SYLLABUS

REGARDING THE QUALIFICATION CYCLE FROM 2024/2025 TO 2027/2028

Academic year 2026/2027

1. BASIC COURSE/MODULE INFORMATION

Course/Module title	**Brewing**
Course/Module code *	-
Faculty (name of the unit offering the field of study)	Faculty of Technology and Life Sciences
Name of the unit running the course	Faculty of Technology and Life Sciences Institute of Food Technology and Nutrition Department of General Food Technology and Human Nutrition
Field of study	Food Technology and Human Nutrition
Qualification level	First grade
Profile	Academic
Study mode	Stationary
Year and semester of studies	IIIrd year, VI semester
Course type	specialized/ Fermentation processes in food production
Language of instruction	Polish
Coordinator	Dr hab. Ireneusz Kapusta, prof. UR
Course instructor	Dr inż. Agata Pawłowska, dr inż. Paweł Hanus

* - as agreed at the faculty

1.1. Learning format – number of hours and ECTS credits

Semester (no.)	Lectures	Classes	Colloquia	Lab classes	Seminars	Practical classes	Internships	Others	**ECTS credits**
6	15			30					5

1.2. Course delivery methods

X conducted in a traditional way

- involving distance education methods and techniques

1.3. Course/Module assessment (exam, pass with a grade, pass without a grade)

EXAM

2.PREREQUISITES

biochemistry, microbiology, food analysis, general food technology

3. OBJECTIVES, LEARNING OUTCOMES, COURSE CONTENT, AND INSTRUCTIONAL METHODS

3.1. Course/Module objectives

O1	Acquainting with beer production technologies, raw material base and elements of equipment necessary for beer production.
O2	Acquainting with the main physicochemical characteristics of the control of the correct course of the mashing process (gelatinization, saccharification), fermentation and maturation.
O3	Presentation of specialized equipment used in brewing. Acquainting with the construction, principle of operation and operation.

3.2 COURSE/MODULE LEARNING OUTCOMES

Learning Outcome	The description of the learning outcome defined for the course/module	Relation to the degree programme outcomes
LO_01	Student knows the theoretical basis of the production of various types of beers and the properties of raw materials used in brewing production, as well as the quality parameters of raw materials and finished products, as well as the methods of assessing their quality.	K_W11
LO_02	Student understands the scheme of the general course of the technological process as well as the goals and tasks of unit processes (biochemical changes during mashing, fermentation and aging). He knows the types and properties of selected pure microbial cultures and the basics of their multiplication, understands their role and importance in brewing biotechnology.	K_W11
LO_03	Student knows and understands the principles of beer production using unmalted brewing raw materials.	K_W11
LO_04	Student can develop a recipe for the selected type of beer and perform basic calculations for its preparation.	K_U07
LO_05	Student can prepare a wort characteristic for a certain type of beer and conduct its fermentation.	K_U09
LO_06	Student can analyze given task, determine necessary to perform actions and optimize work plan in the laboratory.	K_U09
LO_07	Student is aware of the need for additional training and improvement in the biotechnology field.	K_K03

LO_o8	Student is responsible for the safety of his own work and that of the others, he knows how to act in emergencies.	K_K05

3.3 Course content

A. Lectures

Content outline
General information about beer, characteristics of the raw materials used in brewing technology: water, malt (barley, wheat, special), yeast (bottom and top fermentation), hops (bitter, aromatic, extracts, granules).
General flow chart of the technological process of beer production. Objectives and tasks of subsequent unit processes (operations) (grinding and mashing of malt, filtration of the wort and its cooking with hops, separation of hot sediments, cooling, dosing of yeast and fermentation of adjustable wort and aging of young beer).
Characteristics and specificity of different types of beers (pils, weissbier, ale, stout, etc).
Methods of evaluation of beers quality (organoleptic: point evaluation, triangular test; physico-chemical: alcohol concentration, extract content, pH, color etc.).

