HUNGARIAN UNIVERSITY OF AGRICULTURE AND LIFE SCIENCES

Budai Campus
Institute of Food Science and Technology
1118 Budapest, Villányi út 29-43.
international.buda@uni-mate.hu

List of available courses

***- A limited number of ERASMUS students can be admitted.**

****- The course will only start if there is a sufficient number of students.**

1 BSc program - Food Engineering – Fall semester

1.1 Biology

Course title**: Biology** **Subject code: ELTUD030N**	**Credits: 3**
Nature of the course: **obligatory course**	
„Training character”: **lecture** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark: offered grade on the basis of mid semester written tests **Other ways** to be applied in evaluation**:**	
Place in training: **1st semester (fall)**	
Prerequisites:	
Course Description:	
Biology focuses on the basic principles of cell biology, phytology and zoology. This course provides basic knowledge on the structure and function of prokaryotic and eukaryotic cells, types, structures and functions of plants and animals at both tissue and body levels.	
Required and recommended **reading**: Campbell NA, Reece JB, Urry LA, Michael L. (2008) Campbell Biology. 8th ed. Pearson Benjamin Cummings, ISBN: 9780805368444. James D. Mauseth: Botany: An Introduction to Plant Biology	
Responsible instructor: Andrea Taczman Brückner, PhD	
Teacher(s) involved in teaching of the subject: Viktória Dobó	

1.2 General Microbiology*

Course title**: General Microbiology** **Subject code: ELTUD015N**	**Credits: 4**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + practical** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **26 (lecture) + 26 (practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark: colloquium **Other ways** to be applied in evaluation**:** practice written tests	
Place in training: **3rd semester** (**fall)**	
Prerequisites:	
Course Description:	
Within the confines of lectures, the morphology of microbes, cell structure, organelles and function will be reviewed. Furthermore, the principles and kinetics of microbial growth, genetic background of properties and the main microbial metabolic pathways will be discussed with examples. Basic methods in microbiology (investigation of macro- and micromorphology, metabolic processes) are also discussed and applied in practice, as well.	
Required and *recommended* **reading**: Brock Biology of Microorganisms (Madigan – Martinko - Stahl – Clark), Benjamin Cummings, 2012 Alcamo’s Fundamentals of Microbiology (Jeffrey C. Pommerville), Jones and Bartlett Publishers, 2011	
Responsible instructor: Mónika Kovács, PhD	
Teacher(s) involved in teaching of the subject: Ágnes Belák, PhD; Andrea Pomázi, CSc; Andrea Taczman-Brückner, PhD	

1.3 Food Chemistry 1 (theory)

Course title: **Food Chemistry 1** **Subject code: ELTUD067N**	**Credits: 3**
Nature of the course: **obligatory course**	
„Training character": lecture (credit%)	
Course type: lecture course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: oral or written exam **Other ways** to be applied in evaluation**:**	
Place in training: **3rd semester (autumn)**	
Prerequisites: Undergraduate courses in Inorganic Chemistry, Organic Chemistry, and Biochemistry or equivalent background knowledge	
Course Objectives: The aim of the Food Chemistry course is to provide students with an overview of the chemical and physical properties of the food components, and to understand the close relationship between their structure and functionality. The course covers the chemical structures and properties of water, carbohydrates, amino acids, proteins, fatty acids, lipids, minerals, vitamins, and their functions in food systems, in addition food toxicants, and a short summary of common analytical techniques.	
Required and *recommended* **reading**: Belitz H-D., Grosch W.: Food Chemistry. Springer Verlag, 2009. Velisek J.: The Chemistry of Food, Wiley, 2014.	
Responsible instructor: Prof. Dr Livia Simon Sarkadi, DSc, full professor	
Lecturer: Prof. Dr Livia Simon Sarkadi, DSc, full professor	

1.4 Analytical Chemistry for Food and Bioengineering

Course title**: Analytical Chemistry for Food and Bioengineering** **Subject code: ELTUD398N**	**Credits: 3**
Nature of the course: **obligatory course**	
„Training character”: **lecture** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **39 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark **Other ways** to be applied in evaluation**:**	
Place in training: **3rd semester (fall)**	
Prerequisites: *familiar knowledge in general, inorganic and organic chemistry*	
Course Description:	
An introduction to food analysis. Basic concepts, rules and methods applied in of food and biomaterioal sampling and sample preparation. Introduction to classical food analytical methods (e.g., various titration methods, Soxhlet fat and Kjeldhal protein methods). Understanding the analytical methods for the determination of macro components (water, fat, acidity, salt, sugar, protein, starch, fibre) of food and biomaterials. Introduction to bioanalytical and instrumental analytical chemistry: basics of electroanalysis (pH measurement), chromatography and spectroscopy. Examples for analytical calculations.	
Required and *recommended* **reading**: Nielsen's Food Analysis, (or any textbook on food analytical methods)	
Responsible instructor: László Abrankó, PhD	
Teacher(s) involved in teaching of the subject:	

1.5 Measurement Technology in Food Industry *

Course title: **Measurement Technology in Food Industry** **Subject code: ELTUD104N**	**Credits: 3**
Nature of the course: **mandatory course (a limited number of ERASMUS students can be admitted)**	
„Training character": **lecture + laboratory practice** (credit%) 33**% theory / 67% practice (kredit%)**	
Course type: lecture course and lab course number of **hours** per semester: **13 (lecture) + 26 (laboratory practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: **case studies, project teamwork, student presentation**	
Evaluation: test on technical terms, exam mark **Other ways** to be applied in evaluation**: practical exam (week 7), all practicals are validated by question at the end, written test yield offered grade**	
Place in training: **3rd semester (autumn)**	
Prerequisites: -	
Course Objectives:	
The main purpose of the subject is to provide information about electric sensors, machines, present their advantages and limitations. Students will be able to select the appropriate one for specific tasks and can perform simple design calculations.. Curriculum (Lecture / Practice): 1., Requirements. Measurement and error. / Introduction, preparatory test. 2., Capacitor based sensors. / Working with multimeters. 3., Resistor based sensors. / M1 – Electronic measurements. 4., Coil based sensors. / M2 – Analysis of accumulators. 5., DC circuits for measurements. / M3 – Analysis of rotary machines. 6., AC circuits for measurements. / M4 – Semiconductor circuits: proximity and motion sensors. 7., Pulsed electric field. / Evaluation of practicals (exam measurements) 8., Features of accumulators. / S1 – Capacitor based sensors. 9., Features of DC machines. / S2 – Resistor based sensors. 10., Ultrasonic measurements and treatments. / S3 – Analysis of accumulators. 11., Computer vision. / S4 – Analysis of machines. 12., Spectroscopy. / Written test. 13., Selected case studies. / Supplementation of missing practicals and written test.	
Required and *recommended* **reading**: • Shared documents and videos on the e-learning site Class code: 1FA35NAK04B or ELTUD104N • N.E. Battikha: The Condensed Handbook of Measurement and Control. 2017. International Society of Automation. ISBN 978-1945541384 • Kourosh Kalantar-zadeh: Sensors: An Introductory Course. 2013. Springer. ISBN 978-1461450511 • https://www.springer.com/gp/book/9781461450511	
Responsible instructor: László Baranyai, PhD	
Teacher(s) involved in teaching of the subject: Dr. Zsomné Dr. Muha Viktória, PhD, Kertész István, PhD	

1.6 Basics of Raw Materials *

Course title: **Basics of Raw Materials** **Subject code: ELTUD138N**	**Credits: 4**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + laboratory practice** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **26 (lecture) + 13 (laboratory practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: The grade given for the subject is formed from the results of the written exam during the examination period. **Other ways** to be applied in evaluation**:** Each student must complete 3 practices during the semester, with a minimum of 80% of the student's marks in each practice.	
Place in training: **3rd semester (autumn)**	
Prerequisites: -	
Course Objectives:	
The subject provides comprehensive knowledge of the most important characteristics, nutritional and physiological significance and quality requirements of the raw materials in the food industry (fruits, vegetables, cereals, industrial plants, meat, egg and milk). The student is introduced to the methods and aspects of raw material qualification.	
Required and *recommended* **reading**: Shared documents and videos on the e-learning site	
Responsible instructor: Géza Hitka, PhD	
Teacher(s) involved in teaching of the subject: Klára Pásztor-Huszár, Katalin Badak-Kerti, Zsuzsanna Kiss, Adrienn Varga- Tóth, Gábor Jónás, Karina Hidas, József Surányi	

1.7 Knowledge of Livestock Products Technologies 1 **

Course title**: Knowledge of Livestock Products Technologies 1** **Subject code: ELTUD009N**	**Credits: 3**
Nature of the course: **obligatory course (The course will only start if there is a sufficient number of students.)**	
„Training character”: **lecture** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark: exam **Other ways** to be applied in evaluation**:**	
Place in training: **5th semester** (**fall)**	
Prerequisites:	
Course Description:	
In the framework of the course, students will learn about the situation of the dairy, poultry and meat industries in Hungary and the EU, the structure and opportunities of the industries concerned. During the semester, students will learn the basics of dairy farming, the composition of milk, the physical, chemical, microbiological and colloidal characteristics of milk and the centralised milk grading system. Students will learn about primary and general technological operations and equipment in the meat, poultry and dairy industries. Importance and composition of meat, livestock species and breeds, slaughtering techniques, meat grading, and storage processes are discussed. Students will learn about meat biochemistry, aging processes, additives used in the meat industry and poultry processing technologies.	
Required and *recommended* **reading**:	
Responsible instructor: Klára Pásztor-Huszár, PhD	
Teacher(s) involved in teaching of the subject: Klára Pásztor-Huszár, PhD; Ildikó Csilla Nyulas-Zeke, PhD, József Surányi	

