovation & Digital Competence
6	Employ advanced digital tools, diagnostic systems, and automation technologies for monitoring, control, and performance assessment of marine and industrial systems, in line with the requirements of the evolving maritime digitalization era.				✓	Regulatory Frameworks & Safety
7	Demonstrate competence in planning, executing, and managing engineering projects, including resource allocation, budgeting, and maintenance planning, while ensuring quality, safety, and compliance with regulatory frameworks.				✓	Teamwork & Leadership
8	Function effectively as a leader and member of multidisciplinary and multicultural teams, fostering collaboration, ethical conduct, and efficient communication in dynamic and often high-stress maritime environments.				✓	Project Management & Entrepreneurship
9	Communicate effectively in both written and oral forms with clarity, professionalism, and technical precision in English and other relevant languages within maritime and industrial contexts.			✓		Ethics & Professionalism
10	Adhere to the ethical and professional standards of the engineering and maritime professions, demonstrating accountability, integrity, and a commitment to continuous professional development and lifelong learning.				✓	Lifelong Learning & Adaptability
11	Evaluate and implement sustainable engineering practices and emerging green technologies to minimize the environmental footprint of marine and industrial operations.			✓		Communication Competence
12	Exhibit the flexibility and interdisciplinary mindset required to transfer marine engineering knowledge and skills to diverse sectors, contributing effectively to innovation and technological advancement beyond the maritime industry.			✓		Global Vision & Societal Impact

***0:** No Contribution **1:** Little Contribution **2:** Partial Contribution **3:** Full Contribution

Program Outcomes /Course Learning Outcomes Matrix **Level of Contribution**:**0**-No Contribution **1**-Little Contribution **2**-Partial Contribution **3**-Full Contribution						
PO	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**	**CLO6**
PO1	3	3	2	2	2	2
PO2	3	3	3	3	2	2
PO3	2	3	3	3	2	2
PO4	2	3	3	3	2	2
PO5	1	2	3	3	2	3
PO6	1	2	2	3	3	3
PO7	1	2	2	2	2	3
PO8	1	2	2	2	2	3
PO9	1	1	2	2	2	3
PO10	1	2	2	3	3	3
PO11	2	2	2	2	3	3
PO12	2	2	3	3	3	3

Course Learning Outcomes/ Evaluation Method		
CLO	**Teaching Method**	**Assessment Method**
CLO1	Lecture, Problem-Solving Sessions, Demonstrations	Midterm Exam, Quizzes, Homework
CLO2	Lecture, Guided Practice, Computational Exercises	Midterm Exam, Quizzes, Homework
CLO3	Lecture, Problem-Based Learning, In-class Applications	Midterm Exam, Quizzes, Homework
CLO4	Lecture, Laboratory/Software Applications, Numerical Simulations	Midterm Exam, Homework, Project
CLO5	Lecture, Case Studies, Error/Convergence Analysis Workshops	Midterm Exam, Homework, Project
CLO6	Lecture, Computer-Based Applications, Project-Oriented Learning	Final Exam, Project, Homework

ECTS / Workload Table			
Activities	**Number**	**Duration (Hours)**	**Total Workload**
Preparation for lectures	-	-	-
Lectures	**15**	**3**	**45**
Midterm Exam	**1**	**3**	**3**
Preparation for Midterm Exam	**1**	**10**	**10**
Final Exam	**1**	**3**	**3**
Preparation for Final Exam	**1**	**10**	**10**
Presentation(s)	-	-	-
Preparation for Presentation(s)	-	-	-
Case Studies / Critical Thinking	-	-	-
Project Writing	**2**	**10**	**20**
Group Work	-	-	-
In-class Discussion(s)	-	-	-
Quiz(es)	-	-	-
Preparation for Quiz(es)	-	-	-
Laboratory / Practical Applications	-	-	-
Assignment(s)/Homework/Class Works	**4**	**10**	**40**
Micro-Teaching Sessions	-	-	-
Lesson Planning	-	-	-
Materials Adaptation	-	-	-
Material Development	-	-	-
Draft Preparation	-	-	-
Drawing	-	-	-
Essay Writing	-	-	-
Tutorial(s)	-	-	-
Portfolio Preparation	-	-	-
Portfolio Presentation	-	-	-
Total Workload			**131**
ECTS Credit			**5**

Evaluation System		
Semester Requirements	**Number**	**Percentage of Grade**
Attendance/Participation	-	-
Laboratory	-	-
Application	-	-
Field Work	-	-
Special Course Internship (Work Placement)	-	-
Homework/Assignments	4	20
Providing reliability and motivation of the individual homework completion and Submission	-	-
Presentation/Jury	-	-
Project	2	10
Quiz	-	-
Midterms/Oral Exams	1	30
Final/Oral Exams	1	40
Total	**10**	**100**

	Percentage	**Course Grade**	**Coefficient**
Grading Policy	90-100	AA	4.0
	85-89	BA	3.5
	80-84	BB	3.0
	75-79	CB	2.5
	70-74	CC	2.0
	60-69	DC	1.5
	50-59	DD	1.0
	49 and below	FF	0.0
	Less than 70% attendance	NA	-
Course Requirements and Policies	• Alerted attendance at the lectures is essential! • Students are expected to check frequently the instructor's web page for the course announcements. • University of Kyrenia honor code will be strictly enforced regarding any issues concerning cheating.		

