
	<b>UNIVERSITY OF EAST SARAJEVO</b>					
	Faculty of Technology Zvornik					
	<b>Study program:</b> <i>Chemical Engineering and Technology / Food Technology</i>					
	Cycle I	Academic year III				
<b>Course title</b>	COOLING TECHNOLOGY					
<b>Department</b>	Department of Food Technology - Faculty of Technology Zvornik					
<b>Course code</b>	<b>Status</b>	<b>Semester</b>	<b>ECTS</b>			
TF-1-1-HIT-04-2-110-7-4-2-2	Elective	VII	4			
<b>Teacher / s</b>	Dragan Vujadinović, PhD, Associate Professor					
<b>Teaching assistant</b>	Milan Vukić, PhD, Assistant Professor					
<b>Number of classes/ teaching workload (per week)</b>		<b>Individual student workload (in hours per semester)</b>			<b>Student workload coefficient S<sub>0</sub></b>	
<b>P</b>	<b>AV</b>	<b>LV</b>	<b>P</b>	<b>AV</b>	<b>LV</b>	<b>S<sub>0</sub></b>
2	0	2	45	0	45	1.50
total teaching load (in hours, semester) 2 * 15 + 0 * 15 + 2 * 15 = 60 h			total student workload (in hours, semester) 2 * 15 * 1.50 + 0 * 15 * 1.50 + 2 * 15 * 1.50 = 90			
Total workload of the course (teaching + student): 60 + 90 = 150 hours per semester						
<b>Learning outcomes</b>	<p>After finishing the course, students will be able to:</p> <ol style="list-style-type: none"> <li>1. demonstrate and utilize the knowledge of the characteristics of insulation materials, principles of operation of refrigeration machines;</li> <li>2. understand the heat load of the refrigeration machine, storage systems, the impact of changes in humid air and the calibration of food in the chambers;</li> <li>3. select equipment and technology for refrigeration, freezing and storage of refrigerated and frozen foods in the refrigerator;</li> <li>4. select the regime and equipment for chambers with controlled atmosphere;</li> <li>5. determine the quality parameters of food products intended for storage or freezing in the refrigerator;</li> <li>6. understand all the factors which affect the dynamics of certain processes and the possibility of rationalization;</li> <li>7. perform basic calculations necessary for the preparation of energy and material balances of the refrigerator.</li> </ol>					
<b>Prerequisites</b>						
<b>Teaching methods</b>	Lectures, laboratory exercises.					
<b>Syllabus outline per week</b>	<ol style="list-style-type: none"> <li>1. Introduction. Cold chain in food production. Conception and construction of the refrigerator.</li> <li>2. Thermal insulation of the refrigerator. Cooling. Cooling fluids. Cooling procedures.</li> <li>3. Storage. Storage systems.</li> <li>4. Internal transport in warehouses.</li> <li>5. Cooling chamber capacity and product storage density.</li> <li>6. Control and regulation of air temperature in the cooling chamber.</li> <li>7. Cycle of changing the state of moist air in the cooling chamber.</li> <li>8. Cold rooms with controlled atmosphere.</li> <li>9. Change in food products during cold storage and during transport. Weight loss during storage and transportation in food products.</li> <li>10. Chemical changes, physical changes, microbiological changes in foods during refrigeration.</li> <li>11. Freezing of food. Principles and technological procedures.</li> <li>12. Change in food products during freezing.</li> <li>13. Hygiene and sanitation in refrigerators and vehicles.</li> <li>14. Transport of food products. Means of transport. Cooling systems during transport. Refrigerated containers.</li> </ol>					

	15. Organization of transport of different types of food: meat and meat products, milk, fruits and vegetables, oil and fats, refrigerated and frozen products, products packaged in a modified or controlled atmosphere.		
<b>Obligatory literature</b>			
<b>Author / s</b>	<b>Title of publication, publisher</b>	<b>Year</b>	<b>Pages (from-to)</b>
Janković M.	Cooling technology, General part, second supplemented edition, Faculty of Agriculture, Belgrade	2002	1-200
Grujić R., Grujić S.,	Fundamentals of processing and storage technology food, Apeiron, Banja Luka	2009	116-161
<b>Additional literature</b>			
<b>Author / s</b>	<b>Title of publication, publisher</b>	<b>Year</b>	<b>Pages (from-to)</b>
Evans JA	Frozen Food Science and Technology. Blackwell Publishing Ltd	2008	1-360
Rahman, MS	Handbook of food preservation - 2nd ed., Taylor & Francis Group, LLC, New York	2007	635-691
Da-Wen S.	Handbook of frozen food packaging and processing, Taylor & Francis Group , LLC	2006	1-503
<b>Obligations, assessment methods and grading system</b>	<b>Type of student work evaluation</b>	<b>Grade points</b>	<b>Percentage</b>
	Pre-examination obligations		
	Attendance at lectures / exercises	6	6%
	Mid-term test (Colloquium) 1	20	20%
	Mid-term test (Colloquium) 2	20	20%
	Laboratory exercises	24	24%
	Final exam		
	Final exam (oral)	30	30%
TOTAL		100	100%
<b>Website</b>	<a href="http://www.tfzv.ues.rs.ba">www.tfzv.ues.rs.ba</a>		
<b>Date</b>	2023		