1.8 Knowledge of Postharvest Technologies 1**

Course title**: Knowledge of Postharvest Technologies 1** **Subject code: ELTUD020N**	**Credits: 3**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark: exam **Other ways** to be applied in evaluation**:**	
Place in training: **5th semester (fall)**	
Prerequisites: -	
Course Description:	
The course provides an overview of the methods of handling food products. This semester will focus on the storage and logistics of food of animal origin and the related quality control tasks. Students will gain an insight into the inventory management of meat, meat products, milk and dairy products, eggs, fish, ready to eat meals and catering.	
Required and *recommended* **reading**:	
Responsible instructor: György Kenesei, PhD	
Teacher(s) involved in teaching of the subject: György Kenesei, PhD; Karina Ilona Hidas, PhD, József Surányi, Géza Hitka, PhD	

1.9 Packaging Technology

Course title**: Packaging Technology** **Subject code: ELTUD040N**	**Credits: 3**
Nature of the course: **compulsory optional course**	
„Training character”: **lecture** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **13 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark: exam **Other ways** to be applied in evaluation**:**	
Place in training: **5th semester (fall)**	
Prerequisites:	
Course Description:	
The objective of this course is to provide students with an understanding of the role and function of food packaging. To acquire a broad knowledge of the groups, properties and production methods of different packaging materials and devices. Gain an insight into the storage, transport and distribution of foodstuffs and their requirements. During the semester, students will become familiar with basic packaging machines, the principles of their operation and their integration into the food production process. Students will acquire knowledge of modern and innovative packaging materials, new packaging technology processes and machinery, current regulations on packaging.	
Required and *recommended* **reading**:	
Responsible instructor: Beatrix Szabó-Nótin, PhD	
Teacher(s) involved in teaching of the subject: Beatrix Szabó-Nótin, PhD	

1.10 How to write a thesis?*

Course title**: How to write a thesis?** **Subject code: ELTUD090N**	**Credits: 3**
Nature of the course: **compulsory elective course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + practical** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **13 (lecture) + 13 (practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark **Other ways** to be applied in evaluation**:**	
Place in training: **5th semester** (**fall)**	
Prerequisites: -	
Course Description:	
The aim of this course is to help students to write their thesis in accordance with the relevant formal and content requirements. They will be given information on what parts a thesis has and what requirements their thesis must meet. They will be informed about how to choose literature and which databases to use. They will also learn the basics of text and image editing.	
Required and *recommended* **reading**:	
Responsible instructor: Viktória Zsom-Muha , PhD	
Teacher(s) involved in teaching of the subject: Adrienn Varga-Tóth, Éva Illési, Tamás Zsom	

2 BSc program - Food Engineering – Spring semester

2.1 Organic and Biochemistry *

Course title: **Organic and Biochemistry** **Subject code: ELTUD164N**	**Credits: 6**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character": **lecture + laboratory practice** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **52 (lecture) + 13 (laboratory practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark **Other ways** to be applied in evaluation**: laboratory reports**	
Place in training: **2nd semester (spring)**	
Prerequisites: *General and inorganic chemistry*	

Course Objectives:

Organic chemistry 1: Chemical reactivity of organic molecules (electronegativity, electronaffinity). Phases in chemical reactions, nucleophilic and electrophilic, radical and ionic reactions. Reactions with addition, substitution and elimination. Biogenic elements. Tendency of hydrogenic-bonding of organic molecules in context of polar/apolar character. Carbon skeletons. Alkanes (paraffins), alkenes (olefines), alkynes (acetylene). Structural and geometrical isomerism.
Organic chemistry 2: Chemical character of the aromatic hydrocarbons: high level delocalization. Heteroaromatic rings and their physical-chemical character compared to benzene. Nucleic acid bases.
Organic chemistry 3: Simple functional groups, reactivity, acid-base character. Organochlorine compounds, chlorine-containing organic solvents. The most important alcohols and phenols, their reactions, amines, biogenic amines. Reactivity of ethers, ether complexes. Chemical reaction of carbonyl-group, redox-reaction of aldehydes. Structure of carbohydrates, cyclization of monosaccharides, glucosidation.
Organic chemistry 4: Complex functional groups. The most important carboxylic acids, their attribute. Specific reaction of esters, the most important representatives. The amide functional group, the effect of partial delocalization.
Organic chemistry 5: Type of biomolecules and their characters from organic chemistry point of view.
Biochemistry 1: Basic principles of biochemistry, anabolism and catabolism. Characterization of biomolecules, their role in metabolism.
Biochemistry 2: Structural levels, classification and characterisation of proteins. Enzyme catalysis, kinetics of enzymatic reaction, classification of enzymes, enzyme activity. Biochemistry of the amino acids, amino acid metabolism.
Biochemistry 3: Carbohydrates, the most important mono-, di- and polysaccharides. Carbohydrates metabolism. Glycolysis, oxidative decarboxylation of pyruvate, citric acid cycle, terminal oxidation, pentose phosphate pathway. Carbohydrate synthesis, gluconeogenesis, photosynthesis.
Biochemistry 4: Lipids, biochemistry of major lipid classes. Lipid metabolism.
Biochemistry 5: Nucleic acids, their role in protein synthesis. Biological membranes and transport processes.

Required and *recommended* **reading**:
Maintland Jones, Steven A. Fleming: Organic chemistry (5th edition)
Stryer: Biochemistry (1988. New York)

Responsible instructor: Marczika Andrásné dr. Sörös Csilla, senior lecturer, PhD

Teacher(s) involved in teaching of the subject: Dr Anna Kacsándi, senior lecturer, PhD, Dr. Nóra Papp, senior lecturer, PhD

2.2 Knowledge of Additives and Their Technological Functions

Course title**: Knowledge of Additives and Their Technological Functions** **Subject code: ELTUD192N**	**Credits: 3**
Nature of the course: **obligatory course**	
„Training character”: **lecture** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark: exam **Other ways** to be applied in evaluation**:**	
Place in training: **2nd semester (spring)**	
Prerequisites:	
Course Description:	
The aim of the course is to provide students with an insight into different types of food through knowledge of additives. In order, they learn about the different groups of additives (e.g. texture modifiers, sweeteners, colourings, preservatives, technological modifiers), their most well-known members, their uses, functions and their potential applications in different types of food. Students will also gain insight into the regulatory system for the use of additives in food.	
Required and *recommended* **reading**:	
Responsible instructor: Lilla Szalóki-Dorkó, PhD	
Teacher(s) involved in teaching of the subject: Lilla Szalóki-Dorkó, PhD; Mónika Máté, PhD	

2.3 Nutrition Science

Course title: **Nutrition Science** **Subject code: ELTUD171N**	**Credits:3**
Nature of the course: **obligatory course**	
„Training character": lecture (credit%)	
Course type: lecture course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: exam **Other ways** to be applied in evaluation**: -**	
Place in training: **2nd semester (spring)**	
Prerequisites: -	

Course Objectives:

1. The importance of healthy eating, nutrition recommendations
2. Reformed foods for healthy diet
3. The structure of the digestive system, its regulation by the nervous system
4. Functioning of the gastrointestinal tract: oral cavity, mechanism of taste perception
5. Gastric function. Role of liver and pancreas
6. Intestinal function
7. Importance of microbiome
8. Structure of the cell membrane, absorption processes
9. Metabolism of carbohydrates. Diabetes.
10. Transportation and storage of fats. Cardiovascular disease
11. Metabolism of Proteins. Allergy, enzymopathy
12. Nutritional importance of amino acids. Qualification of proteins.
13. Consultation

Required and *recommended* **reading:**

- Gibney, Lanham-New, Cassidy, Vorster: Introduction to Human Nutrition. A John Wiley & Sons, Ltd., Publication, 2009.
- Caballero: Encyclopedia of human nutrition. Elsevier 2005.

Responsible instructor: Mednyánszky Zsuzsanna, associate professor, PhD

Teacher(s) involved in teaching of the subject: Rita Végh, research fellow

2.4 Food Chemistry 2.*

Course title**: Food Chemistry 2.** **Subject code: ELTUD068N**	**Credits: 3**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **practice** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **24 (practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark: **practical grade** **Other ways** to be applied in evaluation**:**	
Place in training: **4th semester (spring)**	
Prerequisites: -	
Course Description:	
1. Labor and fire safety training. Chemical calculations (solution preparation, factoring, sample preparation, dilution). Tools and chemicals in the laboratory. Correct use of analytical balance 2. Determination of alcohol content of food by distillation and density measurement. Determination of the volatile acid content of foods. 3. Measurement of protein content by Kjeldahl method 4. Determination of starch content by polarimetry. Determination of reducing disaccharides by Schoorl method. Measurement of soluble solid content by refractometry 5. Determination of iodine value of lipids by Winkler method. Measurement of refractive index of lipids. Determination of lipid content of foods by Soxhlet-extraction (demonstration) 6. Written examination	
Required and recommended **reading**: Belitz H-D., Grosch W.: Food Chemistry. Springer Verlag, 2009. Velisek J.: The Chemistry of Food, Wiley, 2014.	
Responsible instructor: Zsuzsanna Mednyánszky, PhD	
Teacher(s) involved in teaching of the subject: Marianna Csóka, PhD; Rita Végh	

2.5 Food Microbiology and Hygiene*

Course title**: Food Microbiology and Hygiene** **Subject code: ELTUD069N**	**Credits: 6**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + practical** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **26 (lecture) + 39 (practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark: colloquium **Other ways** to be applied in evaluation**:** practice written tests	
Place in training: **4th semester** (**spring)**	
Prerequisites:	
Course Description:	
The student will gain insight into the laws of microbial decay, the factors influencing reproduction and the microbiological effects of technological operations. The student will have knowledge of microbes affecting food and are of importance for food health, cleaning and disinfection processes, microbiological quality control and the basics of HACCP	
Required and *recommended* **reading**:	
Responsible instructor: Csilla Mohácsi-Farkas, PhD	
Teacher(s) involved in teaching of the subject: Ágnes Belák, PhD; Gabriella Kiskó, PhD; Mónika Kovács, PhD; Andrea Taczman-Brückner, PhD	

