



SYLLABUS PREDMETA

General information

Course title:	Brewing technology I
ISVU ¹ course code:	38352
Studies in which the course is taught:	Food processing technology
Course Instructor:	Goran Šarić, PhD, senior lecturer
Course Assistant:	
ECTS credits:	6,0
Semester of the course execution:	IV
Academic year:	
Exam prerequisites:	Biochemistry
Lectures are given in a foreign language:	English
Aims:	Aim of the course is to familiarize the students with the raw materials that are needed for beer production, with the making of different recipes for different beer types, choosing the right raw materials for different beer types. Students will learn about different technological processes for malt milling, mashing, lautering, wort boiling, casting, cooling and clarifying and removal of the coarse break. Besides that they will learn what chemical, biochemical and physical changes happen during those technological processes and why they are important

Course

Course structure	Number of contact hours per week:	Number of contact hours per semester:	Student's requirements by type of teaching:
Lectures:	2	30	attendance 80%
Tutorials:			attendance 80%
Practical (lab) sessions:	3	45	
Seminars:			
Field work:			
Other:			
TOTAL:	5	75	

Monitoring of students' work, knowledge evaluation and learning outcomes

Formation of the grade during the implementation of teaching: (Define from minimum 5 to maximum 10 learning outcomes)	LEARNING OUTCOMES (upon completion of the course the student should be able to:)	FACTORS AFFECTING THE GRADE (e.g. term paper, practical work, presentation, ...)	MAXIMUM NUMBER OF POINTS PER FACTOR
	I1: Describe the brewhouse and all of the phases of wort production	Term paper 1	Term paper 1 - 25 points Term paper 2 - 25 points Attendance - 10 points Oral exam - 40 points
	I2: Name primary raw materials for wort production and describe the process of their preparation for mashing	Term paper 1	
	I3: Describe the process and changes which happen during mashing and lautering procedure	Term paper 1	
	I4: Describe the process of wort boiling, ways of adding the hops and changes that happen	Term paper 2	

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	I5: Describe the process of wort treatment and preparation for fermentation	Term paper 2	
	I6: Calculate the necessary amount of raw material for production of a certain beer type	Term paper 2	
Alternative formation of the grade (I 1 – I 10)	or alternative formation of the grade: I 1 – I 10		TOTAL: 100 points
Students' competencies	Students will gain practical and theoretical knowledge about the process of selection and preparation of raw materials for wort production used to produce the specific beer types. They will learn about all the stages of wort production, from malt milling, mashing, lautering, hops adding, wort boiling to removing the coarse break, clarification and preparing for fermentation. Besides that, they will learn how to draw and explain mashing diagram, how and why certain biochemical processes occur and what is their role in the whole process of wort production.		

Prerequisites for course approval (lecturer's signature):	Student attendance on lectures and practical work - minimum 80%
Prerequisites for taking exams:	Signature and seminar.
Grading scale:	<p>(According to the Regulations on student assessment of Karlovac University of Applied Sciences, Article 9, Paragraph 5)</p> <p>90-100 - excellent (5) (A) 80 to 89.9 - very good (4) (B) 65 to 79.9 - good (3) (C) 60 to 64.9 - sufficient (2) (D) 50 to 59.9 - sufficient (2) (E) 0 to 49.9 – fail (1) (F)</p> <p>Students are graded during class, what forms 70% of final exam. Students who achieve 50% (35 points) and more are allowed to take the final exam. The score on final exam makes 30% of the final grade.</p>

ECTS structure

ECTS credits allocated to the course reflect the total burden to the student during adoption of the course content. Total contact hours, relative gravity of the content, effort required for exam preparation, as well as, every other possible burden are taken in account:

Attendance (active participation)	Term paper	Composition	Presentation	Continuous assessment and evaluation	Practical work
0,5					
Independent work	Project	Written exam	Oral exam	Other	
		3	2,5		

Review of topics/units per week associated with learning outcomes

Week	Lectures topics/units and learning outcomes:	Tutorials topics/units and learning outcomes:
1.	Wort production, brewing equipment, types of breweries	Introduction to brewhouse. To name parts, machines and apparatus in brewhouse



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2.	Malt milling, dry and wet milling machines	Malt milling. To choose and describe the best milling procedure of malt or adjuncts
3.	Whole wheat composition, Whole wheat grading	Determination of physico-chemical quality parameters of malt. To describe and apply the methods for determination of malt quality.
4.	Temperatures during wort production and its duration, Concentration of wort	Mashing and wort production
5.	Enzyme activity, Starch degradation, Factors which affect composition of fermentable sugars	Mashing and wort production
6.	Degradation of β -glucan, proteins and other components	Mashing and wort production
7.	Extract composition, Wort acidification	Introduction to the methods for wort quality assessment and their application.
8.	Vessels for mashing	Using the methods for wort quality assessment
9.	Mixing of water and malt, Infusion mashing, Decoction process	Introduction to different mashing procedures
10.	Mashing diagrams, Wort oxidation	Drafting and drawing mashing diagrams
11.	Mashing with skipping break for β -amylase activity, Mashing of barley malt and malt obtained from other cereals	Drafting and drawing mashing diagrams
12.	Lautering, Mash and wort separation	Wort lautering. Introduction to different procedures of wort extraction from mash
13.	Wort boiling, Dosage, dissolution and conversion of hop components, Design and heating of the wort kettle	Adding hops and wort boiling
14.	Other procedures of wort boiling, Energy usage and saving during wort boiling, Boiling record and control	Drafting and writing the brewhouse diary
15.	Removal of the coarse break in settling tank, Whirlpool, Cooling and clarifying the wort, Equipment for wort cooling, Wort aeration	Removal of the coarse break and wort clarification. Preparation of wort for fermentation

References

REFERENCES (compulsory/additional):

- Basic: Marić, V., Tehnologija piva, Karlovac University of Applied Sciences, 2009.
Marić, V., Biotehnologija i sirovine, SIP, Zagreb, 2000.
- Additional: Kunze, W. Technology Brewing and Malting, VLB Berlin, 5th edition., 2014.
Briggs, D. E. et al., Brewing - Science and practice, Woodhead Publishing Ltd and CRC Press, 2004.
Bamforth, C. W., Brewing - New technologies, Woodhead Publishing Ltd and CRC Press, 2006.

Exams for the academic year: 2022/2023

Exam dates:	According to the schedule of exams for current academic year
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Contact information

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