University of Kyrenia

Faculty of Maritime Studies

Marine Engineering

Syllabus

Course name: Maritime Safety IV							
Code	**Year**	**Semester**	**Credit**	**ECTS**	**Course application, Hour/Week**		
					Theoretical	**Application**	**Laboratory**
SAF202	II	Spring	3	3	2	2	0
Course type: Compulsory				**Prerequisite: x**		**Language:** English	
% Contribution to the Professional Fundamental Component				**Basic Sciences**	**Engineering Science**	**Engineering Design**	**General Education**
				30	-	-	70
Course Venue and Time				Wednesday 14.30-17.20			
Instructor information				**Cpt. Çağrı Deliceırmak** Faculty of Maritime Studies Wednesday / 09:00 – 12:00 +90 (392) 650 26 00 / 4060 cagri.deliceirmak@kyrenia.edu.tr www.kyrenia.edu.tr			

Course Description	Maritime Safety IV provides advanced training in shipboard safety, emergency response, and crisis management for both crew and passengers. The course focuses on protective measures on passenger ships during maritime emergencies, fast rescue boat (FRB) operations, passenger and cargo safety, vessel stability, and effective use of safety equipment. Additionally, this course provides comprehensive training in collision, grounding, and evacuation procedures. Students will gain practical and theoretical knowledge to respond efficiently to emergencies on passenger ships, manage passengers in critical situations, operate lifesaving appliances, and uphold international maritime safety standards. The course will be conducted in accordance with the IMO Model Courses 1.24, 1.28, and 1.29, as well as the national regulation "Egitim Sinav Yonergesi 2025" of the Turkish Republic. Successful students will obtain mandatory STCW certificates of (1); Proficiency in Fast Rescue Boats, (2); Crowd Management, Passenger Safety, and Safety Training for Personnel Providing Direct Services to Passengers In Passenger Spaces, (3); Proficiency in Crisis Management and Human Behaviour Training, Including Passenger Safety, Cargo Safety, and Hull Integrity Training. The course emphasizes leadership, communication, and human behaviour management to ensure preparedness and safety in diverse maritime scenarios.
Course Aims and Objectives	The course aims to equip students with the advanced knowledge and practical skills necessary to ensure the safety of passengers, crew, and vessels in emergencies. It focuses on enhancing maritime safety awareness, improving emergency response capabilities, and fostering effective management of life-saving operations and safety equipment on board. • Comprehend and execute protocols for safeguarding passengers and crew members during maritime emergencies. • Acquire proficiency in the operation, launching, recovery, and management of fast rescue boats (FRBs) across diverse sea and weather conditions. • Oversee passenger evacuation procedures, manage crowd control, and ensure safety in accordance with international regulations. • Develop skills for effective communication, leadership, and human behavior management during crises.

	• Ensure proper handling and securing of cargo, maintenance of vessel stability, and management of hazardous materials. • Comprehend and implement protocols during emergencies, including collisions, groundings, beaching, and emergency evacuations. • Conduct safety drills, risk assessments, and inspections to uphold shipboard safety and readiness.
Course Learning Outcomes	**LO1**: Demonstrate knowledge of maritime emergency response procedures for the protection of passengers and crew. **LO2**: Ensure the safe operation, launching, and recovery of Fast Rescue Boats (FRBs) across diverse sea and weather conditions. **LO3**: Implement crowd management, evacuation protocols, and passenger safety procedures, including aiding individuals with special needs. **LO4**: Utilize effective situational awareness, communication, and leadership skills to manage human behavior during onboard emergencies. **LO5**: Implement safe cargo handling, securing, stowage, and transfer techniques to maintain the stability of a passenger ship. **LO6**: Identify and mitigate risks associated with hazardous materials, dangerous goods, and other safety threats on passenger ships.