2.6 Control Engineering in Food Industry*

Course title: Control Engineering in Food Industry **Subject code: ELTUD105N**	**Credits: 3**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + laboratory practice** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **13 (lecture) + 26 (laboratory practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark **Other ways** to be applied in evaluation**: laboratory reports**	
Place in training: **4th semester (spring)**	
Prerequisites: Measurement technology in food industry	
Course Objectives:	
Required and *recommended* **reading**:	
Responsible instructor: Zoltán Gillay, PhD	
Teacher(s) involved in teaching of the subject: -	

2.7 The basics of preservation technologies *

Course title: Basics of Preservation Technologies **Subject code: ELTUD175N**	**Kreditértéke: 4**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character: lecture + laboratory practice (credit%)	
Course type: lecture course and lab course Number of **hours** per semester: 26 (lecture) + 13 (laboratory practice) language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: exam **Other ways** to be applied in evaluation**: -**	
Place in training: **4th semester (spring)**	
Prerequisites: -	

Course description:

Water content in food, spoilage of foodstaffs, preservation methods.
Water content and Activity of different foods. Microorganisms in different foods.
Spoilage caused microorganisms. Groups of different preservation technologies.
General aspects of Conventional Thermal Processing and Preservation (Temp., O_2, pH, aw)
Thermal death rate Curve (D value), Thermal Death Time curve (Z-value). Amount of heat treatment using 12-D and F-Value-concept. Heat treatment Methods: Pasteurisation, Sterilisation.
Ripening processes of horticultural plant products and their control. Temperature dependence of chemical and biochemical life processes in plant products. The effect of artificial temperature decrease on living plant materials. Advantageous and disadvantageous effects of temperature decrease in case of storage of plant materials.
Role of factors affecting the cold storage of foodstuffs with plant origin: relative humidity, air speed and gas composition. Cold storage methods. Technical basics of cold storage, (pre)cooling methods for horticultural products. Theory of controlled atmosphere storage, methods and tools for gas concentration alteration and control.
Theoretical aspects of food freezing. The process of freezing and the rules of water freezing. Freezing of solutions. Food as a biopolymer system. Rules of food freezing.
Effect of freezing on microorganisms. Changes in plant cells and tissues during freezing. Changes in muscle tissue due to freezing. Thermophysical aspects of food freezing: Weight loss during freezing. Freezing procedures and equipments.
Preservation by dehydration. Water content in foods. Role of water content of foods in the drying technology
Theoretical basic of drying. Drying curves and stages, sorption isotherms.
Evaporation technologies, effect of heat for foods during evaporating. Multi-stage evaporator systems.
Preservatives. Legislation of using of preservatives. Main groups and their properties.
Combined preservation technologies.
Practice:
Investigation of heat treatment in practice
Investigation of fruit juice's evaporation
Vacuum cooling
Freezing of solutions

Required and *recommended* **reading:**

Sinha, N.,Sidhu, J.S., Barta. J., Wu, J., Pilar Cano, M.(ed): Handbook of Fruits and Fruit Processing. Wiley- Blackwell Publishing, Ames, Iowa, USA. ISBN-13: 978-0-8138-0894-9/2012
Tokusoglu Ö, Swanson B.G. (ed.): Improving Food Quality with Novel Food Processing Technologies. CRC Press ISBN 9781138199880

Responsible instructor: Mónika Máté, associate professor, PhD

Teacher(s) involved in teaching of the subject:

Beatrix Szabó-Nótin, associate professor, PhD
István Dalmadi, associate professor, PhD
Lilla Szalóki-Dorkó, assistant professor, PhD
Tamás Zsom, associate professor, PhD

3 MSc - Food Science and Technology Engineering – Fall semester

3.1 Technology and Product Innovation*

Course title**: Technology and Product Innovation** **Subject code: ELTUD180N**	**Credits: 5**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + practical** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **52 (lecture) + 39 (practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge:	
Evaluation: test on technical terms, exam mark: The grade given for the subject is formed from the results of the written exam during the examination period. **Other ways** to be applied in evaluation**:** Presentations, and laboratory reports	
Place in training: **1st semester** (**fall)**	
Prerequisites:	
Course Description:	
The aim of the course is to provide students with knowledge about the need for product development and the steps of development. The course presents the steps of product development implementation from idea to implementation, from economic evaluation to consumer testing. Students become able to assess and implement the need for product development.	
Required and *recommended* **reading**: - Gordon W. Fuller New Food Product Development G.W. Fuller Associated Ltd, Montreal, Canada, 2004 ISBN: 0-8493-1673-1 - Aaron L. Brody, John B. Lord: Developing New Food Product for a Changing Marcetplace USA, 2007 ISBN: 0-8493-2833-0 - Robert C. Baker, Patricia Wong Hanh, Kelly R. Robbins Fundamentals of New Food Product development USA, 1988 ISBN: 0-44-41688-9	
Responsible instructor: Géza Hitka, PhD	
Teacher(s) involved in teaching of the subject: Lilla, Szalóki-Dorkó, Beatrix Szabó-Nótin, PhD; László Ferenc Friedrich, PhD; Klára Pásztorné Huszár, PhD; Adrienn Vargáné Tóth, PhD; Géza Hitka, PhD	

3.2 Mass and Energy Transfer Processes*

Course title: **Mass and Energy Transfer Processes** **Subject code: ELTUD018N**	**Credits: 4**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character": **lecture + practice** (credit%)	
Course type: lecture course and calculation course number of **hours** per semester: **26 (lecture) + 13 (practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: exam mark **Other ways** to be applied in evaluation**: design exercise**	
Place in training: **1st semester (autumn)**	
Prerequisites: -	

Course Objectives:

1. Mathematical modelling of batch and continuous processes. Balance equations for steady state and unsteady-state operation. The film concept and the mass transfer processes. Similarity of heat and mass transport.
2. Principles of absorption. Phase equilibria. Mass balances, determination of minimal solvent flow rate. Estimation of the number of theoretical stages. Absorber design.
3. Design of absorber (calculation exercise)
4. Principles of adsorption, isotherms.
5. Phase diagrams of ideal and non-ideal liquid-vapor mixtures. Continuous and batch distillation.
6. Calculation exercises of continuous and batch distillation.
7. Operation of continuous rectification, equations of operating lines, determination of Number of Theoretical Stages. Possible values of reflux ratio.
8. Calculation exercises of continuous rectification.
9. Batch rectification (multistage distillation). Theory and calculation exercises.
10. Steady-state and unsteady-state heat transfer in solids and in liquids. Temperature profiles.
11. Calculation exercises of Unsteady-state heat transfer.
12. Unsteady-state diffusion. Theory and calculation exercises.
13. Batch drying. Prediction of drying time from drying rate data

Required and *recommended* **reading**:

- ***Bird, Stewart, Lightfoot 2001.*** Transport phenomena. Wiley International.
- ***Hallström, Skjöldebrand, Tagardh 1998.*** Heat transfer and food products. Elsevier.
- ***Sattler, Feindt. 1995.*** Thermal Separation Processes. VCH
- ***Toledo, 2007.*** Fundamentals of Food Process Engineering, Springer.
- ***D. Basmadjian, 2007.*** Mass Transfer and Separation Processes, CRC Press

Responsible instructor: Szilvia Bánvölgyi, PhD

Teacher(s) involved in teaching of the subject: -

3.3 Complex Food Analytical Methods*

Course title**: Complex Food Analytical Methods** **Subject code: ELTUD073N**	**Credits: 4**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + practical** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **39 (lecture) + 26 (practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark **Other ways** to be applied in evaluation**:**	
Place in training: **1st semester** (**fall)**	
Prerequisites:	
Course Description:	
The course provides a comprehensive overview of food quality testing procedures for food professionals. The background and applications of the applied analytical, physical, rheological and sensory methods are discussed in theoretical lectures. Half of the course consists of laboratory exercises and completion of related test reports. This course develops competence about the options for instrumental food testing.	
Required and *recommended* **reading**:	
Responsible instructor: Eszter Benes , PhD	
Teacher(s) involved in teaching of the subject:	

3.4 Advanced Consumer Sensory Methods*

Course title: **Advanced Consumer Sensory Methods** **Subject code: ELTUD115N**	**Credits: 4**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + laboratory practice** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **13 (lecture) + 26 (laboratory practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: exam mark **Other ways** to be applied in evaluation**:**	
Place in training: **1st semester (autumn)**	
Prerequisites: -	
Course Objectives:	
Required and *recommended* **reading**:	
Responsible instructor: Attila Gere, PhD	
Teacher(s) involved in teaching of the subject: -	

3.5 Animal Product Technologies and Developments*

Course title: **Animal product technologies and developments** **Subject code: ELTUD011N**	**Credits: 7**
Nature of the course: **elective course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + laboratory practice** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **52 (lecture) + 26 (laboratory practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark **Other ways** to be applied in evaluation**: laboratory reports**	
Place in training: **autumn semester**	
Prerequisites: -	
Course Objectives:	
The course provides knowledge about raw materials of livestock products, their microbiology and biochemical characteristics. Microbiological, physico-chemical, biochemical and physical methods of preservation of food of livestock origin, theoretical background of the most widely used methods are discussed. Possibilities to hinder food spoilage processes are studied. Minimal processing technologies (high hydrostatic pressure, ultrasound, sous-vide technologies etc.) and their potential in ensuring food quality and extending shelf-life of foods is introduced. Role of starter cultures during food processing, mechanisms of action, role of live flora in development of product characteristics are included into the curriculum. The course helps students to understand the principles of technofunctional properties of meat paste and development of gel structure. Microbiological and enzymological background of acid fermentation and rennet coagulation, gel structure development of curd are presented. Role of microbiological and biochemical reactions in the development of organoleptic characteristics during cheesemaking and ripening are surveyed. Biochemical background of processes taking place during curing, possibilities to accelerate processes (tumbling, ultrasound) are studied. Determination of product development trends, extension of shelf life, introduction of new packaging materials and additives. Laboratory and pilot-scale practicals are part of the course as well.	
Required and *recommended* **reading**: Lawrie, R.A., Ledward, D.A. (2006): Lawrie's meat science. Cambridge, Woodhead Publishing. ISBN: 9781845691592 - Goff, D.: Dairy Science and Technology. Dairy Science and Technology Education. University of Guelph. Canada. www.foodsci.uoguelph.ca/dairyedu/home.html - Sun, D-W. (ed.) (2014):Emerging Technologies for Food Processing. (2nd ed.) London. Academic Press. ISBN: 9780124114791	
Responsible instructor: Klára Pásztor-Huszár, PhD	
Teacher(s) involved in teaching of the subject: Friedrich László, PhD., Dalmadi István, PhD., Jónás Gábor, PhD., Dr. Kenesei György, PhD.	

