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| **Title** **and Code** of the subject:**Rheology in food testing, MTMEL7022A** | **ECTS Credit Points: 3** |
| **Type** of the subject: **compulsory** / optional |
| **Ratio of theory and practice: 50/50** (credit%) |
| **Type and number of classes per semester**: 14 hour(s) lecture and 14 hour(s) practice per **semester** Number of teaching hours / week : eg.:1+1 (lecture and practice) |
| **Type of exam**: **exam** / practical course mark |
| **Subject in the curriculum:** semester IV. |
| Preliminary requirements:- |

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| **Summary of content - theory**:  |
| Course objectives:The aim of this subject is to present the basic elements of rheology. It presents the aims of rheology and the general properties of elastic and viscous deformation. It presents the connections of stress and deformation in details and the connecting principles, the basic models of different rheological systems (Kelvin, Maxwell and other). The measurement of rheological properties – rheometry. The general rheometric methods (capillary viscometers, rotational viscometers, rheometers, texture analysis). At the end, selected food groups are presented by their rheological behaviour and their special rheometric methods are also discussed.1. Aim of rheology
2. The elastic and viscous deformation.
3. Connections of stress and deformation. Superposition principles
4. Elastic deformations and modulus. Shearing stress and viscosity
5. Rheological models (Kelvin, Maxwell, Burgers model)
6. Rheometry: Capillary viscometers, Rotational viscometers, Rheometers
7. Force measurement methods
8. Distance, time and ratio measurements
9. Texture analysis – aims, types
10. Exam
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| **Summary of content - practice**: |
| Skills to be learnt: The general aim of the practice is to enable students to acquire knowledge in the science of rheology. Learn the practical use of rheology by measuring rheological properties by performing different rheometric measurements.1. Safety education and accident prevention
2. Demonstration the tools using in the practice
3. Rheological methods in cereal analysis
4. Farinograph
5. Hagberg falling number
6. Viscosity
7. Calculation practice
8. Rheological methods in fruit analysis
9. Texture analyser
10. Exam
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| **Literature, handbooks in English**  |
| 1. Howard A. Barnes (2000): A Handbook of Elementary Rheology. University of Wales, Institute of Non-Newtonian Fluid Mechanics, 200. p. ISBN 0953803201 2. Malcolm C. Bourne (2002): Food Texture and Viscosity: Concept and Measurement. Second Edition. Academic Press, UK, 427. p. ISBN-10: 01211906253. Sipos P. (2014): Rheology in food analysis. Debreceni Egyetem, Debrecen, egyetemi jegyzet, 57. p. |
| **Competencies gained** *(acc. to the Regulation on training and outcome requirements)* |
| 1. **Knowledge:**
* Know the principles of laboratory testing, which is necessary to identify a problem in the food industry.
1. **Skills:**
* Students will able to carry out a laboratory task, taking into account the environmental and health protection aspects.
1. **Attitude:**
* Students are sensitive and open to the problems in the food industry, strive to analyze and solve them.
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| **Responsible lecturer: Dr. Diána Ungai, assistant professor, PhD** |
| **Other lecturer(s): ………..., ………………….** |

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| **Terms of course completion:** |
| 1. Completing assignments
2. Giving presentation
3. Take an exam
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| **Form of examination:** |
| written exam |
| **Requirement(s) to get signature:** |
| Attendance at **lectures** is recommended, but not compulsory. Participation at **practice** is compulsory. Students must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Attendance at practice classes will be recorded by the practice leader. Requirements to get a grade:The minimum requirement for the test is 60%.0-59 % fail (1)60-69 % pass (2)70-79 % satisfactory (3)80-89 % good (4)90-100 % excellent (5) |

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| **Exam questions:** |
| 1. Why is rheology important in the food industry?
2. What is the definition of rheology?
3. Rheological systems (elastic deformations)
4. Rheological systems (flow deformation)
5. Rheological systems (viscoelastic and plastoelastic deformations)
6. Maxwell model
7. Kelvin model
8. Burgers model
9. Capillary viscometer
10. Falling ball viscometer
11. Types of rotational viscometer
12. Texture analyser, its importance in the food industry
13. Rheological methods in cereal analysis (farinograph)
14. Rheological methods in cereal analysis (alveograph)
15. Rheological methods in cereal analysis (extenzigraph)
16. Rheological methods in fruit and vegetable analysis
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