VELEUČILIŠTE U KARLOVCU
Karlovac University of Applied Sciences

COURSE SYLLABUS

General information

Course title:	**MALT PRODUCTION**
ISVU course code:	266810
Course instructor:	
Course assistant:	
Study programme and specialization in which the course is taught:	Food processing technology
ECTS credits:	5,0
Semester of the course execution:	IV
Exam prerequisites:	-
Course objectives:	The aim of the course is to acquaint students with the process of malt production from barley, the desirable and undesirable changes that occur in that process, and the types of malt used in the brewing industry.

Course structure

Teaching mode	**Number of contact hours per semester:**	**Student's requirements per teaching mode**
Lectures:	45	80%
Exercises (auditory, linguistics):		
Exercises (laboratory, practical):	26	100%
Field work:	4	100%
Other:		
TOTAL:	75	

Monitoring of students' work and knowledge evaluation during the course

OUTCOMES		**Colloquium 1**	**Colloquium 2**	**Seminar work**	**Oral exam**	**Total**	**Pass**	**Time frame for the recognition of the outcome**
Outcome 1	Define the types of malt and describe the reception and preparation procedures of barley for production	12%				12%	6%	By the end of the academic year
Outcome 2	Describe the production process of processing barley into malt and define and describe the biochemical changes that occur during this process	12%				12%	6%	By the end of the academic year

Outcome 3	Distinguish the specifics in the production process of different types of malt			22%		22%	11%	By the end of the academic year
Outcome 4	Describe malt processing procedures		12%			12%	6%	By the end of the academic year
Outcome 5	Evaluate the efficiency of the process and the quality of the obtained malt		12%			12%	6%	By the end of the academic year
Outcome 6	Evaluate the success and degree of modification of barley grain				30%	30%	15%	By the end of the academic year
Total % grade points		24	24	22	30	100	50	
Share in ECTS		1,2	1,2	1,1	1,5	5,0		

Knowledge evaluation on exams

Exam prerequisites					
OUTCOMES		**Written exam**	**Oral exam**	**Total**	**Pass**
Outcome 1	Define the types of malt and describe the reception and preparation procedures of barley for production	12%		12%	6%
Outcome 2	Describe the production process of processing barley into malt and define and describe the biochemical changes that occur during this process	12%		12%	6%
Outcome 3	Distinguish the specifics in the production process of different types of malt		22%	22%	11%
Outcome 4	Describe malt processing procedures	12%		12%	6%
Outcome 5	Evaluate the efficiency of the process and the quality of the obtained malt	12%		12%	6%
Outcome 6	Evaluate the success and degree of modification of barley grain		30%	30%	15%
Total % of grade points		48%	52%	100%	50%
Share in ECTS		2,4	2,6	5,0	

Review of units per week with associated learning outcomes

Week	**Lecture course content and learning outcomes:**	**Outcome**	**Exercises course content and learning outcomes:**	**Outcome**
1.	Basic terms in malting, basic ingredients of barley grain	I1	Preparation of barley grain samples and microscopy of the obtained preparations - laboratory exercises	I1

2.	Basics of barley cultivation with special reference to the quality of barley raw material for the production of malt	I1	Determining the quality of barley grains - laboratory exercises	I1
3.	Structure, composition and quality of barley grains	I1, I5, I6	Determination of physicochemical parameters of barley grain quality - laboratory exercises	I1, I5, I6
4.	Types of malt, Application of malt as raw material, Malt surrogates	I2	Distinguishing different types of malt - laboratory exercises	I2
5.	Barley reception, Barley cleaning, Barley sorting	I2	Determination of the proportion of impurities - laboratory exercises	I2
6.	Barley and malt transport, Conveyor types and characteristics, Dust removal devices	I2	Determination of the proportion of impurities - laboratory exercises	I2
7.	Barley drying and storage, Barley grain cooling	I2, I3	Storage of barley and determination of its characteristics during storage - laboratory exercises	I2, I3
8.	Barley steeping, Steeping vessels, Pre-steeping and additional steeping	I2, I3	Steeping and germination of barley grains and determining the degree of steeping and germination - laboratory exercises	I2, I3
9.	Germination of barley, Malting vessels, Activation and synthesis of enzymes, Decomposition of starch and protein	I2, I3	Determining the degree of modification of barley grains - laboratory exercises	I2, I3
10.	Germination procedures and control, Determination of germination completion, Addition of germination inhibitors or stimulators	I2, I3	Determining the degree of modification of barley grains - laboratory exercises	I2, I3
11.	Drying of green malt - biochemical changes during drying	I2, I3, I4	Physico-chemical parameters of dried malt - laboratory exercises	I2, I3, I4
12.	Malt dryers, Control of dryer operation, Heat consumption and saving	I4	Physico-chemical parameters of dried malt - laboratory exercises	I4
13.	Malt processing, Malt cooling, Malt descaling, Malt polishing	I4, I5, I6	Determining the proportion of rootlets and total losses during malt production - laboratory exercise	I4, I5, I6
14.	Evaluation of malt, Mechanical and chemical analysis of malt	I4, I5, I6	Field teaching - visit to an industrial malt house	I1-6
15.	Special types of malt and malt from other grains	I4, I5, I6	Field teaching - visit to an industrial malt house	I1-6

References (compulsory / additional)

Compulsory

1. Briggs, D. E., Malts and Malting, Blackie Academic & Professional, Velika Britanija, 1998.
2. Mallett, J., Malt: A practical guide from field to brewhouse, Brewers Publications, SAD, 2014.
3. Kunze, W., Technology Brewing and Malting, VLB Berlin, 6. izd., Njemačka, 2019.