4 MSc - Food Science and Technology Engineering – Spring semester

4.1 Process Control in the Food Industry 1.*

Course title: **Process Control in the Food Industry I.** **Subject code: ELTUD062N**	**Credits: 4**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + laboratory practice** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **13 (lecture) + 26 (laboratory practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: case studies, group work, project planning	
Evaluation: oral exam, Design a technological work flow, Programing task with a Programable Logic Controller simulation **Other ways** to be applied in evaluation**: laboratory reports**: team projects: Design a technological work flow, individual project: Programing task with a Programable Logic Controller simulation	
Place in training: **2nd semester (spring)**	
Prerequisites: -	

Course Objectives:

The main goal of the subject is to develop skills in Process Control in the Food Industry including different controlling systems. Further goal is to gain knowledge how to design a technological work flow and how to program and simulate PLC programs. Students take part in laboratory practices where they can see different control systems and their different parts.

Curriculum:

1. Characterization of the pneumatic control systems. Directional control valves and logic valves.
2. Types and operation of the pneumatic cylinders. Cylinder actuation, delay, multiple position cylinders.
3. Characterization of the hydraulic control systems. Directional control valves and logic valves. Cylinder actuation.
4. Hydraulic cylinder actuation. Synchronic cylinders, control of the piston rod speed.
5. Characterization of the mixed control systems (electro pneumatic, electro hydraulic, hydro pneumatic).
6. Program-controls and cycle-diagrams in pneumatic systems: state-dependent, pressure-dependent and time-dependent sequential controls.
7. Relay and semiconductor based (TTL) control systems. Characterization (advantages, disadvantages), logic operations (AND, OR, NOT, Memory), time-relays
8. Programmable Logic Controllers (PLC): set-up, functional units, programming. Points of view for selection of a PLC.
9. Actuators of electrical and mechanical output. Characterization (advantages, disadvantages), applications.
10. Actuators of pneumatic and hydraulic output. Characterization (advantages, disadvantages), applications.
11. Set-up of the closed loop systems. Types, comparison of the continuous and discrete (On/Off) controls.
12. Linear closed loop control systems, typical testing signals, weight function, transition function.
13. Signal transfer properties of the linear control systems (P, I, D, T1, …).
14. Characterization of the Controlled Process (Proportional, First-Order processes with/without dead time).
15. Stability of the closed loop control; quality characteristics of the continuous/OnOff control. Set-up of a controller.

Required and *recommended* **reading**:

Recommended:

1., William C. Dunn: Fundamentals of Industrial Instrumentation and Process Control, 2005

2., Slides of the lectures

3., Internet
Responsible instructor: Zoltán Kovács, full professor, PhD
Teacher(s) involved in teaching of the subject: István Kertész, assistant lecturer, PhD

4.2 Experiment Design and Measurement Assessment*

Course title**: Experiment Design and Measurement Assessment** **Subject code: ELTUD109N**	**Credits: 4**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + practical** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **13 (lecture) + 26 (practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark **Other ways** to be applied in evaluation**:**	
Place in training: **2nd semester** (**spring)**	
Prerequisites:	
Course Description:	
The aim of the course is to provide students with theoretical and practical knowledge of experimental design and error calculation in complex food systems in food industry. Within the subject, students will be introduced to the law of error propagation and will perform calculation examples related to the food industry. They will also learn about the evaluation methods of different measurement results in food industry. Computer vision used in food industry and their applications will be introduced. Practicals in the food industry related to the theoretical material will deepen the students' knowledge.	
Required and *recommended* **reading**:	
Responsible instructor: Viktória Zsom-Muha, PhD	
Teacher(s) involved in teaching of the subject: István Kertész	

4.3 Science of Nutrition

Course title: **Science of Nutrition** **Subject code: ELTUD172N**	**Credits: 4**
Nature of the course: **obligatory course**	
„Training character”: **lecture** (credit%)	
Course type: lecture course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark	
Place in training: **2nd semester (spring)**	
Prerequisites: -	

Course Objectives:

14. Basic terms in human nutrition
15. The health-promoting diet, dietary guidelines
16. Structure and neural regulation of digestive system. Sense of taste.
17. Operation of gastrointestinal tract.
18. Digestion and metabolism of carbohydrates, dietary fibres, sweeteners
19. Disorder of carbohydrate metabolism. Diabetes Mellitus I. and II., lactose intolerance
20. Protein metabolism, biological value of protein, utilization of plant and animal protein sources
21. Disorder of protein metabolism and its diet: Phenylketonuria, Coeliac disease, Protein allergy
22. Lipid metabolism: animal and plant lipids, essential fatty acids, trans-fatty acids, their physiological role
23. Disorder of lipid metabolism: obesity, cardiovascular disease and metabolic syndrome
24. Antinutritive compounds in food
25. Functional foods in health and disease (the role of pro- and prebiotics in human health)
26. Eating habits in Hungary. Alcohol consumption and its effects on the body.

Required and *recommended* **reading**:

- Gibney, Lanham-New, Cassidy, Vorster: Introduction to Human Nutrition. A John Wiley & Sons, Ltd., Publication, 2009.
- Caballero: Encyclopedia of human nutrition. Elsevier 2005.
- Berdanier: Handbook of nutrition and food. CRC Press 2002.

Responsible instructor: Mednyánszky Zsuzsanna, associate professor, PhD

4.4 Preservation Technologies and Product Developments*

Course title**: Preservation Technologies and Product Developments** **Subject code: ELTUD178N**	**Credits: 7**
Nature of the course: **elective (a limited number of ERASMUS students can be admitted)**	
„Training character": **lecture + laboratory practice** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **39 (lecture) + 26 (laboratory practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: exam **Other ways** to be applied in evaluation**: -**	
Place in training: **2nd semester (spring)**	
Prerequisites: -	

Course description:

The system approach of food technology, the complex approach of technological aim. Integrating the chemical, physical, microbiological and operational aspects of vegetable and fruit preservation processes into a coherent technological knowledge. The reaction kinetic analysis of material changes during processing, the relationship between technological parameters and product quality. Recourse of cans and other packaging materials during heat treatment. Calculation and measurement of internal pressure. Sizing of flow system heat treatment and tracking property changes. Validation. Heat treatment technologies in packaged foods and flow systems. Change of food properties, kinetic description and constants. Changes of ingredients, healthy and unhealthy substances of vegetable raw materials during the processing. The reaction kinetic analysis of changes. The relationship between production technology operations and product quality in the production of fruit concentrates. Biological preservation of vegetables. The effect of the chemical and physical parameters of the process on product quality. The knowledge and practice of spray drying, the refrigeration and storage of powder products. Impact of technological parameters on product quality. Food quality changes during frozen storage. The principle and calculation of TTT, quality change models, loss of mass during the storage. Freeze drying (lyophilization): the physical conditions of ice sublimation, the theory of the sublimation heat treatment and the methods of its implementation, the freeze drying technology and its mechanical equipment. The stability of lyophilized products and the economics of lyophilization. Gentle Technologies: Sous vide technology, its base and application areas. The use of pulse electrical field in the food industry. Use of high hydrostatic treatment.

Required and *recommended* **reading**:

Sinha, N.,Sidhu, J.S., Barta. J., Wu, J., Pilar Cano, M.(ed): Handbook of Fruits and Fruit Processing. Wiley- Blackwell Publishing, Ames, Iowa, USA. ISBN-13: 978-0-8138-0894-9/2012
Tokusoglu Ö, Swanson B.G. (ed.): Improving Food Quality with Novel Food Processing Technologies. CRC Press ISBN 9781138199880

Responsible instructor: Mónika Máté, associate professor, PhD

Teacher(s) involved in teaching of the subject:

Beatrix Szabó-Nótin, associate professor, PhD

István Dalmadi, associate professor, PhD

Lilla Szalóki-Dorkó, assistant professor, PhD

György Kenesei, assistant professor, PhD

Ildikó Nyulas-Zeke, assistant professor, PhD

4.5 Safety, Ethical and Legal Aspects of Biotechnology

Course title**: Safety, Ethical and Legal Aspects of Biotechnology** **Subject code: ELTUD035N**	**Credits: 5**
Nature of the course: **obligatory course**	
„Training character”: **lecture** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark: exam **Other ways** to be applied in evaluation**: essay**	
Place in training: **4th semester** (**spring)**	
Prerequisites:	
Course Description:	
Characteristics of different types of GMOs (GMMs, transgenic plants and animals); GMO-related environmental and food safety questions; Safety aspects and legislation of GMO foods, with special emphasis on genetically modified components and additives; risk analysis, risk management and risk communication. Environmental risk and safety; Legislation of GMOs in EU and in the other districts of the World. Ethical issues and social opinion on biotechnology and transgenic organisms.	
Required and *recommended* **reading**: 1. Luning, P.A:, Devlieghere, F., Verhé, R. (eds.) Safety in the agri-food chain. Wageningen Academic Publisher, 2006. 2. Biotol Series: Biotechnological Innovations in Food Processing. Open Universiteit, Butterworth-Heinemann, 1991.	
Responsible instructor: Pomázi, Andrea, PhD	
Teacher(s) involved in teaching of the subject: Anna Maráz, PhD	

4.6 Planninng of Processing Technologies*

Course title: **Planninng of Processing Technologies** **Subject code: ELTUD083N**	**Credits: 7**
Nature of the course: **elective course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + laboratory practice** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **39 (lecture) + 26 (laboratory practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark **Other ways** to be applied in evaluation**: laboratory reports**	
Prerequisites: -	
Course Objectives:	
During the course a food industrial planning project has to be prepared in small teams and submitted and presented by the end of the semester. General aspects of the planning process. Determination of design aims: product to be produced, raw material to be processed, capacity. Analysis of operations in the processing technology. Relationship of processing technology and product quality. Characteristics of material transport and Shankey diagram. Model creation and validation of a technology by SuperPro software. Technical and economic design based on the developed model. Material consumption plan: determination of material consumption standard. Aspects of choosing equipment (equipment specifications). Presentation of flow charts and equipment. Determination of energy, water and labour needs of the technology. Waste and by-product management. Visits to various food processing plants.	
Required and *recommended* **reading**:	
Responsible instructor: László Friedrich , PhD	
Teacher(s) involved in teaching of the subject: Pásztorné Huszár Klára, PhD., Szabó-Nótin Beatrix, PhD., Koris András, PhD., Dalmadi István, PhD., Badakné Kerti Katalin, PhD., Jónás Gábor, PhD.	

