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| **Title and code** of the subject: **Food microbiology MTBE7024A** | **ECTS Credit Points: 4** |
| **Type** of the subject: compulsory / optional |
| **Ratio of theory and practice: 50/50** (credit%) |
| **Type and number of classes per semester**: 28 hour(s) lecture and 28 hour(s) practice per **semester**. Number of teaching hours / week: 2+2 (lecture and practice) |
| **Type of exam**: exam / practical course mark |
| **Subject in the curriculum:** semester 5 |
| Preliminary requirements:- |

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| **Summary of content - theory**:  |
| Course objectives: The aim of the subject is the introduction of the subject, task and history of food microbiology, internal and external factors that influence the safety and quality of raw materials and finished products. Students will also learn about the most important microbiological contaminants of the food, the major preservation methods, furthermore, about the disease and spoilage causing microorganisms.1. The subject, task and history of food microbiology
2. Microbial ecology of food. Sources of contamination
3. Characteristics of microorganisms. The inherent characteristics of food
4. External environmental factors. Interactions of ecological factors
5. Growth and destruction of microorganisms
6. Diseases caused by food (food infection, food poisoning)
7. Food borne pathogens
8. Mycotoxin-producing moulds, mycotoxins
9. Preserving operations. Heat treatment, heat removal, dehydration, radiation
10. Chemical and combined preservation methods
11. Food-fermentation. Useful microorganisms
12. Indicator and spoilage microorganisms
13. Microbiology of plant products
14. Microbiology of animal products
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| **Summary of content - practice**:  |
| Skills to be learnt: to know the main microbiological methods, which are used in a food microbiological laboratory. 1. Sampling and transport of food samples
2. Determination of all cell counts using Thoma cell counting chamber
3. Preparation of agar media
4. Examination of total aerobic plate count of feed sample with plate count method
5. Examination of Enterobacteriaceae count of meat products with plate count method
6. Examination of coliform bacterium count of water sample with membrane filtration method
7. Examination of staphylococci count in raw milk samples with spread plate method
8. Detection and enumeration of Enterobacteriaceae count of dairy product by MPN technique
9. Examination of yeast and mould count in frozen products with spread plate method
10. Oxidase test in case of an isolated bacterium
11. Catalase test in case of an isolated bacterium
12. Monitoring the surface hygiene with swab methods using poured plates
13. Measurement of the size of yeast cells under light microscope
14. Mid-year written exam
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| **Literature, handbooks in English**  |
| 1. Karaffa, E. – Peles, F. (2015): Microbiological aspects of food quality and safety. University lecture notes. University of Debrecen. TÁMOP-4.1.2.D-12/1/KONV-2012-0008. 110p.
2. Doyle, M.P. - Buchanan, R.L. (2013): Food Microbiology: Fundamentals and Frontiers. 4th edition. ASM Press, Washington. 1118p.
3. Adams, M.R. - Moss, M.O. (2008): Food Microbiology. 3rd edition. RSC Publishing. 478p.
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| **Competencies gained** *(acc. to the Regulation on training and outcome requirements)* |
| 1. **Knowledge:**
* Familiar with the most important biological and microbiological processes in food production, their basic laws and methods of testing.
* Familiar with the basics of microbiological safety of food.
1. **Skills:**
* Capable of assessing the microbiological risks of food raw materials, furthermore storing and preserving them safely.
1. **Attitude:**
* Committed to microbiological food safety.
1. **Autonomy and responsibility:**
* Has responsibility towards the safety of food products that were produced with his/her contribution.
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| **Responsible lecturer: Ferenc Peles, PhD** |
| **Other lecturer(s): Erzsébet Karaffa, Ph.D.; Károly Pál, Ph.D.; Anikó Bérczesné Szojka** |

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| **Terms of course completion:** |
| 1. Participating in the exercises
2. Completing practical exercises
3. Three mid-year written exams
4. Written exam (if the result of the mid-year written exams is less than 60%)

The course ends in a mid-semester grade based on the result of the mid-year written exams. The minimum requirement for both mid-term and end-term written exams is 60%.Result and grade:0-59%: fail (1) 60-69%: pass (2)70-79%: satisfactory (3)80-89%: good (4)90-100%: excellent (5)If the result of the written exams is below 60%, it is necessary to rewrite that.  |
| **Form of examination:** Written form |
| **Requirement(s) to get signature:** |
| 1. Participating in the exercises
2. Completing practical exercises
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| **Exam questions:** |
| 1. History of food microbiology
2. Development of microscopes (Hans and Zacharias Jansen, Anton van Leeuwenhoek, Robert Hooke, Carl Zeiss, Ernst Abbe)
3. Work of Nicolas Appert
4. Work of Louis Pasteur
5. Work of Robert Koch
6. Work of Sir Alexander Fleming
7. Main characteristics and main types of indicator microorganisms
8. Main characteristics of Enterobacteriaceae, coliform, *Escherichia coli*
9. Main characteristics of enterococci, aerobic plate count, yeast and moulds. Specific indicators
10. Main intrinsic parameters of foods that affect microbial growth, and their characteristics
11. Main extrinsic parameters of foods that affect microbial growth, and their characteristics
12. Growth and destruction of microorganisms
13. Most important food borne diseases and food borne pathogens, and their characteristics
14. Types and characteristics of mycotoxin-producing moulds and mycotoxins
15. Characteristics of heat treatment
16. Characteristics of heat removal
17. Characteristics of dehydration
18. Characteristics of radiation
19. Chemical and combined preservation methods
20. Types and characteristics of food-fermentation
21. Types and microbiology of plant products
22. Types and microbiology of animal products
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