SYLLABUS

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

ACADEMIC YEAR 2026/2027

1. BASIC COURSE/MODULE INFORMATION

Course/Module title	**Fermentation processes in the production of bread**
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 Food Technology and Human Nutrition
Field of study	Food technology and human nutrition
Qualification level	1st stage
Profile	academic
Study mode	stationary
Year and semester of studies	3nd year, 6th semester
Course type	specialized/ Fermentation processes in food production
Language of instruction	English
Coordinator	Joanna Kaszuba, PhD
Course instructor	Joanna Kaszuba, PhD, Zuzanna Posadzka-Siupik, PhD

* - 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					**3**

1.2. Course delivery methods

☒ 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):
pass with a grade

2. PREREQUISITES

Subjects: Food chemistry, Food biochemistry, Food industry machinery and equipment, Food microbiology, Quality assessment of plant raw materials and products

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

3.1. Course/Module objectives

O1	Characterization of basic and auxiliary raw materials and microorganisms used in bakery production.
O2	Knowledge of the role of chemical components of raw materials, microorganisms and fermentation processes in shaping the structure of dough and bakery products.
O3	Introduction of students to the technologies of production of wheat, rye, mixed and gluten-free bread using fermentation processes.

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	The student has advanced knowledge of the technologies for producing wheat, rye, mixed and gluten-free bread using fermentation processes.	K_W11
LO_02	The student is able to assess the technological value of bakery raw materials and then select the appropriate method for making dough using fermentation processes.	K_U07, K_U09
LO_03	The student is able to bake wheat, rye and gluten-free bread using fermentation processes.	K_U09
LO_04	The student appreciates the achievements of the cereal and bakery industry and is ready to maintain the tradition of producing bread using fermentation processes.	K_K05

3.3 Course content

A. Lectures

Content outline
Bakery raw materials – basic and auxiliary. Chemical components of bread flours and their role in creating the structure of bakery middle products and finished products.
Microorganisms used in bread production. Microbiology of sourdough. Bakery starter cultures – composition and role in bakery production. Fixed natural acids (dry sourdough and liquid sourdough) used in bakery production.
Physiology and biochemistry of bakery sourdough microflora. Fixed natural acids (dry sourdough and liquid sourdough) used in bakery production.
Dough production – kneading and methods of loosening.
Preparation of wheat dough – direct and two-phase methods, methods of intensifying maturation.
Preparation of rye dough – classic and shortened methods of dough preparation. The role of lactic acid in creating the structure of rye dough. The effect of temperature and acidification of rye dough on the quality of the resulting bread.
Methods of dough preparation for mixed bread. Methods of producing gluten-free bread.

Preparation of pieces for baking and baking bread. Processes and operations after baking.
Bread quality indicators. Bread defects.
Bread aging and preventive measures. Methods of packaging and storing different types of bread.
HACCP systems in milling and bakery plants. The importance of operation of devices for the production of sourdough bread.
The influence of sourdough on the quality and nutritional properties of bread.

B. Laboratory classes

Content outline
Research on the baking value of wheat and rye flours using indirect methods.
Research on the fermentation properties of dough. Research on the physical properties of dough. Development of technological recommendations for making bakery sourdoughs.
Techniques for making rye sourdough and assessing its quality.
Techniques for making wheat sourdough and leaven and assessing their quality.
Baking tests of wheat bread using the direct and indirect method.
Baking tests of rye bread using the direct method, the 3-phase method and the 5-phase method.
Technology of gluten-free bread production.
Physico-chemical assessment of bread. Point assessment of bread.

3.4 Methods of Instruction

Lecture: a lecture supported by a multimedia presentation.
Laboratory classes: group work, performing experiments, interpretation of source texts, case analysis and discussion, solving tasks.

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	colloquium	lectures, laboratory
LO_ 02	report, observation during classes	laboratory
LO_03	report, observation during classes	laboratory
LO_04	observation during classes, discussion	lectures, laboratory

4.2. Course assessment criteria

The condition for passing the course is achieving all the assumed learning outcomes. Lecture: the grade is determined by the number of points obtained in the written colloquium: good 51-60%, good plus 61-70%, good 71-80%, good plus 81-90%, very good 91-100% Laboratory classes: average grade from written colloquia (testing knowledge), from reports (skills, social competences) and a positive assessment (pass) of teamwork skills (social competences): good up to 3.25, good plus 3.26-3.75, good 3.76-4.25, good plus 4.26-4.75, very good 4.76-5.00.

The grade in the subject is determined by the average grade from the lecture (40%) and laboratory (60%).

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)	consultation hours: 1/0,03
Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.)	preparation for laboratory: 15/0,50 preparation for reports: 9/0,30 preparation for test/ colloquia: 20/0,67
Total number of hours	90
Total number of ECTS credits	**3**

* 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. Brant M., Gänzle M. (red.). (2015). Technologia w piekarni. Zakwas. Wydawnictwo Naukowe PWN. ISBN: 978-83-01-18299-1.
2. Jakubczyk T., Haber T. (1983): Analiza zbóż i przetworów zbożowych. Wyd. SGGW, Warszawa
3. Sobczyk A., Kaszuba J. (2015): Technologia zbóż. Wyd. UR, Rzeszów.
4. Sobczyk, A., & Kaszuba, J. (2017). Prefermenty piekarskie dzisiaj-tradycyjny smak, nowa technologia. Postępy Nauki i Technologii Przemysłu Rolno-Spożywczego, 72(1).
5. Siepmann, F. B., Ripari, V., Waszczynskyj, N., & Spier, M. R. (2018). Overview of sourdough technology: From production to marketing. Food and Bioprocess Technology, 11, 242-270.
6. Islam, M. A., & Islam, S. (2024). Sourdough bread quality: Facts and Factors. *Foods*, *13*(13), 2132.
7. Păucean, A., Man, S. M., Chiş, M. S., Mureşan, V., Pop, C. R., Socaci, S. A., ... & Muste, S. (2019). Use of pseudocereals preferment made with aromatic yeast strains for enhancing wheat bread quality. *Foods*, *8*(10), 443.

Complementary literature:

1. Mondal, A., & Datta, A. K. (2008). Bread baking–A review. Journal of Food Engineering, 86(4), 465-474.
2. Corsetti, A. (2012). Technology of sourdough fermentation and sourdough applications. In *Handbook on sourdough biotechnology* (pp. 85-103). New York, NY: Springer US.

3. Papadimitriou, K., Zoumpopoulou, G., Georgalaki, M., Alexandraki, V., Kazou, M., Anastasiou, R., & Tsakalidou, E. (2019). Sourdough bread. In *Innovations in traditional foods* (pp. 127-158). Woodhead Publishing.
4. Kaszuba, J., Czyż, M., Cebulak, T., & Pycia, K. (2024). Assessment of the Suitability of Flour Obtained from Mountain Rye Grain Milling and the Method of Dough Fermentation for the Production of Rye Bread. *Foods*, *13*(19), 3035.
5. Bredariol, P., & Vanin, F. M. (2022). Bread baking review: Insight into technological aspects in order to preserve nutrition. *Food Reviews International*, *38*(sup1), 651-668.

Approved by the Head of the Department or an authorised person