4.7 Plant based Processing Technologies and Developments*

Course title: **Plant based Processing Technologies and Developments** **Subject code: ELTUD137N**	**Credits: 6**
Nature of the course: **elective course (a limited number of ERASMUS students can be admitted)**	
„Training character": lecture + laboratory practice (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **39 (lecture) + 26 (laboratory practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark **Other ways** to be applied in evaluation**: laboratory reports**	
Place in training: **4th semester (spring)**	
Prerequisites: -	
Course Objectives:	
Students will learn about the following topics: food emulsion manufacturing technologies and stability ; food milling production technologies, restructuring operations and their production technologies, food quality modification processes and novel processing technologies for plant raw materials (as alternatives to animal products)	
Required and *recommended* **reading**:	
Responsible instructor: Katalin Badakné Kerti, PhD	
Teacher(s) involved in teaching of the subject: Katalin Badakné Kerti, PhD, Ivett Jakab-Molnárné	

5 MSc - Food Safety and Quality Engineering – Fall semester

5.1 Food Safety and Regulation*

Course title: **Food safety and regulation** **Subject code: ELTUD052N**	**Credits: 6**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + practical** (credit%)	
Course type: lecture course and practical course number of **hours** per semester: **39 (lecture) + 13 (laboratory practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark **Other ways** to be applied in evaluation**:**	
Place in training: **1st semester (autumn)**	
Prerequisites: -	
Course Objectives:	
Required and *recommended* **reading**:	
Responsible instructor: Gyula Kasza, PhD	
Teacher(s) involved in teaching of the subject: -	

5.2 Separation Techniques*

Course title**: Separation Techniques** **Subject code: ELTUD075N**	**Credits: 5**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + practical** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **39 (lecture) + 13 (practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark **Other ways** to be applied in evaluation**:**	
Place in training: **1st semester** (**fall)**	
Prerequisites:	
Course Description:	
Separation of mixtures into their components with energy investment. Mechanical methods: filtration, sieving, dialysis, chromatography, clarification, flotation,centrifugation. Thermal methods: distillation, crystallization, evaporation, drying, sublimation, lyophilization. Electrical methods: electrophoresis, electroosmosis, electrodialysis and electrostatic precipitation. Mass spectrometry is also included.	
Required and *recommended* **reading**:	
Responsible instructor: Eszter Benes , PhD	
Teacher(s) involved in teaching of the subject:	

5.3 Advanced Consumer Sensory Methods*

Course title: **Advanced Consumer Sensory Methods** **Subject code: ELTUD115N**	**Credits: 4**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + laboratory practice** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **13 (lecture) + 26 (laboratory practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: exam mark **Other ways** to be applied in evaluation**:**	
Place in training: **1st semester (autumn)**	
Prerequisites: -	
Course Objectives:	
Required and *recommended* **reading**:	
Responsible instructor: Attila Gere, PhD	
Teacher(s) involved in teaching of the subject: -	

5.4 Spectroscopic Analytical Methods*

Course title**: Spectroscopic Analytical Methods** **Subject code: ELTUD150N**	**Credits: 5**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character": **lecture + practical** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **39 (lecture) + 13 (practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark: exam **Other ways** to be applied in evaluation**:**	
Place in training: **1st semester** (**fall)**	
Prerequisites:	
Course Description:	
A field-specific chemistry course for the acquisition of basic food analytical skills and professional knowledge (spectroscopy, mass spectrometry). In addition to the theoretical knowledge of atomic and molecular spectroscopy, organic and inorganic mass spectrometry, students will also get to know the analytical applications of these analytical techniques in food analysis.	
Required and *recommended* **reading**:	
Responsible instructor: Zsuzsanna Jókai Szatura, PhD	
Teacher(s) involved in teaching of the subject: Péter Fodor, PhD	

5.5 Physiological Relationships of Food Safety and Quality*

Course title**: Physiological Relationships of Food Safety and Quality** **Subject code: ELTUD054N**	**Credits: 6**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture** + **practice** (credit%)	
Course type: lecture course and lab course number of **hours** per semester**: 39 (lecture)** + **26 (practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark: **written exam** **Other ways** to be applied in evaluation**:**	
Place in training: **3rd semester (fall)**	
Prerequisites: -	
Course Description:	
The course provides an overview of the main risk factors that threaten food safety: natural toxins, contaminants and food processing toxicants. The quality and safety of apiculture products are also presented. Additional topics are allergens and bioactive compounds of food and their analytical detection methods. Genetically modified organisms, food adulterations and application of animal models in food nutrition and safety are also discussed. Food colloid systems, food additives and nutrition-related diseases are also an important part of the topics.	
Required and recommended **reading**: Andrea T. Da Poian, Miguel A. R. B. Castanho (2021): Integrative Human Biochemistry. Springer, DOI 10.1007/978-1-4939-3058-6 Po Sing Leung (2014): The Gastrointestinal System. Gastrointestinal, Nutritional and Hepatobiliary Physiology. Springer, DOI 10.1007/978-94-017-8771-0 Kontogeorgis, G. M., Soren K., (2016): Introduction to Applied Colloid and Surface Chemistry. John Wiley & Sons Ltd. ISBN: 978-1-118-88118-7 S.T. Omaye (2004): Food and Nutritional Toxicology. CRC Press, ISBN 1-58716-071-4	
Responsible instructor: Marianna Csóka, PhD	
Teacher(s) involved in teaching of the subject: Zsuzsanna Mednyánszky, PhD; Arijt Nath, PhD; Krisztina Takács, PhD; Erika Koppány Szabó, PhD; Anna Jánosi, PhD; András Nagy, PhD; Emőke Németh-Szerdahelyi, PhD; Rita Végh; Rita Tömösközi-Farkas, PhD;	

5.6 Analytical Classification of Foodstuffs 2*

Course title: **Analytical Classification of Foodstuffs 2** **Subject code: ELTUD058N**	**Credits: 6**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + practical** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **26 (lecture) + 26 (laboratory practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark **Other ways** to be applied in evaluation**:**	
Place in training: **3rd semester (fall)**	
Prerequisites: *familiar knowledge of instrumental analytical techniques and classical food analytical methods*	
Course Description:	
Course covers the ingredients, properties that determine the quality and chemical safety of food commodities (bakery products, fruit and vegetable, fish, alcoholic beverages, edible oil) and the relevant EU regulations and analytical product-specific test methods. Half of the course consists of instrumental analytical measurement practicals and a laboratory visit to develop competence in practical applications of food classification tasks.	
Required and *recommended* **reading**: Nielsen's Food Analysis, (or any textbook on food analytical methods) Understanding Codex – 5th Edition (An introduction to Codex Alimentarius) Background info on EU chemical food safety policies (https://food.ec.europa.eu/food-safety/chemical-safety_en)	
Responsible instructor: László Abrankó, PhD	
Teacher(s) involved in teaching of the subject: Dr. Eszter, Benes, Dr. Judit Tormási, Dr. Zsuzsanna, Jókai-Szatura, Dr Csilla Sörös-Marczika, Dr. Rita-Tömösközi-Farkas	

5.7 Plant and Process Design*

Course title**: Plant and Process Design** **Subject code: ELTUD191N**	**Credits: 4**
Nature of the course: **compulsory optional course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + practical** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **26 (lecture) + 26 (practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark: exam **Other ways** to be applied in evaluation**:**	
Place in training: **3rd semester (fall)**	
Prerequisites: -	
Course Description:	
This course provides legal, technical, economic conditions, practical aspects and process of design, establishment and operation of a food processing plant. Planning process, energy flow of the plant, architectural and technical design documentation. Requirements for the design of the plant"s surroundings and buildings. Material and personal circulation. Food plant construction, technical hygiene. Personal hygiene, labour, plant documentation, production sheet. Specific sectoral requirements for food processing plant. Ancillary facilities, warehouses, storage. Architectural solutions, energy aspects of plants. From concept to implementation. Project task: learning to use the SuperPro Design program, application in the preparation of the design task.	
Required and *recommended* **reading**:	
Responsible instructor: Mónika Máté, PhD	
Teacher(s) involved in teaching of the subject: Mónika Máté, PhD; Beatrix Szabó-Nótin, PhD; András Koris, PhD	

