	UNIVERSITY OF EAST SARAJEVO Faculty of Technology ***Study program:*** *Chemical Engineering and Technology / Food Technology* Cycle I | Academic year III	

Course title	COOLING TECHNOLOGY
Department	Department of Food Technology - Faculty of Technology

Course code Course	**status**	**Semester**	**ECTS**
TF-1-1-HIT-04-2-110-7-4-2-2	election	VII	4

Teacher / s	Dragan Vujadinović, PhD, Assistant Professor
Teaching assistant	Milan Vukić, MSc, Senior Assistant

Number of classes/ teaching workload (per week)			**Individual student workload (in hours per semester)**			**Student workload coefficient S_o**
P	**AV**	**LV**	**P**	**AV**	**LV**	**S_o**
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

Learning outcomes	Student will show knowledge / abilities to: 1. know the characteristics insulation materials, principles of operation of refrigeration machines; 2. understands the heat load of the refrigeration machine, storage systems, the impact of changes in humid air and the calibration of food in the chambers; 3. select equipment and technology for refrigeration, freezing and storage of refrigerated and frozen foods in the refrigerator; 4. select the regime and equipment for chambers with controlled atmosphere; 5. determines the quality parameters of food products intended for storage or freezing in the refrigerator; 6. understands all the factors on which the dynamics of certain processes and the possibility ofdepend rationalization; 7. performs basic calculations necessary for the preparation of energy and material balances of the refrigerator
Prerequisits	
Teaching methods	Lectures, laboratory exercises
Syllabus outline per week	1. Introduction. Cold chain in food production. Conception and construction of the refrigerator. 2. Thermal insulation of the refrigerator. Cooling. Cooling fluids. Cooling procedures. 3. Storage. Storage systems. 4. Internal transport in warehouses. 5. Cooling chamber capacity and product storage density. 6. Control and regulation of air temperature in the cooling chamber. 7. Cycle of changing the state of moist air in the cooling chamber. 8. Cold rooms with controlled atmosphere. 9. Change of food products during cold storage and during transport. Weight loss during storage and transportation of food products. 10. Chemical changes, physical changes, microbiological changes of foods during refrigeration. 11. Freezing of food. Principles and technological procedures. 12. Change of food products during freezing. 13. Hygiene and sanitation in refrigerators and vehicles. 14. Transport of food products. Means of transport. Cooling systems during transport. Refrigerated containers. 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.

Obligatory literature

Author / s	**Title of publication, publisher**	**Year**	**Pages (from-to)**
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
Supplementary literature			
Author / s	**Title of publication, publisher**	**Year**	**Pages (from-to)**
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

Obligations, assessment methods and grading system	**Type of student work evaluation**	**Points**	**Percentage**
	Pre-examination obligations		
	attendance at lectures / exercises	6	6%
	colloquium 1	20	20%
	colloquium 2	20	20%
	Laboratory exercises	24	24%
	Final exam		
	Final exam (oral)	30	30%
	TOTAL	100	100%
Website	www.tfzv.ues.rs.ba		
Date			