Content of the Course

Week	*Subject*
1	**Passenger Ship Safety – Crowd Management** Terminology and related maritime English terms Muster stations, assembly lists, and emergency instructions Role allocation and muster procedures Control in corridors, stairways, and escape routes Evacuation of disabled or special-needs passengers
2	**Passenger Ship Safety – Crowd Management** Terminology and related maritime English terms Instructions and management of passengers Panic prevention strategies Organizing evacuation, checks, and counting of evacuated people Safety checks on life jackets and passenger readiness
3	**Passenger Safety Training – Direct Service Personnel** Terminology and related maritime English terms Effective communication with passengers, the importance of English, and a common language Multilingual and non-verbal communication during emergencies Importance of multilingual emergency instructions Instructing and training passengers on the use of personal life-saving appliances Embarkation and disembarkation of disabled or special-needs passengers
4	**Crisis Management and Human Behaviour** Terminology and related maritime English terms Ship design, safety rules, and emergency plans Emergency organization, resource management, and leadership Behavioural responses in emergencies Controlling and managing stress and panic in emergencies Common passenger behaviour and responses in emergencies
5	**Passenger and Cargo Safety, Vessel Integrity** Terminology and related maritime English terms Loading, unloading, lifting, shifting, and securing cargo Handling of hazardous materials on Ro-Ro vessels Applying proper lashing methods to the vehicles Use of lashing equipment and compliance with safety regulations
6	**Passenger and Cargo Safety, Vessel Integrity** Terminology and related maritime English terms Stability, trim, and stress calculations on passenger and RORO ships Effects of ballast and fuel transfers Opening, closing, and securing vessel hatches, ramps, and doors Ventilation and monitoring the atmosphere in RORO vehicle decks Safe operations on RORO vessels during loading, unloading, and emergencies
7	**Fast Rescue Boats (FRBs)** Terminology and related maritime English terms

	Construction and types of FRBs Specifications and accessories of the FRBs Launching Appliances for the FRBs
8	**Fast Rescue Boats (FRBs)** Terminology and related maritime English terms Preparation and launching of the FRBs Safety measures and precautions during the launching and recovery of the FRBs Launching and operating the FRB in heavy seas
9	**Fast Rescue Boats (FRBs)** Terminology and related maritime English terms Navigational and operational characteristics of the FRBs Up-righting of a capsized FRB, self-righting FRBs Navigation and operation of the FRB in heavy seas
10	**Fast Rescue Boats (FRBs)** Terminology and related maritime English terms Equipment and accessories of the FRB Engine of the FRBs, starting and operating methods Search and rescue methods with the FRBs, and natural limitations
11	**Collision, Grounding, and Emergency Evacuation** Terminology and related maritime English terms Definitions and differences between grounding, stranding, and beaching Preparations for beaching Measures to be taken after grounding, stranding, and beaching
12	**Collision, Grounding, and Emergency Evacuation** Terminology and related maritime English terms Collision and collision management Measures to be taken after a collision Measures to be taken after a fire or explosion
13	**Collision, Grounding, and Emergency Evacuation** Terminology and related maritime English terms Damage control and ship rescue operations Steering failures and emergency steering Towing operations
14	**Collision, Grounding, and Emergency Evacuation** Terminology and related maritime English terms Emergency evacuation, abandoning ship Evacuation methods and techniques
15	**Course Review and Practical Exercises** FRB drills and emergency scenarios Passenger evacuation simulations Integration of shipboard safety, cargo security, and crisis management

Methods and Techniques used in the Course

Lectures and Presentations: Delivery of theoretical knowledge on maritime safety regulations, emergency response, and passenger/cargo safety.

Case Studies and Scenario Analysis: Examination of real-life maritime incidents to develop problem-solving and decision-making skills.

Practical Training and Simulations: Hands-on practice with Fast Rescue Boats (FRBs), lifesaving appliances, and safety equipment under controlled conditions.

Drills and Exercises: Organization of crowd management, evacuation, and firefighting drills to reinforce emergency preparedness.

Group Discussions and Role-Playing: Collaborative activities to enhance communication, leadership, and crisis management abilities.

Workshops and Demonstrations: Guided practice on cargo securing, ship stability calculations, and use of emergency equipment.

Multimedia Tools: Use of videos, simulation software, and visual aids to illustrate complex safety operations.

Assessment and Feedback Sessions: Continuous evaluation through quizzes, practical performance tests, and instructor feedback.

Sample Questions

- Explain the main responsibilities of crew members during a passenger ship emergency evacuation.
- What are the critical differences between crowd management and crisis management on board passenger ships?
- List the essential steps to be followed when operating a Fast Rescue Boat (FRB) in heavy weather conditions.
- A Ro-Ro passenger ship is preparing to load dangerous cargo. What kind of safety measures and precautions must be implemented before, during, and after loading a dangerous cargo onto a RORO vessel?
- What is the correct method of launching and recovering a Fast Rescue Boat using appropriate equipment?
- Name and explain the function of at least five of the safety and emergency equipment used on passenger ships.

Materials Used in the Course

Textbooks and Reference Books

- Lecturer Notes, Related IMO Model Courses and STCW (Standards of Training, Certification, and Watchkeeping) manuals.
- SOLAS Consolidated Edition, LSA Code, FSS Code, The Fire Fighting System Guidance, Fire Prevention and Fire Fighting, Master Guide for Fire and Safety on Ferries, Safety of RORO Passenger and Cruise Ships, Guidelines for Contingency Plans on Passenger Ships, Emergency Procedures and Check Lists at Sea
- Related IMO Model Courses and STCW (Standards of Training, Certification, and Watchkeeping) manuals.
- Maritime Safety textbooks covering Passenger Ship Safety, Safety on RORO vessels, Fast Rescue Boats and Emergency Procedures, including SOLAS, STCW, ISPS Code, LSA Code, and FSS Code
    - SOLAS Consolidated Edition
    - LSA Code
    - FSS Code
    - The Fire Fighting System Guidance
    - Fire Prevention and Fire Fighting
    - Master Guide for Fire and Safety on Ferries
    - Safety of RORO Passenger and Cruise Ships
    - Guidelines for Contingency Plans on Passenger Ships
    - Emergency Procedures and Check Lists at Sea

