

Faculty of Maritime Studies / MARINE ENGINEERING / THERMODYNAMICS AND HEAT TRANSFER

Course:	THERMODYNAMICS AND HEAT TRANSFER			
Course ID	Course status	Semester	ECTS credits	Lessons (Lessons+Exercises+Laboratory)
10241	Mandatory	2	6	3+2+0
Programs	MARINE ENGINEERING			
Prerequisites	No.			
Aims	Introduction with the basic concept and terms of thermodynamics, the specifics of thermal energy and its utilization for obtaining work			
Learning outcomes	After passing the exam, the student is expected to: 1. Understands and knows how to describe basic thermodynamic terms and quantities 2. Correctly interprets thermal energy as a term 3. Correctly interprets Thermodynamic System as a term 4. Understands the exchange of energy between parts of the system 5. Understands heat transfer mechanisms 6. Understands the essence of steam and real gases 7. Understands the concept of ideal gases 8. Able to describe thermodynamic processes 9. Able to describe and understand the transformation of heat into work and vice versa			
Lecturer / Teaching assistant	Prof. dr Igor Vušanović, Mr Draško Kovač			
Methodology	Auditory lectures, exercises, preparation of seminar papers, colloquium			
Plan and program of work				
Preparing week	Preparation and registration of the semester			
I week lectures	Basics of thermodynamics. State sizes. Thermodynamic system. Heat and work. Specific heat. Basics of molecular kinetic theory of gases.			
I week exercises				
II week lectures	Ideal gas. Equation of state.			
II week exercises				
III week lectures	Real gases and vapor. Phase diagram. Energy work and heat in real gases.			
III week exercises				
IV week lectures	First and Second law of thermodynamics. Display in p - v and T - s coordinate system. Stationary and non-stationary processes. Reversible and irreversible processes. Changes of state. A mixture of gases			
IV week exercises				
V week lectures	Right-handed and left-handed cycles. Carnot cycle, cycles of heat engines and gas turbines. Coefficient of thermodynamic efficiency.			
V week exercises				
VI week lectures	Colloquium I			
VI week exercises				
VII week lectures	Cycles with real gases. Rankin Clausius cycle.			
VII week exercises				
VIII week lectures	I Law of thermodynamics for an open system.			
VIII week exercises				
IX week lectures	Flow of gases. The speed of sound. Nozzles.			
IX week exercises				
X week lectures	Colloquium II			
X week exercises				
XI week lectures	Elements of Heat transfer. The main transport mechanisms: convection, conduction, ventilation.			
XI week exercises				
XII week lectures	Combined convection-conduction heat transfer. Heat exchangers.			
XII week exercises				

XIII week lectures	Humid air.					
XIII week exercises						
XIV week lectures						
XIV week exercises						
XV week lectures						
XV week exercises						
Student workload	In the semester Lessons and final exam: 8 hours x 16 = 128 hours Necessary preparations before the beginning of the semester (administration, registration, certification) 8 hours x 2 = 16 hours Total load for the course: 6 x 30 = 180 hours For exam preparation in the make-up exam period, including taking the make-up exam: 180 - (144 hours) = 36 hours Load structure: 128 hours (teaching) + 16 hours (preparation) + 36 hours (additional work)					
Per week			Per semester			
6 credits x 40/30=8 hours and 0 minuts 3 sat(a) theoretical classes 0 sat(a) practical classes 2 excercises 3 hour(s) i 0 minuts of independent work, including consultations			Classes and final exam: 8 hour(s) i 0 minuts x 16 =128 hour(s) i 0 minuts Necessary preparation before the beginning of the semester (administration, registration, certification): 8 hour(s) i 0 minuts x 2 =16 hour(s) i 0 minuts Total workload for the subject: 6 x 30=180 hour(s) Additional work for exam preparation in the preparing exam period, including taking the remedial exam from 0 to 30 hours (remaining time from the first two items to the total load for the item) 36 hour(s) i 0 minuts Workload structure: 128 hour(s) i 0 minuts (cources), 16 hour(s) i 0 minuts (preparation), 36 hour(s) i 0 minuts (additional work)			
Student obligations			Students are obliged to attend classes, do homework and take the final exam			
Consultations			Every weekday from 12 - 2PM			
Literature			LITERATURE: 1. N. Kažić, Thermodynamics - authorized lectures, Manual for Thermodynamics - Kotor, 2006. 2. D. Malić, Thermodynamics and thermotechnics, Scientific book, Belgrade, 1988. 3. Djordjević, Vasiljević, Bekavac, Collection of problems from thermodynamics, MF, Belgrade, 2000.			
Examination methods			FORMS OF KNOWLEDGE CHECK AND ASSESSMENT: 1. Colloquium I, from 0 to 25 points; 2. Colloquium II, from 0 to 25 points; 3. Final exam, from 0 to 50 points; A student has passed the exam if he/she collects at least 51 points during the semester.			
Special remarks						
Comment						
Grade:	F	E	D	C	B	A
Number of points	less than 50 points	greater than or equal to 50 points and less than 60 points	greater than or equal to 60 points and less than 70 points	greater than or equal to 70 points and less than 80 points	greater than or equal to 80 points and less than 90 points	greater than or equal to 90 points