5.8 Food Industry Management*

Course title**: Food Industry Management** **Subject code: GAZDT080N**	**Credits: 6**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + practical** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **39 (lecture) + 26 (practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark: exam **Other ways** to be applied in evaluation**:**	
Place in training: **3rd semester** (**fall)**	
Prerequisites: -	
Course Description:	
Through food industry examples and case studies, students will become familiar with modern theories in strategic management, marketing management, innovation management, and project management. The main food development trends (such as functional, organic, etc.) are also part of the course. Additionally, the course covers business and project planning. The practical application of theoretical knowledge is realized in business and project planning, as well as in marketing research and its role in the development of new food products. Finally, the theoretical and practical foundations of communication and leadership skills will support the students' future careers.	
Required and *recommended* **reading**:	
Responsible instructor: Ágoston Temesi, PhD	
Teacher(s) involved in teaching of the subject: Ágoston Temesi, PhD	

6 MSc - Food Safety and Quality Engineering – Spring semester

6.1 Analytical Classification of Foodstuffs 1*

Course title: **Analytical Classification of Foodstuffs 1** **Subject code: ELTUD057N**	**Credits: 6**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + practical** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **26 (lecture) + 26 (laboratory practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark **Other ways** to be applied in evaluation**:**	
Place in training: **2nd semester (spring)**	
Prerequisites: *familiar knowledge of instrumental analytical techniques and classical food analytical methods*	
Course Description:	
Course covers ingredients and properties that determine the quality and chemical safety of food product groups (meat, dairy products, waters, chemically preserved foods, coffee, tea) and the relevant EU regulations and analytical product-specific test methods. Half of the course consists of instrumental analytical measurement practicals and a laboratory visit to develop competence in practical applications of food classification tasks.	
Required and *recommended* **reading**: Nielsen's Food Analysis, (or any textbook on food analytical methods) Understanding Codex – 5th Edition (An introduction to Codex Alimentarius) Background info on EU chemical food safety policies (https://food.ec.europa.eu/food-safety/chemical-safety_en)	
Responsible instructor: László Abrankó, PhD	
Teacher(s) involved in teaching of the subject: Dr. Eszter, Benes, Dr. Judit Tormási, Dr. Zsuzsanna, Jókai-Szatura, Dr Csilla Sörös-Marczika, Dr. Rita-Tömösközi-Farkas	

6.2 Microbiology of Food Qualtiy*

Course title**: Microbiology of Food Qualtiy** **Subject code: ELTUD070N**	**Credits: 6**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + practice** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **39 (lecture) + 26 (practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark: exam **Other ways** to be applied in evaluation**:**	
Place in training: **2nd semester (spring)**	
Prerequisites: -	
Course Description:	
The aim of the subject is to apply microbiological food quality aspects in the production, storage and distribution of food raw materials and food products, and to critically analyse technologies and testing methods to ensure food quality. Content of the course: sources of microbiological contamination in food raw materials and products of plant and animal origin, microbiological spoilage, rapid microbiological testing methods.	
Required and recommended **reading**: Montville, T.J., Matthews, K.R.: Food microbiology. An Introduction. 2nd edition. ASM Press, Washington DC, 2008. ISBN 978-1-55581-396-3.	
Responsible instructor: Gabriella Kiskó, PhD	
Teacher(s) involved in teaching of the subject: Gabriella Kiskó, PhD, Csilla Mohácsi-Farkas, PhD; Ágnes Belák, PhD, Tamás Kocsis, PhD, Andrea Taczman-Brückner, PhD	

6.3 Quality Assurance of Food Inspections*

Course title**: Quality Assurance of Food Inspections** **Subject code: ELTUD074N**	**Credits: 4**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + practical** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **26 (lecture) + 13 (laboratory practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark **Other ways** to be applied in evaluation**:**	
Place in training: **2nd semester (spring)**	
Prerequisites: *familiar knowledge of instrumental analytical techniques*	
Course Description:	
A course providing theoretical knowledge and practical competence for food inspection professionals to assess the adequacy and reliability of sampling and analytical methods used in food testing. It discusses in detail the quality assurance principles and procedures to be followed during sampling and analytical method validation and everyday routine application. It provides practical knowledge for determining the performance characteristics of analytical methods through specific calculation examples.	
Required and *recommended* **reading**: Background info on the concept of Analytical Quality Assurance (Analyst, 1991,116, 975-990)	
Responsible instructor: László Abrankó, PhD	
Teacher(s) involved in teaching of the subject:	

6.4 Science of Nutrition

Course title: **Science of Nutrition** **Subject code: ELTUD172N**	**Credits: 4**
Nature of the course: **obligatory course**	
„Training character”: **lecture** (credit%)	
Course type: lecture course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark	
Place in training: **2nd semester (spring)**	
Prerequisites: -	

Course Objectives:

27. Basic terms in human nutrition
28. The health-promoting diet, dietary guidelines
29. Structure and neural regulation of digestive system. Sense of taste.
30. Operation of gastrointestinal tract.
31. Digestion and metabolism of carbohydrates, dietary fibres, sweeteners
32. Disorder of carbohydrate metabolism. Diabetes Mellitus I. and II., lactose intolerance
33. Protein metabolism, biological value of protein, utilization of plant and animal protein sources
34. Disorder of protein metabolism and its diet: Phenylketonuria, Coeliac disease, Protein allergy
35. Lipid metabolism: animal and plant lipids, essential fatty acids, trans-fatty acids, their physiological role
36. Disorder of lipid metabolism: obesity, cardiovascular disease and metabolic syndrome
37. Antinutritive compounds in food
38. Functional foods in health and disease (the role of pro- and prebiotics in human health)
39. Eating habits in Hungary. Alcohol consumption and its effects on the body.

Required and *recommended* **reading**:

- Gibney, Lanham-New, Cassidy, Vorster: Introduction to Human Nutrition. A John Wiley & Sons, Ltd., Publication, 2009.
- Caballero: Encyclopedia of human nutrition. Elsevier 2005.
- Berdanier: Handbook of nutrition and food. CRC Press 2002.

Responsible instructor: Mednyánszky Zsuzsanna, associate professor, PhD

6.5 Risk Communication and Risk Management Project task*

Course title: **Risk Communication and Risk Management** **Subject code: ELTUD111N**	**Credits: 6**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + laboratory practice** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **13 (lecture) + 26 (laboratory practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark **Other ways** to be applied in evaluation**: reports**	
Place in training: **4th semester (spring)**	
Prerequisites: -	
Course Objectives:	
Required and *recommended* **reading**:	
Responsible instructor: Gyula Kasza, PhD	
Teacher(s) involved in teaching of the subject: -	

6.6 Quality Management in Food Processing*

Course title: **Quality Management in Food Processing** **Subject code: ELTUD127N**	**Credits: 4**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + laboratory practice** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **26 (lecture) + 13 (laboratory practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark **Other ways** to be applied in evaluation**: reports**	
Place in training: **4th semester (spring)**	
Prerequisites: -	
Course Objectives:	
Required and *recommended* **reading**:	
Responsible instructor: László Sipos, PhD	
Teacher(s) involved in teaching of the subject: -	

7 Available for both MSc and BSc program students

7.1 Advanced Food Physical Measurements

Course title: **Advanced Food Physical Measurement** **Subject code: ELTUD221N**	**Credits: 4**
Nature of the course: **optional course** (C)	
„Training character": **lecture** (credit%)	
Course type: lecture course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: case reports, role play, thematic presentations	
Evaluation: presentation of measurements **Other ways** to be applied in evaluation: reports about the measurements	
Place in training: **fall and spring**	
Prerequisites: High school level of Physics	

Course description:

Food technologies usually require the simultaneous knowledge of several physical quantities. Today, more and more instruments are emerging that can measure two or more physical quantities simultaneously. The course - without claiming to be exhaustive - describes these measurements and the basic measurements connected to them. Advanced structure testing methods, special light microscopes, atomic force microscope, electron microscope. Liquid density measurement by vibrating capillary method, density measurement of porous materials. Viscosity measurement, oscillation rheometer measurements. Spectroscopic methods, various methods of evaluating NIR spectra; measurement of thermal conductivity by instational methods. Determination of electrical conductivity and dielectric constant by impedance spectroscopy; Simultaneous measurement of different physical characteristics: rheological characteristics and dielectric characteristics; NIR spectrum and rheology characteristics; recording a Raman spectrum in different layers with a confocal microscope.
Structure test methods:
1-2 weeks: special light microscopes, ultraviolet microscope, fluorescence microscope, polarizing microscope, confocal microscope; atomic force microscope; electron microscope
3 Week: Measurement of fluid density with a vibrating capillary
4 Week: Viscosity measurement with oscillation rheometer, determination of yield strength
5-6 weeks: infrared spectroscopy: Recording and evaluation of NIR (near infrared) spectra by different methods
7-8 weeks electrical property measurements
9 week measurement of thermal conductivity by instacioner method
10 week measurement of electrical properties under the influence of force
11 week Determination of rheological characteristics in electric field
12 weeks Recording of NIR spectrum under pressure
13 week Evaluation of reports

Required and *recommended* **reading**:

Grimnes S. Martinsen O.G. *Bioimpedance and bioelectricity, Basics*, Elsevier, 2015 ISBN: 978-0-12-411470-8 N
Figura, L.O., Teixeira A.A.: *Food Physics* , Springer, 2007.
Scientifical articles, tudományos cikkek

Responsible instructor: Vozáry Eszter PhD.

Teacher(s) involved in teaching of the subject: Dr. Kaszab Tímea PhD.