Supplementary Resources

- Instructional videos
- Interactive simulations
- Real-life accident investigation reports for analysis and discussion
- Safety posters, diagrams, and procedural flowcharts
- Fast Rescue Boat (FRB) and associated launching/recovery equipment
- Personal Life-Saving Appliances (lifejackets, immersion suits, lifebuoys, etc.)
- Firefighting equipment (extinguishers, breathing apparatus, hoses, fixed systems)
- Passenger evacuation plans, crowd management drill scenarios, and muster lists
- Communication tools (radios, public address systems, emergency alarms)

All the above listed books are available at UoK's Grand Library

Program Outcomes Matrix

	Program Outcomes	*Level of Contribution				Targeted Competence Areas
		0	1	2	3	
1	Demonstrate comprehensive knowledge of marine engineering principles, systems, and machinery operations, and effectively apply this knowledge to ensure safe, efficient, and sustainable vessel performance in compliance with IMO and STCW standards.				✓	Technical Knowledge & Applied Sciences
2	Apply advanced engineering design principles to develop, adapt, and optimize mechanical, electrical, and control systems onboard ships and in shore-based industrial contexts, integrating safety, cost-efficiency, and environmental considerations.				✓	Analytical & Computational Skills
3	Perform engineering watchkeeping duties and operational management with professional responsibility, situational awareness, and adherence to international maritime conventions and best practices.				✓	Sustainable Design & Safe Operating
4	Identify, formulate, and analyze complex engineering problems using appropriate theoretical, computational, and experimental techniques to derive sound, data-driven solutions in marine and related engineering domains.			✓		Research & Experimentation
5	Integrate principles of safety culture, risk assessment, and environmental protection into all engineering practices, promoting sustainable operations aligned with IMO conventions such as MARPOL and SOLAS.			✓		Innovation & Digital Competence
6	Employ advanced digital tools, diagnostic systems, and automation technologies for monitoring, control, and performance assessment of marine and industrial systems, in line with the requirements of the evolving maritime digitalization era.				✓	Regulatory Frameworks & Safety
7	Demonstrate competence in planning, executing, and managing engineering projects, including resource allocation, budgeting, and maintenance planning, while ensuring quality, safety, and compliance with regulatory frameworks.				✓	Teamwork & Leadership
8	Function effectively as a leader and member of multidisciplinary and multicultural teams, fostering collaboration, ethical conduct, and efficient communication in dynamic and often high-stress maritime environments.				✓	Project Management & Entrepreneurship
9	Communicate effectively in both written and oral forms with clarity, professionalism, and technical precision in English and other relevant languages within maritime and industrial contexts.			✓		Ethics & Professionalism
10	Adhere to the ethical and professional standards of the engineering and maritime professions, demonstrating accountability, integrity, and a commitment to continuous professional development and lifelong learning.				✓	Lifelong Learning & Adaptability
11	Evaluate and implement sustainable engineering practices and emerging green technologies to minimize the environmental footprint of marine and industrial operations.			✓		Communication Competence
12	Exhibit the flexibility and interdisciplinary mindset required to transfer marine engineering knowledge and skills to diverse sectors, contributing effectively to innovation and technological advancement beyond the maritime industry.			✓		Global Vision & Societal Impact

***0:** No Contribution **1:** Little Contribution **2:** Partial Contribution **3:** Full Contribution

Program Outcomes /Course Learning Outcomes Matrix **Level of Contribution**:**0**-No Contribution **1**-Little Contribution **2**-Partial Contribution **3**-Full Contribution										
PO	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**	**CLO6**	**CLO7**	**CLO8**	**CLO9**	**CLO10**
PO1	3	3	3	3	3	3	3	3	x	x
PO2	3	3	3	3	3	3	3	3	x	x
PO3	3	3	3	3	3	3	3	3	x	x
PO4	2	2	2	2	2	2	2	2	x	x
PO5	3	3	3	3	3	3	3	3	x	x
PO6	3	3	3	3	3	3	3	3	x	x
PO7	3	3	3	3	3	3	3	3	x	x
PO8	2	2	2	2	2	2	2	2	x	x
PO9	2	2	2	1	1	1	1	1	x	x
PO10	3	3	3	3	3	3	3	3	x	x
PO11	3	3	3	3	3	3	3	3	x	x
PO12	3	3	3	3	3	3	3	3	x	x

