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**Syllabus**

**BSc. Food Science and Biotechnology**

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| **Subject** | **FOOD PHYSICS** |
| **Type** | **Semester** | **ECTS** | **Code** |
| (O) | 3 | 4 | 130PHF257 |
| **Course Lecturer****Course Assistant** | Prof. Dr. Violeta Lajqi Makolli: Prof. Dr. Sami MakolliProf. Dr. Violeta Lajqi Makolli: Prof. Dr. Sami Makolli |
| **Aims and Objectives** | The following topics will be covered in this course: Physical quantities, units and dimensions; Rheology, rheological properties of liquid foods (Newtonian and non-Newtonian fluids); Transport / fluid movement; Factors affecting rheological properties, viscoelasticity; Rheological properties of doughs; Methods and apparatus for determining the rheological properties of liquid and semi-liquid materials; Rheological properties of suspensions; Rheological characteristics of granules and powder materials; Rheological properties of solid materials - textures. Thermophysical properties of food; Methods for determination of thermophysical properties; Phenomena in the boundary phase of foods; Water activity and properties of food sorption; Dielectric electric and optical properties of food. |
| **Learning Outcomes** | After completing the course students will gain knowledge and skills to:* know the physical and derived quantities necessary for measuring the physical and thermophysical properties of foods,
* recognize and apply the rheological properties of liquid materials, the movement of effluents and factors affecting these rheological properties,
* define, interpret, and apply problems related to the rheological characteristics of the doughs, suspensions and solids,
* know the phenomena at the boundary stages and methods for determining the thermophysical properties of food,
* recognize and describe the electrical and optical properties of foods etc.
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| **Course Content** | **Weekly plan** | **Week** |
| Introduction, units and dimensions in food physics | 1 |
| The differences between physical and thermophysical properties of foods. | 2 |
| Rheology, rheological properties of food | 3 |
| Rheology and factors affecting the rheological properties of foods. | 4 |
| Viscometry and instruments for measuring viscosity | 5 |
| Rheological properties of solid materials | 6 |
| Rheological properties of suspensions, granules and powder materials | 7 |
| Rheological properties of doughs | 8 |
| Thermal properties of foods | 9 |
| Phenomena in the boundary stages of foods and Water activity | 10 |
| Electrical properties of Food | 11 |
| Optical properties of Food | 12 |
| Presentations | 13 |
| Presentations, Repetition of the subject or by agreement with the students, study visits or preliminary exams can be foreseen. | 14 |
| Final exam | 15 |
| **Weekly plan – Exercises (numerical exercises)** | **Week** |
| Density of composite foods and porosity | 1 |
| Calculation of Specific Heat of food products | 2 |
| Calculation of Latent Heat of food products | 3 |
| Flow regimes, fluid flow and fluid velocity | 4 |
| Study visits to the food industry (to get to know with production lines and specific equipment/apparatus for measuring the rheological properties of foods) | 5 |
| Rheological properties of foods | 6 |
| **Literature/****References** | * Skript interne.
* Ludger O.Figura Arthur A. Teixeira ©2023. Food Physics Physical Properties - Measurement and Applications, Second Edition, [Springer International Publishing](https://www.jpc.de/s/springer%2Binternational%2Bpublishing?searchtype=ctxverlag)
* Ludger O.Figura ArthurA.Teixeira Food Physics, Physical Properties – Measurement and Applications, USA, © Springer-Verlag BerlinHeidelberg2007
* M. J. Lewis, Physical properties of foods and food processing systems, UK Woodhead Publishing Limited Cambridge England, Woodhead Publishing Limited Reprinted 2002,2006
* Serpil Sahin and Servet G¨ul¨um Sumnu, Physical Properties of Foods, Middle East Technical University Ankara, Turkey, 2006 Springer Science+Business Media, LLC.
* M.J. Lewis: Physical Properties of Foods and Food Processing Systems, Ellis Horwod, Chichester 1987.
* T.Lovric, Procesi u prehrambenoj tehnologiji s osnovama prehrambenog inzinjerstva, Hinus, Zagreb, 2003.
* A.Kopalli, I. Malollari (2007), Proceset themelore në teknologjinë ushqimore, Maluka,Tiranë.
* I.G. Mandala, S.V. Protonotariou, Chapter 3 - Physical properties of food materials, Editor(s): Seid Mahdi Jafari, Engineering Principles of Unit Operations in Food Processing, Woodhead Publishing, 2021, Pages 45-64, https://doi.org/10.1016/B978-0-12-818473-8.00015
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**Academic and Etiquette Rules:**

Regular attendance at lectures and exercises and rules of etiquette such as: respecting the class schedule, entering the classroom on time, keeping calm in class, turning off mobile phones, etc.