	UNIVERSITY OF EAST SARAJEVO **Faculty of Technology Zvornik**	
	Study program: Chemical Engineering and Technology	
	First cycle / **Fourth year**	

Course title	**REFRIGERATION TECHNIQUES**
Department	**Department for Process Engineering**

Course code	**Course status**	**Semester**	**ECTS**
04-2-050-7	**Mandatory**	**VII**	**3**

Teacher	Vladan Mićić, PhD, full professor
Teaching Assistant	Duško Kostić, MSc, teaching assistant

Class fund/ teaching load (weekly)			**Individual student workload (in semester hours)**			**Student load factor So**
Lectures	**Auditory Exercises**	**Laboratory Exercises**	**Lectures**	**Auditory Exercises**	**Laboratory Exercises**	**S_o**
2	1	0	30	15	0	1,00

total teaching load (in hours, per semester) 2*15 + 1*15 + 0*15 = 45	total student workload (in hours, per semester) 2*15*1,00 + 1*15*1,00 + 0*15*1,00 = 45
Total course load (teaching + student): 45+ 45 = 90 semester hours	

Learning outcomes	After finishing the course, students will be able to: 1. apply principles and basic knowledge from the field of technical sciences in order to describe simple problems of refrigeration technology 2. set different calculations for left-handed processes 3. describe changes in the state of working fluids in cooling devices 4. choose an environmentally friendly working fluid 5. recommend the optimal composition of the regulation of the cooling device 6. create basic diagrams of cooling systems and heat pumps.
Prerequisites	-
Teaching methods	Lectures, auditory exercises, laboratory exercises, industrial visits
Syllabus outline per week	**I Lectures** 1. Thermodynamic basics of left-handed processes (Carnot's left-handed process, gas processes) 2. Thermodynamic basics of cooling techniques (gas and steam processes, heat pumps, multi-stage compression) 3. Thermodynamic basics of cooling techniques - processes with azeotropic mixtures 4. Cooling systems and processes: cascade systems, indirect and direct cooling 5. Cooling fluids: properties, impact on the environment 6. Components of cooling systems and heat pumps 7. Revision and analysis of the topics covered 8. Air cooling 9. Cooling of liquid fluids 10. Pipelines of cooling devices 11. Equipment of cooling devices 12. Counter-clockwise processes in heating - heat pump mode 13. Automatic regulation 14. Ways of regulating the operation of cooling devices 15. Revision and analysis of the topics covered **II Practical exercises**

Mandatory literature

Author	**Title of publication, publisher**	**Year**	**Pages (from-to)**
Markoski , M.	Rashladni uređaji, Mašinski fakultet, Beograd	2006	
Granryd, E.	Introduction to refrigerating Engineering, Part I&II, Royal Institute of Technology, Stockholm	2005	
Ćurko , T	Hlađenje i dizalice topline, Skripta fakulteta strojarastva, Zagreb	2011	

Supplementary literature

Author	**Title of publication, publisher**	**Year**	**Pages (from-to)**

Obligations, assessment methods and grading system	**Type of student work evaluation**	**Grade points**	**Percentage**
	Pre-exam obligations		
	Attendance at lectures/exercises	6	6 %
	Mid-term test/Colloquium 1	32	32 %
	Mid-term test/Colloquium 2	32	32 %
	Final exam		
	Final exam	30	30 %
	Total	100	100 %
Web page	www.tfzv.ues.rs.ba		
Date	2023		