Course Learning Outcomes/ Evaluation Method		
CLO	**Teaching Method**	**Assessment Method**
LO1	Lectures, Practical Applications, Case Studies, and Discussions	Midterm Exam, Practical Exam, Final Exam, Assignment
LO2	Lectures, Practical Applications, Case Studies, and Discussions	Midterm Exam, Practical Exam, Final Exam, Assignment
LO3	Lectures, Practical Applications, Case Studies, and Discussions	Midterm Exam, Practical Exam, Final Exam, Assignment
LO4	Lectures, Practical Applications, Case Studies, and Discussions	Midterm Exam, Practical Exam, Final Exam, Assignment
LO5	Lectures, Practical Applications, Case Studies, and Discussions	Midterm Exam, Practical Exam, Final Exam, Assignment
LO6	Lectures, Practical Applications, Case Studies, and Discussions	Midterm Exam, Practical Exam, Final Exam, Assignment
LO7	Lectures, Practical Applications, Case Studies, and Discussions	Midterm Exam, Practical Exam, Final Exam, Assignment
LO8	Lectures, Practical Applications, Case Studies, and Discussions	Midterm Exam, Practical Exam, Final Exam, Assignment

ECTS / Workload Table			
Activities	**Number**	**Duration (Hours)**	**Total Workload**
Preparation for lectures	**15**	**1**	**15**
Lectures	**15**	**3**	**45**
Midterm Exam	**1**	**1**	**1**
Preparation for Midterm Exam	**1**	**5**	**5**
Final Exam	**1**	**1**	**1**
Preparation for Final Exam	**1**	**5**	**5**
Presentation(s)	-	-	-
Preparation for Presentation(s)	-	-	-
Research for Project(s)/Essay(s)	-	-	-
Project Writing	-	-	-
Group Work	-	-	-
In-class Discussion(s)	**15**	**1**	**15**
Quiz(es)	-	-	-
Preparation for Quiz(es)	-	-	-
Laboratory	-	-	-
Assignment(s)/Homework/Class Works	**1**	**5**	**5**
Micro-Teaching Sessions	-	-	-
Lesson Planning	-	-	-
Materials Adaptation	-	-	-
Material Development	-	-	-
Draft Preparation	-	-	-
Drawing	-	-	-
Essay Writing	-	-	-
Tutorial(s)	-	-	-
Portfolio Preparation	-	-	-
Portfolio Presentation	-	-	-
Total Workload			**92**
ECTS Credit			**3**

Evaluation System		
Semester Requirements	**Number**	**Percentage of Grade**
Attendance/Participation	1	10
Laboratory	-	-
Application	1	25
Field Work (Class Work)	-	-
Special Course Internship (Work Placement)	-	-
Assignment(s)/Homework/Class Works	1	10
Providing reliability and motivation for the individual homework completion and Submission	-	-
Presentation/Jury	-	-
Project	-	-
Quiz	-	-
Midterms/Oral Exams	1	20
Final/Oral Exams	1	35
Total	**5**	**100**

	Percentage	**Course Grade**	**Coefficient**
Grading Policy	90-100	AA	4.0
	85-89	BA	3.5
	80-84	BB	3.0
	75-79	CB	2.5
	70-74	CC	2.0
	60-69	DC	1.5
	50-59	DD	1.0
	49 and below	FF	0.0
	Less than 70% attendance	NA	-
Course Requirements and Policies	• Alerted attendance at the lectures is essential! • Students are expected to check the instructor's web page frequently for the course announcements. • The University of Kyrenia honor code will be strictly enforced regarding any issues concerning cheating.		

University of Kyrenia

Faculty of Maritime Studies

Marine Engineering

Syllabus

Course name: Turkish II: Verbal Expression							
Code	**Year**	**Semester**	**Credit**	**ECTS**	**Course application, Hour/Week**		
					Theoretical	**Application**	**Laboratory**
TUR102	II	Spring	2	2	2	0	0
Course type: Compulsory Elective				**Prerequisite: x**		**Language:** English	
% Contribution to the Professional Fundamental Component				**Basic Sciences**	**Engineering Science**	**Engineering Design**	**General Education**
				-	-	-	100
Course Venue and Time				Friday / 13:30 – 15:20			
Instructor information				**Aydoğan Erkan** Faculty of Maritime Studies Friday / 09:00 – 12:00 +90 (392) 650 26 00 / 4060 aydogan.erkan@kyrenia.edu.tr www.kyrenia.edu.tr			