7.2 Biochemical properties of cereal- based products**

Course title: **Biochemical Properties of Cereal- based Products** **Subject code: ELTUD350N**	**Credits: 4**
Nature of the course: **optional course** (C)	
„Training character": lecture (credit%)	
Course type: lecture course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge:-	
Evaluation: **written exam** **Other ways** to be applied in evaluation: Students will be given 5-6 articles, which they have to present as case study.	
Place in training: **fall and spring**	
Prerequisites: -	
Course description:	
Week 1. Overview of enzymatic processes during grain storage and processing Week 2. Amylolytic and proteolytic state of various cereals Week 3. The role of starch and amylase enzyme in grain and grist Week 4. Determination of yellow pigment content in cereals and pasta with different methods. Features of carotenoids. Week 5. Grouping and presenting characteristics of phenolic compounds. Determination of phenolic content in cereal and pasta grist. Week 6. Presenting the mechanism of peroxidase and lipoxygenase enzymes, their presence and impact on the production process of dry pasta. Week 7. Presenting the mechanism of polyphenol oxidase enzyme in plant cells. Monitoring the presence of active enzyme during dry pasta production process. Week 8. Presentation the chemical characteristics of special grains and flours. Week 9 Presentation of enzyme system in special cereal grains and grist. Week 10. Comparison of chemical and biochemical characteristics of special and traditional cereal grains and milling products Week 11. Effect chemical and biochemical characteristics of the final pasta product. Week 12. Presentation of special pasta products (bio products) Week 13. Presentation and discussion of the ongoing research activities at the department	
Responsible instructor: Dr. Szedljak Ildikó, assistant professor, PhD	

7.3 Cereals of the World**

Course title: **Cereals of the World** **Subject code: ELTUD382N**	**Credits: 4**
Nature of the course: **optional course** (C)	
„Training character": lecture (credit%)	
Course type: lecture course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge:-	
Evaluation: 30% evaluation of the student's presentation and 70% written exam **Other ways** to be applied in evaluation: Students have to write an essay about the production processes of a chosen cereal. Students have to present their essay for a scientific discussion at the end of the semester.	
Place in training**: fall and spring**	
Prerequisites: -	
Course description: Week 1. Introduction to the course. **Wheat** (cultivation, production data –area, yield, cost, nutrtitional value) Week 2. **Wheat** (food and non-food use, wheat-derivated products) Week 3. **Corn** (cultivation, production data –area, yield, cost, nutrtitional value,) Week 4. **Corn** (food and non-food use, cord-derivated products) Week 5. **Rice** (cultivation, production data –area, yield, cost, nutrtitional value,) Week 6. **Rice** (food and non-food use, rice-derivated products) Week 7. **Rye** (cultivation, production data –area, yield, cost, nutrtitional value, food and nonfood use) Week 8. **Oat** (cultivation, production data –area, yield, cost, nutrtitional value, food and non-food use) Week 9. **Millet and Sorghum** (cultivation, production data –area, yield, cost, nutrtitional value, food and non-food use) Week 10. **Barley** (cultivation, production data –area, yield, cost, nutrtitional value, food and nonfood use) Week 11. Pseudocereals and less common cereals Week 12. Students' presentation Week 13. written exam	
Required and *recommended* **reading**: Presentors's notes Karel Kulp: Handbook of Cereal Science and Technology, Second Edition, Revised and Expanded CRC Press, 2000, ISBN 9780824782948 Peter Belton: Pseudocereals and Less Common Cereals, Springer 2002. ISBN 9783540429395	
Responsible instructor: Badakné dr. Kerti Katalin, egy. docens, PhD	
Teacher(s) involved in teaching of the subject: Badakné dr. Kerti Katalin, associate professor, PhD	

7.4 Component Migration in Food**

Course title: **Component Migration in Food (ETEG004C)** **Subject code: ELTUD351N**	**Credits: 4**
Nature of the course: **optional course** (C)	
„Training character”: **lecture** (credit%)	
Course type: lecture course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: case reports, role play, thematic presentations	
Evaluation: 40% written exam at the end of semester, 30% homework, 30% team work **Other ways** to be applied in evaluation: Team work: case study of the migration control in a chosen food product – presentation given in team (case study) Individual homework: an essay with the comparative analyis of recent publications and its presentation to the group (case study)	
Place in training: **fall and spring**	
Prerequisites: -	
Course description: Week 1: Composite foods – definition, overview Week 2: Migration processes, their types, definition Week 3: Water migration Week 4: Vapour and gas migration Week 5: Oil migration Week 6: Barriers: definition, classification, applications Week 7: Protein based barriers Week 8: Carbohydrate barriers Week 9: Fat based barriers and composite barriers Week 10: Instrumental evaluations. Migration processes between food and its packaging Week 11: Case study I. (Comparison of existing hypotheses – presentation of the home work) Week 12: Case study II. (Presentation of the team work) Week 13: Written exam	
Required and *recommended* **reading**: Presentors’s notes L.L. Katan: Migration from Food Contact Materials Springer Science & Business Media, 2012, ISBN 9781461312253 current publications in the subject	
Responsible instructor: Badakné dr. Kerti Katalin, associate professor, PhD	
Teacher(s) involved in teaching of the subject: Badakné dr. Kerti Katalin, associate professor, PhD	

7.5 Dairy Technology

Course title: **Dairy Technology** **Subject Code: ELTUD232N**	**Credits: 4**
Nature of the course: **optional course** (C)	
„Training character": lecture (credit%)	
Course type: lecture course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: written exam **Other ways** to be applied in evaluation**:** 10 min presentation during the semester about a dairy technology-related topic	
Place in training: **fall and spring**	

Course description:

The aim of the subject is to gain knowledge of the process of milk production, handling and milk processing technologies. The students learn about the composition of milk, its nutritional value, micro-organisms in milk. Processing equipment are also discussed. The students practice and extend their knowledge of English terminology.

Course schedule:

Introduction. Milk production and consumption statistics. Composition of milk.
Physical and chemical characteristics of milk.
Microorganisms in milk, starter cultures. Milk grading.
Primary production, collection and reception of milk.
General milk handling technologies I. (clarification, skimming, homogenization
General milk handling technologies II.(pasteurization, cooling).
Manufacturing of fresh market milk.
Fermented dairy products (yoghurt, kefir, sour-cream).
Manufacturing of butter and butterfat. Ice cream manufacture
Cheesemaking – acid coagulated cheese
Cheesemaking – rennet coagulated cheese, Processed cheese.

Required and *recommended* **reading**:

Norman N. Potter: Food Science, 4th edition, Chapter 13.:
Milk and Milk Products, 1986, Van Nostrand Reinhold, New York;
Douglas Goff: Dairy Science and Technology Education, University of Guelph, Canada,
www.foodsci.uoguelph.ca/dairyedu/home.html.; handouts (selected papers).

Responsible instructor: Klára Pásztor-Huszár, Ph.D.

7.6 Food Additivies*

Course title: **Food Additives** **Subject code: ELTUD213N**	**Credits: 4**
Nature of the course: **optional course** (C) **(a limited number of ERASMUS students can be admitted)**	
„Training character": lecture + practical (credit%)	
Course type: lecture course and practical course number of **hours** per semester: **13 (lecture) + 13 (practice)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: sensory tests	
Evaluation: exam **Other ways** to be applied in evaluation:	
Place in training: **fall and spring**	
Prerequisites: -	

Course description:
Requirements and of the Food Additives, (history, legislation, health effects) Groups, properties, sweeteners in the product development. Sweeteners in the product development Additives influencing the Organoleptic Properties Colorants. Colorants in the product development. Texture modifiers – emulsifiers, foaming agents, gelling agents, thickeners in the product development. Additives lengthening the storage life Preservatives, Antioxidants in the product development Natural preservatives Aromatic compounds Practice: Investigation of texture modifiers Comparison of natural and artificial sweeteners and colorants Product development
Required and *recommended* **reading**:
Regulation 1333/2008 EK Regulation 1129/2011 EK

Responsible instructor: Lilla Szalóki-Dorkó, assistant professor, PhD
Teacher(s) involved in teaching of the subject: Beatrix Szabó-Nótin, assistant professor, PhD Mónika Máté, associate professor, PhD

7.7 Food Packaging and Safety

Course title: **Food Packaging and Safety** **Subject code: ELTUD214N**	**Credits: 4**
Nature of the course: **optional course** (C)	
„Training character": lecture (credit%)	
Course type: lecture course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: sensory tests	
Evaluation: exam **Other ways** to be applied in evaluation: -	
Place in training: **fall**	
Prerequisites: -	

Course description:

Introduction to the Food Packaging
Introduction to the Food Safety and Food Packaging
Packaging solution in case of different product group
Food Packaging Systems and Machines
Food Packaging Systems
New Ways in Plastic Food Packaging Materials
Impact of Environmental Regulations on the Food Packaging, Design and Marketing
Waste System
Practice:
Investigation of different food packaging

Required and *recommended* **reading**:

Brody, A.L. and Lord, J.B. (2000): Developing new Food Products for a Changing Marketplace, CRC Press, USA
Han, J. H. (2005): Innovations in Food Packaging, Elsewier Academic Press, UK
Lee, D. S. and Yam, K.L. (2008):Food Packaging, Science and Technology, CRC Press, London
Moskowitz, H . Et al. (2009):Packaging Research in Food Product Design and Development, Wiley-Blackwell, Iowa
Robertson, G. (1993):Food Packaging, Principle and Practice, Marcel Dekker, N.Y.

