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| **Title and Code** of the subject: **Food toxicology, MTMEL7014A** | **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) seminar per **semester** Number of teaching hours / week :2+2 (lecture and seminar) |
| **Type of exam**: exam / practical course mark short report on a topic |
| **Subject in the curriculum:** semester 3 |
| Preliminary requirements:Basics of food microbiology, Basics of cellular and molecular biology, Nutritional sciences |

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| **Summary of content - theory**: |
| The aim of the subject is to provide up-to date knowledge in food toxicology. We will discuss the toxins of biological, environmental, agricultural and technological origins.1. The introduction of toxicology. The aim, and subjects of toxicology.
2. Mutagenic, carcinogenic and teratogenic effect of toxins.
3. The absorption and excretion of toxins.
4. The ranking of the hazardous materials.
5. Natural toxins: toxic alkaloids, and biogenic amines.
6. Natural toxins: toxic glycosides and essential oils.
7. Natural toxins: antinutritive components
8. Microbial toxins I. bacterial toxins.
9. Microbial toxins II. mycotoxin.
10. POP chemicals and pesticides.
11. Veterinary components in food.
12. Toxic microelements
13. Toxic inorganic compounds. Radioactive pollutants.
14. Technological pollutants in food. Food additives.
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| **Summary of content - seminar**: |
| Skills to be learnt: to recognize the potential toxicological hazards of different foods.  1. Searching for toxicants in foods
2. Probit determination of a toxicant I.
3. Probit determination of a toxicant II.
4. Recognize the different mutation types, and the consequences of a mutation I.
5. Recognize the different mutation types, and the consequences of a mutation I.
6. Explanation of SDS data sheets
7. Data collection and student’s presentation about bacterial toxins in food
8. Data collection and student’s presentation about mycotoxins in food
9. Case studies and historical case evaluations I.
10. Case studies and historical case evaluations II.
11. Test of toxins with paramecium
12. Crime scene investigation
13. Test of toxins with plants I.
14. Test of toxins with plants II.
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| **Literature, handbooks in English**  |
| 1. Jay, J. M., Loessner, M. J., Golden, D. A. (2005): Modern Food Microbiology. ISBN 978-0-387-23413-7
2. Adams, M. R., Moss M. O. (2008): Food Microbiology. The Royal Society of Chemistry. ISBN 978-0-85404-284-5
3. Karaffa E., Peles F (2014): Microbiological Aspects of Food Quality And Safety. Debreceni Egyetem, Debrecen.
4. 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
5. Michael J. Derelanko- Mannfred A. Hollinger: CRC Handbook of Toxicology 1995
6. Descotes J.: Human Toxicology. Elsevier, 1987
7. Vernet J.P.: Heavy Metals in the Environment. Elsevier, 1991
8. Nutritional Toxicology Second Edition by Frank Kotsonis and Maureen Mackey
9. ATSDR home page: <http://www.atsdr.cdc.gov/>
10. Vettorazzi, G.: Handbook of international food regulatory toxicology. Food Additives. Sp. Medical & Scientific Books,New York, 1981
11. Principles for the Safety Assessment of Food Additives and Contaminants in Food Enviromental Health Criteria 70 World Health Organization, Geneva, 1987
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| **Competencies gained** *(acc. to the Regulation on training and outcome requirements)* |
| 1. **Knowledge:**
* Familiar with food chain safety and food quality and human health hazards in the whole food chain process.
* Have a good understanding of food safety risks and their extent..
1. **Skills:**
* Develops a detailed analysis of the various ideas that make up the food safety and quality expertise system with the help of engineering and research.
* The student identifies specific problems in the field of food safety and quality with an interdisciplinary approach, explores and formulates the detailed theoretical and practical background needed to solve them by means of science.
1. **Attitude:**
* Committed to his profession, he knows and undertakes its core values and norms, strives to critically interpret and develop them, and solve problems on a professional basis.
* The student recognizes values in the field of food safety and quality, is responsive to the use of effective methods and tools.
1. **Autonomy and responsibility:**
* The student is responsible for the safety of food produced with the help of it.
* The student also takes responsibility for the environmental, health, quality and consumer protection effects of decision-making situations.
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| **Responsible lecturer: Erzsébet Karaffa, Ph.D.** |
| **Other lecturer(s): Judit Remenyik, Ph.D., József Prokisch, Ph.D.** |

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| **Terms of course completion:** |
| Submitting essayGiving presentation |
| **Form of examination:** |
| Written form |
| **Requirement(s) to get signature:** |
| Participating on the seminarsCompleting topic literature summary and presentation |

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| **Exam questions:** |
| 1. Definition of toxicology and food toxicology. Origins of toxins in the food (4) and min 1 example for each.
2. The phases of toxicology (3) and short descriptions.
3. Toxicity determination with the help of dose-response relationship. Define the probit in toxicology.
4. Factors that influence toxicity (min 3). Irreversible toxic effects (3) and their characteristics.
5. Types of mutations and short description (min 3). Mutation tests examples.
6. Bacterial toxin types (4) based on mode of action, and examples.
7. Description of minimum 2 mycotoxins.
8. Explain the following abbreviation/term: Toxin, Xenobiotic, LD50,Dose, NOEL
9. Case studies in the toxicology. Write about a story related to toxicology from your country.
10. Toxicology of arsenic (compounds, their toxicity, mechanism of poisoning, symptoms, treatment, stories, arsenic in the environment)
11. Toxicology of lead, mercury and cadmium (compounds, their toxicity, mechanism of poisoning, symptoms, treatment, stories, arsenic in the environment)
12. Toxicity of radioactivity, accidents in the nuclear industry.
13. Examples and case studies about the poisons from plant and animal origins.
14. Toxicity of gases (CO, CO2, N2, NOx, SO2).

Prescription for Nutritional Healing The A to Z Guide to Supplements 234-243 pages1. How can you group medicinal herbs?
2. What is Phytomedicine?
3. How many forms of commercial herbars do you know?
4. What are the adventages of herbal extracts?
5. Can herbs be harmful?

Risk Management for Food Allergy 25-37 pages1. Which food goups can cause food allergy?
2. What type of food allergies do you know, depending on the type of altered immunological response? Which is the most frequent?
3. Which fruits and vegetables cause allergy most often?
4. What is the relationship between fruits and vegetables allergies and pollen allergies?
5. What kind of symptoms does food allergy have?
6. How can we manage food allergies?
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