Course Description	*Turkish II: Verbal Expression* is designed to provide students with a comprehensive understanding of the fundamental aspects of written Turkish. The course focuses on the phonetic features of the language, word stress, word types, phrase and sentence structures, and the use of suffixes. Additionally, students will learn the purposes and rules of punctuation marks, as well as the spelling conventions of Turkish. Through practical examples and exercises, the course aims to develop students' ability to construct grammatically correct sentences and coherent texts, enhancing both their writing accuracy and clarity. This foundation prepares students for effective written communication in academic and everyday contexts.
Course Aims and Objectives	To develop students' understanding of the fundamental grammatical structure of the Turkish language. To enhance students' ability to write correctly using proper spelling, punctuation, and sentence structures. To provide students with a comprehensive understanding of Turkish phonetics, word formation, and morphological rules. To improve students' written communication skills in various contexts, emphasizing clarity and accuracy. • Recognize and apply the phonetic features of Turkish in written form. • Correctly use word stress patterns to convey meaning in writing. • Identify and appropriately use different word types (nouns, verbs, adjectives, adverbs, conjunctions, etc.) in sentences. • Construct phrases and sentences following the rules of Turkish syntax. • Apply suffixes correctly in nouns, verbs, and derivational forms. • Utilize punctuation marks effectively to structure written texts clearly. • Apply Turkish spelling rules consistently in written communication. • Analyze and correct common grammatical and orthographic errors in writing. • Compose coherent paragraphs that reflect proper grammar, vocabulary, and sentence structure.
Course Learning Outcomes	**CLO1 – Phonetics** Demonstrate understanding of Turkish phonetic features and apply them correctly in writing. **CLO2 – Word Stress** Identify and apply proper word stress patterns in written texts. **CLO3 – Word Types** Distinguish between different word types and use them accurately in sentences.

	CLO4 – Syntax Construct grammatically correct phrases and sentences following Turkish syntax rules. **CLO5 – Morphology** Apply nouns, verbs, and derivational suffixes appropriately in written communication. **CLO6 – Punctuation** Use punctuation marks effectively to enhance clarity and coherence in writing. **CLO7 – Spelling** Apply Turkish spelling rules accurately in all written exercises. **CLO8 – Error Correction** Recognize and correct common grammatical and orthographic errors in written Turkish. **CLO9 – Paragraph Composition** Compose clear and coherent paragraphs that reflect proper grammar, vocabulary, and sentence structure. **CLO10 – Integrated Writing Skills** Integrate phonetics, morphology, syntax, spelling, punctuation, and vocabulary to produce well-structured written texts.

Content of the Course

Week	*Subject*
1	**Introduction & Course Orientation** • Overview of the course objectives • Importance of written expression in Turkish • Introduction to basic phonetic features
2	**Phonetics and Pronunciation** • Turkish vowel and consonant sounds • Word stress patterns in Turkish • Common pronunciation rules
3	**Word Types in Turkish I** • Nouns, pronouns, adjectives, verbs, adverbs • Examples of usage in sentences • Basic exercises
4	**Word Types in Turkish II** • Conjunctions, prepositions, interjections, numerals • Role of each word type in sentence structure
5	**Phrase Structures I** • Definition of phrases in Turkish • Noun phrases and verb phrases • Examples and exercises
6	**Phrase Structures II** • Adjective phrases, adverbial phrases • Combining phrases for meaning • Practice exercises
7	**Sentence Types I** • Simple sentences • Compound sentences • Examples and sentence formation
8	**Sentence Types II** • Complex sentences • Subordinate clauses • Practice with sentence combination
9	**Suffixes I** • Noun suffixes: plural, possessive, case suffixes • Usage and examples
10	**Suffixes II** • Verb suffixes: tense, aspect, mood, person markers • Derivational suffixes • Exercises for application
11	**Punctuation Marks I** • Period, comma, colon, semicolon, question and exclamation marks • Rules and correct usage in sentences
12	**Punctuation Marks II** • Quotation marks, parentheses, hyphen, ellipsis, dash • Practical exercises in writing

13	**Spelling Rules I** • Common spelling rules in Turkish • Vowel harmony and consonant changes • Exercises with examples
14	**Spelling Rules II & Review** • Advanced spelling rules and exceptions • Review of phonetics, word types, suffixes, sentence and phrase structures • Writing practice
15	**Final Assessment & Writing Practice** • Composing short texts using learned rules • Peer review and instructor feedback • Final written assessment

Methods and Techniques used in the Course

Lectures and Explanations – Presenting grammatical rules, word structures, suffixes, and spelling conventions in Turkish with examples in English.

Text Analysis – Analyzing sample sentences and paragraphs to illustrate correct usage of words, suffixes, and punctuation.

Writing Exercises – Guided practice in composing sentences, paragraphs, and short texts using the learned grammar and spelling rules.

Drills and Repetition – Exercises focusing on phonetics, word stress, and suffix application to reinforce learning.

Error Correction and Feedback – Reviewing student writing, identifying errors, and providing corrective feedback.

Group Work and Peer Review – Collaborative exercises where students check each other's writing for grammar, spelling, and clarity.

Use of Visual Aids – Charts, tables, and diagrams to illustrate sentence structures, suffix usage, and punctuation rules.

Quizzes and Mini-Assessments – Regular short assessments to evaluate understanding of grammar, word formation, and writing skills.

Homework Assignments – Written tasks to reinforce classroom learning and develop independent writing skills.

Practical Application – Exercises in writing letters, notes, or short essays to simulate real-life written communication.

Sample Questions

Phonetics and Word Stress

- Identify the stressed syllable in the following words: *kitap, öğrenci, mutluluk.*
- Explain the phonetic difference between the letters “c” and “ç” in Turkish with examples.

