Faculty of Mechanical Engineering / Mechanical Engineering, module Production engineering /

Prerequisites	There are no conditions for applying and listening the course
Aims	In this course, students are trained to understand thermodynamic processes
Lecturer / Teaching assistant	Igor Vušanović, Esad Tombarević
Metdod	2 class hours of lectures 2 school hours of calculus exercises 5 hours of independent work and consultation
Week 1, lectures	Measurements Units, thermodynamics methods, basic concepts, types of systems, non-equilibrium, quasi-static and non-quasi-static processes.
Week 1, exercises	
Week 2, lectures	Amount of mass. Properties of state and their explanation in the light of MKT gases. Volume and mass flow rate.
Week 2, exercises	
Week 3, lectures	Energy. Work. Absolute volume work. Heat. The first law of thermodynamics for a closed and stationary system.
Week 3, exercises	
Week 4, lectures	Ideal gas. Ideal gas equation of state. Enthalpy. Specific heat. Real gases.
Week 4, exercises	
Week 5, lectures	The first law of thermodynamics for an open system. Application examples.
Week 5, exercises	
Week 6, lectures	The concept of enthropy. The second law of thermodynamics. TER, MER. T-s diagram and heat. Examples of irreversibility with TER and MER.
Week 6, exercises	
Week 7, lectures	Characteristic changes of state. Polytropic processes. Quasi-static and non-quasi-static changes of state.
Week 7, exercises	
Week 8, lectures	Maximum work. Specific heat in polytropic changes. Maximal work in open system operation.
Week 8, exercises	
Week 9, lectures	Power cycle processes. Basic concept of extracting of work. Power Right and refrigerant-left hand cycles. Carnot 's ideal cycle.
Week 9, exercises	
Week 10, lectures	Power cycles with ideal gas. Otto, Diesel, the Joul cycle.
Week 10, exercises	
Week 11, lectures	Power cycles with steam processes. Rankin Clausius' cycle. Combined cycles. Cogeneration. Improvement measures.
Week 11, exercises	
Week 12, lectures	Refrigeration left steam processes cycles. Measures to improve the degree of cooling. Absorption cycles. Real steam cycles.
Week 12, exercises	
Week 13, lectures	Mixture of gases. Dalton's Law. Humid air.
Week 13, exercises	
Week 14, lectures	The basics of heat transfer. Conduction. Convection. Radiation.
Week 14, exercises	
Week 15, lectures	
Week 15, exercises	
Student obligations	2 theoretical colloquiums 2x20 = 40 Seminar sheets 4x2.5 = 10 Final Exam 50 100 A passing grade is obtained if a minimum of 50 points is collected.
Consultations	

Workload	6 credits x 40/30 = 8 hours Structure: 2 class hours of lectures 2 school hours of calculus exercises 5 hours of independent work and consultation
Literature	
Examination metdods	
Special remarks	
Comment	Teaching and final exam: 8 hours x 16 weeks = 128 hours Necessary preparations: 2 x 8 hours = 16 hours Total load for the item: 6 x 30 = 180 hours Extra work: 36 hours Load structure: 128 hours (teaching) +16 hours (preparation) +36 hours (additional work)
Learning outcomes	After the student passes this exam, they should be able to: 1. Understands and explain basic thermodynamic terms and values; 2. Properly interprets and understands heat as a form of energy and energy balance; 3. Properly interprets and understands the law of energy conservation for the thermodynamic system; 4. Properly understands and interprets the law (II Law of Thermodynamics); 5. Understands and interprets the difference between nonequilibrium and equilibrium processes; 6. Understands the essence of thermodynamic power cycles and the concept of thermodynamic efficiency; 7. Able to describe and understand the transformation of heat into work and vice versa; 8. Understands and describes the refrigeration thermodynamic cycles; 9. Understands the concept of ideal gases and the difference between real gases and mixtures; 10. Able to describe heat transfer mechanisms;