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| **Title and code** of the subject: **Environmental Measurement Techniques, MTMKG7006A** | **ECTS Credit Points: 4** |
| **Type** of the subject: compulsory | |
| **Ratio of theory and practice:** (credit%) 25/75 | |
| **Type and number of classes per semester**: 14 hour(s) lecture and 42 hour(s) practice per **semester**  Number of teaching hours / week : 1+3 (lecture and practice) | |
| **Type of exam**: exam | |
| **Subject in the curriculum:** semester 1 | |
| Preliminary requirements:- | |

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| **Summary of content - theory**: |
| Course objectives: Students are introduced to the applied classic and modern laboratory measuring techniques. Lab rules will be discussed, basic devices will be presented, weight and volume measuring techniques used in labs will be discussed, and basic chemical calculations will be made.  They will be able to use mobile, rapid water, soil analytical methods and the related water and soil quality protection regulations and legal background. Students will be able to determine food, soil and water quality and thus the likely impact and danger of pollutions and can make a decision if there is need for intervention.  Students acquire specialized knowledge in the measurement of municipal, agricultural and food industrial wastes and by-products and their analytical background. They receive useful knowledge about sampling methods (soil and plant) and sample pretreatment. |
| **Summary of content - practice**: |
| Skills to be learnt: working individually and in team; basic knowledge of classic and modern analytical measurements    Exercise 1: Lab safety, basic lab equipment  Exercise 2: Chemical calculations  Exercise 3: General introduction to titrimetry, acid-base titration, determination of acetic acid content in canned food samples and sulfuric acid content in industry wastes  Exercise 4: Determination of water hardiness by complexometric titration  Exercise 5: Determination of food salt concentration (Mohr’s method)  Exercise 6: Determination of acidity of milky products  Exercise 7: Environmental analysis: Sampling methods, soil sampling  Exercise 8: Soil analysis: determination of soil pH, nitrate, nitrite and ammonium content  Exercise 9: Soil analysis: determination of soil carbonate and phosphorus and potassium content  Exercise 10: Waste analysis: pretreatment: extraction methods  Exercise 11: Waste analysis: usage of test methods  Exercise 12: Determination of leaf chlorophyll content by non-destructive and destructive method  Exercise 13: Measurement of Soluble Solids Content of fruits  Exercise 14. Determination of phenol contaminants in water samples by thin layer chromatography |
| **Literature, handbooks in English** |
| 1. W. V. Nazaroff and L. Alvarez-Cohen. 2001. Environmental Engineering Science. 704 pages. Wiley Co.ISBN-13: 978-0471144946 2. Tamás J., Kovács E. 2008. Environmental technology. University of Debrecen, Institute of Water- and Environmental Management. TÁMOP 4.1.2. http://www.tankonyvtar.hu/en/tartalom/tamop425/0032\_kornyezettechnologia\_en/ch03.html 3. Environmental Measurements and Modeling https://www.epa.gov/measurements-modeling/collection-methods |
| **Competencies gained** *(acc. to the Regulation on training and outcome requirements)* |
| 1. **Knowledge:**  * Student has proper knowledge about the basics of laboratory practice. * Knows the methods of modern chemical analysis and environmental protection. * Knows the specific research methods and techniques of environmental management.  1. **Skills:**  * Student will be able to solve different practical problems of environmental sciences. * Student has an appropriate environment perspective thinking. * Student will be able to assist in scientific and developing projects. * Student will be able to participate actively in the team work and thus join the research and development projects.  1. **Attitude:**  * Student is committed to solve problems based on his/her professional basis. * Student has deep and professional interest in the field of environmental protection. * Student is committed to environmental protection, nature conservation and sustainable agriculture.  1. **Autonomy and responsibility:**  * Student is able to apply and develop modern, sustainable and environmental friendly agricultural technologies, independently. |
| **Responsible lecturer: Péter Tamás Nagy (PhD)** |
| **Terms of course completion:** |
| 1. Completing assignments / exercises 2. Giving presentation |
| **Form of examination:** |
| oral presentation |
| **Requirement(s) to get signature:** |
| * attendance of the lessons |

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| **Exam questions:** |
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