Word Types (Parts of Speech)

- Classify the underlined words in the sentence: “Ali hızlı koşuyor ve mutlu görünüyor.” (Noun, verb, adjective, etc.)
- Provide an example of a Turkish pronoun and use it in a sentence.

Suffixes

- Add the appropriate possessive suffix to the noun “ev” (house) to indicate “my house” and “our house.”
- Transform the verb “gitmek” (to go) into its past tense using the correct suffix.

Phrase and Sentence Structures

- Identify the subject and predicate in the sentence: “Öğrenciler derse erken geldi.”
- Rewrite the following sentence in negative form: “Ali kitabı okudu.”

Sentence Types

- Convert the following declarative sentence into an interrogative sentence: “Sen bugün okula gidiyorsun.”
- Provide an example of an imperative sentence in Turkish.

Punctuation and Spelling Rules

- Correct the punctuation in the following sentence: “Ali geldi ve Ayşe de geldi mi?”
- Identify the spelling mistake in the sentence: “Okulda öğrenciler çalışıyorlar.”

Writing Skills / Short Composition

- Write 3–5 sentences introducing yourself, mentioning your family and hobbies.
- Write a short paragraph describing your favorite day of the week and why you like it.

Practical Application

- Fill in the blanks with the correct suffixes: “Kitap___ masada duruyor.” (indicating possession)
- Rewrite the following informal text message in proper written Turkish, paying attention to spelling and punctuation.

Materials Used in the Course

Textbooks and Reference Books

- *Turkish Grammar for Foreigners* – A comprehensive guide to Turkish phonetics, grammar, and sentence structure.
- *Elementary Turkish: A Grammar and Workbook* – Provides examples and exercises for practice in word types, suffixes, and sentence formation.
- *Turkish: A Comprehensive Grammar* – Advanced reference for punctuation rules, spelling conventions, and written expression.

Workbooks and Exercises

- Course-specific exercise booklets focusing on phonetics, suffix usage, and sentence construction.
- Short composition and writing practice exercises designed for weekly assignments.

Digital Resources

- Online Turkish language platforms for interactive exercises in grammar, vocabulary, and punctuation.
- Audio recordings of native speakers for practicing pronunciation and stress patterns.

Supplementary Materials

- Handouts and notes provided by the instructor, covering key topics such as suffixes, sentence types, and punctuation rules.
- Visual aids for explaining phrase structures and word stress patterns.
- Sample texts for reading and writing practice, including letters, emails, and short essays.

Assessment Tools

- Quizzes, in-class exercises, and writing assignments to reinforce learning.
- Peer-review exercises for written compositions to encourage collaborative learning and feedback.

All the above listed books are available at UoK's Grand Library

Program Outcomes Matrix

	Program Outcomes	*Level of Contribution				Targeted Competence Areas
		0	1	2	3	
1	Demonstrate comprehensive knowledge of marine engineering principles, systems, and machinery operations, and effectively apply this knowledge to ensure safe, efficient, and sustainable vessel performance in compliance with IMO and STCW standards.				✓	Technical Knowledge & Applied Sciences
2	Apply advanced engineering design principles to develop, adapt, and optimize mechanical, electrical, and control systems onboard ships and in shore-based industrial contexts, integrating safety, cost-efficiency, and environmental considerations.				✓	Analytical & Computational Skills
3	Perform engineering watchkeeping duties and operational management with professional responsibility, situational awareness, and adherence to international maritime conventions and best practices.				✓	Sustainable Design & Safe Operating
4	Identify, formulate, and analyze complex engineering problems using appropriate theoretical, computational, and experimental techniques to derive sound, data-driven solutions in marine and related engineering domains.			✓		Research & Experimentation
5	Integrate principles of safety culture, risk assessment, and environmental protection into all engineering practices, promoting sustainable operations aligned with IMO conventions such as MARPOL and SOLAS.			✓		Innovation & Digital Competence
6	Employ advanced digital tools, diagnostic systems, and automation technologies for monitoring, control, and performance assessment of marine and industrial systems, in line with the requirements of the evolving maritime digitalization era.				✓	Regulatory Frameworks & Safety
7	Demonstrate competence in planning, executing, and managing engineering projects, including resource allocation, budgeting, and maintenance planning, while ensuring quality, safety, and compliance with regulatory frameworks.				✓	Teamwork & Leadership
8	Function effectively as a leader and member of multidisciplinary and multicultural teams, fostering collaboration, ethical conduct, and efficient communication in dynamic and often high-stress maritime environments.				✓	Project Management & Entrepreneurship
9	Communicate effectively in both written and oral forms with clarity, professionalism, and technical precision in English and other relevant languages within maritime and industrial contexts.			✓		Ethics & Professionalism
10	Adhere to the ethical and professional standards of the engineering and maritime professions, demonstrating accountability, integrity, and a commitment to continuous professional development and lifelong learning.				✓	Lifelong Learning & Adaptability
11	Evaluate and implement sustainable engineering practices and emerging green technologies to minimize the environmental footprint of marine and industrial operations.			✓		Communication Competence
12	Exhibit the flexibility and interdisciplinary mindset required to transfer marine engineering knowledge and skills to diverse sectors, contributing effectively to innovation and technological advancement beyond the maritime industry.			✓		Global Vision & Societal Impact

