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| **Title and Code** of the subject:**Basics of food microbiology, MTMEL7006** | **ECTS Credit Points: 3** |
| **Type** of the subject: compulsory / optional |
| **Ratio of theory and practice:** 100/0(credit%) |
| **Type and number of classes per semester**: 28 hour(s) lecture and 0 hour(s) practice per **semester** Number of teaching hours / week : 2+0 (lecture and practice) |
| **Type of exam**: exam / practical course mark |
| **Subject in the curriculum:** semester 1 |
| 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.1. Metabolism and culture of microbes.
2. Structure of prokaryotic cells.
3. Structure of eukaryotic cells.
4. Basic microbial genetics.
5. Methods of microbial taxonomy.
6. Most important prokaryotic taxons and their characteristics.
7. Characteristics and taxonomy of fungi.
8. Characteristics and taxonomy of protozoa.
9. Extrinsic parameters of foods that affect microbial growth.
10. Intrinsic parameters of foods that affect microbial growth.
11. Physical preservation methods
12. Chemical preservation methods
13. Biological preservation methods
14. New techniques for food preservations.
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| **Summary of content - practice**:  |
| 1. Recognize the role of the different culture medium components
2. Find examples for the role of the different genetic elements of the foodborne bacteria
3. Practice nomenclature and identification
4. Recognize the different morphological characteristics of bacteria and use the correct expression
5. Recognize the difference between the Gram-positive and Gram-negative cell walls
6. Recognize the difference between the three domains of life
7. Recognize the important morphological characters of important fungal species
8. Collect information about foodborne protozoa
9. Collect information about foodborne animal parasites
10. Find if a food is provide growth for a foodborne pathogen based on its water activity
11. Find if a food is provide growth for a foodborne pathogen based on its pH minimum and maximum only
12. Describe the growth characteristics of foodborne pathogens at different temperatures
13. Collect information about the physical preservation methods in a geographical region
14. Collect information about the chemical and biological preservation methods in a geographical region
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| **Literature, handbooks in English**  |
| 1. Madigan, M. T, Martinko, J. M., Bender K., Buckley, D., Stahl, D (2015): Brock Biology of Microorganisms, Benjamin Cumming, 14th edition 1030 oldal, ISBN 978-1-292-01831-7
2. 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.
3. Doyle, M.P. - Buchanan, R.L. (2013): Food Microbiology: Fundamentals and Frontiers. 4th edition. ASM Press, Washington. 1118p.
4. 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 and hazards in agriculture production (horticulture, crop production and animal husbandry), furthermore the basic microbiological test methods.
1. **Skills:**
* Able to apply the microbiological test methods acquired during training.
1. **Attitude:**
* Committed to microbiological safety of plant and animal origin raw materials.
1. **Autonomy and responsibility:**
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| **Responsible lecturer: Erzsébet Karaffa, Ph.D.** |
| **Other lecturer(s): Károly Pál, Ph.D.** |

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| **Terms of course completion:** |
| Giving presentation |
| **Form of examination:** |
|  Written form |
| **Requirement(s) to get signature:** |
| 1. Presentations connecting to preservation methods
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| **Exam questions:** |
| 1. Main groups of microbes, and their role in the food.
2. Characteristics of microbial cells (6) and Major chemical components and macromolecules in the cells.
3. Characteristics of microbial nutrition.
4. Types of culture media, and lab culture of microorganisms.
5. Genetic elements and their characteristics.
6. Prokaryotic cell division and genetic diversity in Prokaryotes
7. Genetic information flow and their characteristics in procariotes.
8. Taxonomy of microorganisms: nomenclature and classification (species concepts)
9. The DNA based division of Gram-positive bacteria. Give minimum 2 genus name of each.
10. Name of the Gram-negative class to which important food-borne bacteria belong. Name of subclasses (5).
11. Name of Proteobacteria subclasses and altogether 6 examples for bacterial genus important in food microbiology (indicating subclass, belong to).
12. Definition of moulds. Important phylogenetic groups of food-borne moulds (3), and one example for each.
13. Definition of yeasts. Groups of yeasts based on asexual reproduction (2). Three genus name of yeasts.
14. Intrinsic parameters of foods that affect microbial growth (list minimum 4 of 6)
15. Optimal pH range for bacterial pathogens (general), moulds and yeasts. Five examples for approximate pH range of some common food commodities. Effect of pH to microbial cells (2).
16. Definition of water activity. Approximate minimum of water activity values for growth of microorganisms – minimum 3 samples.
17. Redox potential (oxidation-reduction potential): definition. Changes of redox potentials of food materials by chopping, grinding, or mincing. The elective effect of redox potential on the microflora of a food.
18. List the five food content necessary for growth of microbes, give requirements for Gram-negative, Gram-positive and moulds each.
19. Antimicrobial barriers and constituents: antimicrobial components of plant and animal tissues importance and three examples.
20. Most important extrinsic parameters for food born organisms (minimum 3 of 4)
21. The 3 main groups of microbes based on temperature requirements and tolerance – name, approximate range. Examples for each groups.
22. The importance of relative humidity in food spoilage during storage
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