B. Laboratory classes

Content outline
Assessment of the basic physico-chemical parameters of the main raw materials for beer production, i.e. water, malt/s and hops of significant technological importance (e.g. water hardness, malt extractivity, α-acid content in hops, etc.). Developing a beer recipe based on the so-called technological calculations. Calculation of appropriate amounts (charge of malt/s based on its/their extractivity, water, hops and (based on the content of α-acids) and yeast).
Presentation of brewery equipment depending on the scale of production, from the so-called home production for own needs, through restaurant and craft breweries to industrial breweries.
Production of the wort of the selected type of beer (malt grinding, mashing, filtration, boiling with hopping, cooling). Wort and spent grain quality analysis.
Yeast quality analysis. Preparation of an appropriate portion of yeast and determination of the viability of rehydrated cells.
Beer fermentation process control, yeast removal, silent fermentation. Calculation of basic indicators characterizing the effectiveness of the course of the main stages of the technological process, i.e. brewhouse efficiency and the degree of fermentation.
Organoleptic and physico-chemical evaluation of the beer, determination of production costs depending on the scale of its production and analysis of hazards resulting from the production conditions.
Analysis of the suitability of unconventional raw materials for brewing production. Characteristics of threats related to the introduction of innovative raw materials and methods of their control. Production and evaluation of wort/beers with innovative raw materials.

3.4 Methods of Instruction

Lecture supported by a multimedia presentation.
Laboratory classes: group work - accounting tasks, discussion, work in a laboratory, carrying out experiments, designing methods.

4. Assessment techniques and criteria

4.1 Methods of evaluating learning outcomes

Learning outcome	Methods of assessment of learning outcomes (e.g. test, oral exam, written exam, project, report, observation during classes)	Learning format (lectures, classes, ...)
LO-01	test, oral exam, written exam	lectures, classes
LO-02	test, oral exam, written exam	lectures, classes
LO-03	test, oral exam, written exam	lectures, classes
LO-04	project, report	classes
LO-05	project, report	classes
LO-06	project, report	classes
LO-07	observation during classes	classes
LO-08	observation during classes	classes

4.2 Course assessment criteria

Lecture: written exam
The number of points obtained is decisive for the positive evaluation (> 50% of the maximum number of points): dst 51-59%, dst plus 60-69%, db 70-79%, db plus 80-89%, very good> 90%.
Classes: passing with a grade
Assessment determined on the basis of partial grades from the colloquium (knowledge check), presentation / report on the elaboration of the selected issue (skills), participation in the discussion, observation of activity during classes (social competences).
The number of points obtained is decisive for the positive evaluation (> 50% of the maximum number of points): dst 51-59%, dst plus 60-69%, db 70-79%, db plus 80-89%, very good> 90%.

The condition for completing the course is achieving all the assumed learning outcomes.

5. Total student workload needed to achieve the intended learning outcomes – number of hours and ECTS credits

Activity	Number of hours
Scheduled course contact hours	15+30/1,5
Other contact hours involving the teacher (consultation hours, examinations)	participation in consultations - 5/0.16 participation in the exam - 2/0.07
Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.)	preparation for the exam - 48/1.7 preparation for a colloquium - 30/1 preparation of reports - 5/0.16 preparation of a project/presentation - 15/0.5

Total number of hours	150
Total number of ECTS credits	5

* One ECTS point corresponds to 25-30 hours of total student workload

6. Internships related to the course/module

Number of hours	-
Internship regulations and procedures	-

7. Instructional materials

Compulsory literature: 1. Kunze W., Technologia słodu i piwa, VLB, Berlin, 2010.
Complementary literature: 1. Dylkowski W., Browarnictwo, WSiP, Warszawa, 1986. 2. Pazera T., Rzemienuk T. Przemysł fermentacyjny - Browarnictwo, WSiP, Warszawa, 1998. 3. Lehr R., Domowe warzenie piwa, Wydawnictwo RM, Warszawa, 2021. 4. Lewis M.J., Young T.W., Piwowarstwo, Wydawnictwo Naukowe PWN, Warszawa, 2001. 5. Antkiewicz P., Poreda A., Osiągnięcia naukowo-techniczne w słodownictwie i browarnictwie. wyd. O.S.W.I. Nauka-Przemysł, Kraków, 2010. 6. Poreda A., Antkiewicz P.:,Stabilność piwa wyzwaniem dla browarnictwa XXI wieku, O.S.W.I. Nauka-Przemysł, Kraków, 2014. 7. Piwowar, magazine

Approved by the Head of the Department or an authorised person