***0:** No Contribution **1:** Little Contribution **2:** Partial Contribution **3:** Full Contribution

Program Outcomes /Course Learning Outcomes Matrix **Level of Contribution**:**0**-No Contribution **1**-Little Contribution **2**-Partial Contribution **3**-Full Contribution										
PO	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**	**CLO6**	**CLO7**	**CLO8**	**CLO9**	**CLO10**
PO1	3	3	2	2	3	2	2	2	3	3
PO2	2	2	2	2	2	2	1	2	2	2
PO3	2	2	2	3	2	2	2	2	3	3
PO4	1	1	1	2	1	2	2	2	2	2
PO5	2	2	2	2	2	2	2	2	2	3
PO6	2	2	2	2	2	2	2	2	2	2
PO7	1	1	2	2	1	2	2	2	2	2
PO8	1	1	1	1	1	1	1	2	2	2
PO9	1	1	1	1	1	1	1	1	2	2
PO10	2	2	2	2	2	2	2	2	2	3
PO11	1	1	1	1	1	1	1	1	1	2
PO12	1	1	1	1	1	1	1	1	1	2

Course Learning Outcomes/ Evaluation Method		
CLO	**Teaching Method**	**Assessment Method**
CLO1	Lecture, Pronunciation Drills, Guided Writing Exercises	Quizzes, Written Exercises, Oral Assessments
CLO2	Lecture, Stress Pattern Exercises, Listening and Writing Practice	Quizzes, Written Exercises, Oral Presentations
CLO3	Lecture, Vocabulary and Grammar Exercises, Sentence Construction Activities	Assignments, Quizzes, Written Exams
CLO4	Lecture, Sentence Building Exercises, Syntax Workshops	Written Assignments, Exams, Peer Reviews
CLO5	Lecture, Morphology Exercises, Guided Writing	Homework, Quizzes, Written Exercises
CLO6	Lecture, Punctuation Practice, Editing Exercises	Quizzes, Writing Assignments, Peer Feedback
CLO7	Lecture, Spelling Drills, Dictation Exercises	Quizzes, Written Assignments, Exams
CLO8	Lecture, Error Identification and Correction Exercises	Assignments, Quizzes, Written Exercises
CLO9	Lecture, Paragraph Construction Workshops, Peer Review	Written Paragraph Assignments, Rubric-Based Assessment
CLO10	Lecture, Integrated Writing Practice, Project-Based Exercises	Writing Projects, Portfolios, Exams

ECTS / Workload Table			
Activities	**Number**	**Duration (Hours)**	**Total Workload**
Preparation for lectures	**15**	**1**	**15**
Lectures	**15**	**2**	**30**
Midterm Exam	**1**	**3**	**3**
Preparation for Midterm Exam	**1**	**20**	**20**
Final Exam	**1**	**3**	**3**
Preparation for Final Exam	**1**	**20**	**20**
Presentation(s)	-	-	-
Preparation for Presentation(s)	-	-	-
Research for Project(s)/Essay(s)	-	-	-
Project Writing	-	-	-
Group Work	-	-	-
In-class Discussion(s)	-	-	-
Quiz(es)	-	-	-
Preparation for Quiz(es)	-	-	-
Laboratory	-	-	-
Assignment(s)/Homework/Class Works	-	-	-
Micro-Teaching Sessions	-	-	-
Lesson Planning	-	-	-
Materials Adaptation	-	-	-
Material Development	-	-	-
Draft Preparation	-	-	-
Drawing	-	-	-
Essay Writing	-	-	-
Tutorial(s)	-	-	-
Portfolio Preparation	-	-	-
Portfolio Presentation	-	-	-
Total Workload			**91**
ECTS Credit			**2**

Evaluation System		
Semester Requirements	**Number**	**Percentage of Grade**
Attendance/Participation	-	-
Laboratory	-	-
Application	-	-
Field Work	-	-
Special Course Internship (Work Placement)	-	-
Homework/Assignments	-	-
Providing reliability and motivation of the individual homework completion and Submission	-	-
Presentation/Jury	-	-
Project	-	-
Quiz	-	-
Midterms/Oral Exams	1	40
Final/Oral Exams	1	60
Total	**2**	**100**

	Percentage	**Course Grade**	**Coefficient**
Grading Policy	90-100	AA	4.0
	85-89	BA	3.5
	80-84	BB	3.0
	75-79	CB	2.5
	70-74	CC	2.0
	60-69	DC	1.5
	50-59	DD	1.0
	49 and below	FF	0.0
	Less than 70% attendance	NA	-
Course Requirements and Policies	• Alerted attendance at the lectures is essential! • Students are expected to check frequently the instructor's web page for the course announcements. • University of Kyrenia honor code will be strictly enforced regarding any issues concerning cheating.		