	UNIVERSITY OF EAST SARAJEVO Faculty of Technology Zvornik	
	Study program: Chemical Engineering and Technology	
	CYCLE I / YEAR II	

Course title	ENGINEERING THREMODYNAMICS
Department	Department for Process Engineering-Faculty of Technology Zvornik

Course code	**Course status**	**Semester**	**ECTS**
	Obligatory	III	6

Teacher	Mitar Perusic, PhD, full professor
Teaching assistant	Dusko Kostic, MSc, teaching assistant

Teaching workload/number of hours (weekly)			**Individual work (hours per semester)**			**Student's work coefficient, S_o**
Lectures	**Auditory exercises**	**Laboratory Exercises**	**Lectures**	**Auditory exercises**	**Laboratory Exercises**	**S_o**
3	2	0	45	30	0	1.4
3*15 + 2*15 + 0*15 = 75			3*15*1.40 +2*15*1.40 + 0*15*1.40 = 105			
Total course workload (hours per semester, teacher + student): 75+ 105 = 180						

Learning outcomes	After finishing the course, students will be able to: 1. find and use literature data related to energy and thermodynamics of the system; 2. recognize the thermodynamic system, demonstrate and utilize the knowledge of the thermodynamic properties of ideal and real gases and vapours; 3. mathematically analyse energy transfer across the boundaries of the thermodynamic system; 4. analyse thermodynamic cycles; 5. analyse, solve, and present task solutions and compare results; recognize the application and importance of thermodynamics in practice; recognize the difference between an ideal and a real thermodynamic process.
Prerequisites	None.
Teaching methods	Lectures, class exercises and individual work
Syllabus outline per week	1. Introduction to the course. Basic concepts of thermodynamics. The concept and forms of energy. Units and dimensions. 2. Ideal gas. Ideal gas equation-thermodynamic aspects. 3. Working medium energy. Internal energy and amount of heat. Thermal capacity. 4. The term thermodynamic system. The first principle of thermodynamics, definition and mathematical model. 5. The concept of enthalpy. Examples of enthalpy changes in the thermodynamic system in chemical reactions. State changes in the p-v coordinate system. 6. The second principle of thermodynamics. Entropy and mathematical model of the second principle of thermodynamics. Examples of the change in entropy of a thermodynamic system in chemical reactions. Mid-term test/Colloquium 1. 7. Reverse and irreversible processes. Circular processes. 8. Thermal T-s diagram and state changes. 9. Reversed Carnot cycle. 10. Joule return cycle. 11. Maximum operation. 12. Real gases and vapours. Deviations from the ideal gas equation of state. 13. Phase transformations and latent heat. Water and physicochemical properties of water. Water vapor as a working medium. 14. Diagrams p-v, T-s and h-s for water vapor. 15. The Carnot and the Clausius-Rankine cycles for water vapor. Analysis of engineering thermodynamics chapters (seminar paper presentation). Mid-term test/Colloquium 2.

Obligatory literature

Author/s	**Title, publisher**	**Year**	**Page**
D. Malic	Thermodynamic and Thermotechnic, GK, Beograd, 7th issue	1977	1-92

Additional reading

Author/s	**Title, publisher**	**Year**	**Page**

B. Pejovic, M. Perusic	Thermodynamic for engineers-solution manual, Faculty of Technology	2012	1-332
M. Novakovic, M. Djuric	Technical thermodynamic, Faculty of Technology, Novi Sad	1998	1-304
O. Singh	Applied Thermodynamics, New Age International Limited	2006	1-330
B. Djordjevic, V. Valent, S. Serbanovic	Solution manual, Thermodynamic and Thermotechnic, TMF, Belgrade	2004	1-223

	Type of student evaluation	Points	Percentage
Obligations, assessment methods and grading system	Pre-exam obligation		
	Attendance	6	6 %
	Mid-term test I	25	25 %
	Mid-term test II	25	25 %
	Seminar paper	14	14 %
	Final exam		
	Final exam	30	30 %
	TOTAL	100	100 %
Web page	www.tfzv.ues.rs.ba		
Date	2023		