Responsible instructor: Beatrix Szabó-Nótin, associate professor, PhD

Teacher(s) involved in teaching of the subject:
Julianna Kereszturi, assistant lecturer

7.8 Food Science and Gastronomy

Course title**: Food Science and Gastronomy** **Subject code: ELTUD201N**	**Credits: 2**
Nature of the course: **optional course**	
„Training character”: **lecture** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark: exam **Other ways** to be applied in evaluation**:** Students will individually work out given case-studies Attendance is recommended but not mandatory. active participation is appreciated during lectures.	
Place in training: **fall and spring semester**	
Prerequisites: -	
Course Description:	
The aim of the course is to summarise basic gastronomic knowledge. The application of food preparation technologies (baking, cooking), the theoretical background, the detailed presentation of the working principles of each technology in practice. Possible applications of cooking technologies in the food industry. Introduction to food preparation methods adapted to new consumer requirements. The aim of the exercises is to familiarise students with the effects of the technologies used on food and their scientific background. To explain the technologies that can be applied to the main categories of ingredients.	
Required and *recommended* **reading**: - Larousse Gastronomique - Akadémia kiadó Konyhatudomány sorozata - Jean Anthelme Brillat-Savarin: Physiology of taste - Michel Maincent: La Cuisine de reference / Technologie Culinaire - The Cambridge World History of Food 1-2 - The Oxford Companion to Food (Alan Davidson) - Hervé This – books, articles cookbooks, blogs, marketplaces and many more	
Responsible instructor: György Kenesei, PhD	
Teacher(s) involved in teaching of the subject: György Kenesei, PhD	

7.9 I Living Lab - Wellbeing and Active Aging

Course title: **International project course in the topic of wellbeing and active aging.** **Subject code: ELTUD240N**	Credits: 6
Nature of the course: **optional course** (C)	
„Training character": consulations (credit%)	
Course type: consultation course language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge**: -**	
Evaluation: **Other ways** to be applied in evaluation:	
Place in training**: fall and spring**	
Prerequisites**:** -	
Course description:	
In this project course, real-world problems, that are different in each year, are solved by group of international students from different European universities. The problem solving is helped by a teacher but only couching the process. The goal of the course is to gain skills are directly connected to the demand of the industry like creativity, computational thinking and digital literacy, new media literacy, social intelligence, design mindset, novel and adaptive thinking, sense Making, (virtual) collaboration, cognitive load management, cooperation skills, future mindset. The goals are achieved in collaboration with fellow students, industrial, social, and governmental partners using the modern information technologies and data bases.	
Responsibe instructor: Adrienn Varga-Tóth PhD, research fellow, PhD	

7.10 I Living Lab (general topic, not only Artificial Intelligence)*

Course title**: I Living Lab (– artificial intelligence)** **Subject code: ELTUD241N**	**Credits: 3**
Nature of the course: **optional course** (C) **(a limited number of ERASMUS students can be admitted)**	
„Training character”: **laboratory practice** (credit%)	
Course type: lab course number of **hours** per semester: 24 (practice) language: English **Other ways** and characteristic to be applied in transferring of the given knowledge: -	
Evaluation**:** based on participation and activity **Other ways** to be applied in evaluation: project evaluation	
Place in training: **fall and spring**	
Prerequisites: -	
Course Description:	
The course focuses on specific not exclusively AI related challenges,. Throughout the course, we will explore the conditions that influence these aspects and identify the needs and gaps present in real world situation. Based on these findings, we aim to develop a plan for practical solutions and tools, that could be implemented later in real life. The course provides an excellent opportunity to develop and practice skills in project management, design thinking, communication, international interdisciplinary teamwork, digital literacy, and product development.	
Required and *recommended* **reading:** several handsouts and videos during the course	
Responsible instructor: Zoltán Gillay , PhD	
Teacher(s) involved in teaching of the subject: Biborka Gillay, Phd, or others	

7.11 Introduction to Cereal based Technologies

Course title: **Introduction to Cereal based Technologies** **Subject code: ELTUD357N**	**Credits: 4**
Nature of the course: **optional course** (C)	
„Training character": lecture (credit%)	
Course type: lecture course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge:-	
Evaluation: 30% evaluation of the student's presentation and 70% written exam **Other ways** to be applied in evaluation: Students have to write an essay about the production processes of a chosen cereal based product (for example a „national" bakery product like pita, bagel ..etc). Students have to present their essay for a scientific discussion at the end of the semester.	
Place in training: **fall and spring**	
Prerequisites: -	
Course description: Week 1. Cultivation of the main cereals I. Wheat, triticale, barley etc. Week 2. Cultivation of the main cereals II. Rice, corn, millet Week 3. Sugar processing. Cultivation of sugar beet and sugar cane. Week 4. Sugar processing. From plant to sugar products. Week 5. Milling technologies. From wheat to wheat flour. Week 6. Milling technologies. Milling of rice, corn. Week 7. Oil plants(cultivation) Week 8. Oil production for cereal based products Week 9. Baking technologies I. (bread) Week 10. Baking technologies II. (bakery products) Week 11. Baked confectionary products. Production of snack foods Week 12. Pasta technologies (dried and fresh pasta) Week 13. Students' presentation	
Responsible instructor: Badakné dr. Kerti Katalin, associate professor, PhD	
Teacher(s) involved in teaching of the subject: Badakné dr. Kerti Katalin, egy. docens, PhD Kóczán Györgyné, egy. adjunktus, PhD Dr. Szedljak Ildikó, egy. adjunktus, PhD Molnárné Jakab Ivett, egy.tanársegéd	

7.12 Introduction to Cloud-based AI Computing for Engineers*

Course title**: Introduction to cloud-based AI computing for engineers** **Subject code: ELTUD418N**	**Credits:** 4
Nature of the course: **optional course** (C) **(a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + practical** (credit%)	
Course type: lecture course and self paced learning and project work number of **hours** per semester: **4 (lecture) + 24 (practice)** language: English **Other ways and characteristic to be applied in transferring of the given knowledge:** -	
Evaluation: project evaluation or exam **Other ways** to be applied in evaluation**:**	
Place in training: **fall and spring**	
Prerequisites: -	
Course Description:	
For students that are interested in gaining experience working with cloud-based technologies, learning Microsoft Azure can be a valuable addition to their skill set. As the use of cloud computing continues to grow in popularity, having experience with platforms like Azure can enhance their career prospects and make them a more attractive candidate in the job market. The primary objective of the course is to provide students with fundamental knowledge of cloud-based computing using Microsoft Azure. During the lectures, students will learn about the distinctions between on-premises and online databases and computing environments, as well as the availability of cloud-based data analysis tools, which include artificial intelligence-related software. Students will be given free access to use Azure during and after completing the course. The course helps with obtaining official, globally acknowledged Microsoft certifications, although acquiring any certification it is NOT a requirement to successfully complete the subject.	
Required and *recommended* **reading:** https://learn.microsoft.com/en-us/training/browse/?products=azure	
Responsible instructor: Zoltán Gillay , PhD	
Teacher(s) involved in teaching of the subject: Matyas Lukacs, operative lecturer	

7.13 Meat and Poultry Technology and Quality Issues

Course title: **Meat and Poultry Technology and Quality Issues** **Subject code: ELTUD216N**	**Credits: 2**
Nature of the course: **optional course** (C)	
„Training character": lecture (credit%)	
Course type: lecture course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: written exam **Other ways** to be applied in evaluation: Students will prepare a ppt. form presentation about individual topics regarding the subject during the semester.	
Place in training: **fall and spring**	
Prerequisites: -	

Course description:

The purpose of the C-type subject is to provide knowledge about the treatments and processing technologies of livestock products such as meat, poultry and egg products. The course covers the knowledge of raw materials, raw material composition, its physical and chemical properties, hygiene and technical aspects regarding to the subject, and the technology-processing steps and parameters. Students meet certain technological processes during practice classes.

1. The importance and tendencies of meat production. The composition of the meat, its physical, chemical and biochemical properties and nutritional value. Meat defects.
2. Effects of conditions before slaughtering (animal husbandry, transport, temporary accommodation) on the cutting value. Slaughtering technology, structure of the slaughtering lines, steps of the slaughtering. The technological steps of the dirty areas of swine slaughtering, its machines and equipment.
3. The technological steps of the clean areas of swine slaughtering, its machines and equipment.
4. Processes of cattle slaughtering. Objective meat grading in the slaughterhouse.
5. Poultry slaughtering technology. Hygiene of slaughtering.
6. The cutting and boning technology and equipment.
7. The cooling, freezing and storage of meat. The impact of storage on meat quality changes.
8. The composition, structure and properties of chicken eggs. The technological steps of egg processing.
9. Examination of the effect of determining technological parameters on the quality of meat mass, stuffed meat products. Theoretical and practical aspects of heat-treated stuffed meat production technology.
10. Parameters affecting the quality of meat mass (in practice)
11. Meat cuts products: cutted, cured products, principles of curing and technological solutions. Raw material preparation, curing, technological solutions for reducing water activity.
12. Cutted and shredded cured cooked products processing technology, heat treatment, machines and equipment.
13. The fermented meat products (dry goods) grouping, processing technology, theoretical background, machines and equipment.
14. Packaging methods of meat and meat products, machines and equipment.

Required and *recommended* **reading**:

Materials, handouts supplied by the course leader
R. A. Lawrie, D. A. Ledward (2006): Lawrie's meat science. CRC Press

Responsible instructor: Adrienn Varga-Tóth PhD, research fellow

Teacher(s) involved in teaching of the subject: László Friedrich PhD., professor, József Surányi,

7.14 Minimal Processing in Food Preservation Technologies

Course title: **Minimal Processing in Food Preservation Technologies** **Subject code: ELTUD220N**	**Credits:4**
Nature of the course: **optional course** (C)	
„Training character": theory (credit%)	
Course type: lecture course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: written exam **Other ways** to be applied in evaluation: Students will prepare a ppt. form presentation about individual topics regarding the subject during the semester.	
Place in training: **fall and spring**	
Prerequisites: -	

Course description

The purpose of the C-type subject is to provide knowledge about the theoretical background of minimal processing technologies of food, a detailed description of the operating principle of the technologies. Food applications of the technologies and its achievements so far, investigation of their possible future potential. The new consumer expectations and their encounter with the minimal processing technologies. Provide knowledge about the effects of the technologies on food products by practice class.

1. The new types of consumer and expectations. **Introduction** of minimal food processing technologies, their principles, advantages and possibilities.
2. Principle of **Modified Atmosphere Packaging** technology
3. Genaral aspects of „**Pressure technologies**"
4. Introducing the **sous-vide** technology
5. Application of **pulsed electric field** in food industry
6. Application of **ultrasound technology** in food industry
7. Principles, history and future potential of the **high hydrostatic pressure** treatment
8. **Irradiation** preservation of foods
9. Introducing of **UV light , Pulsed light**
10. **Edible coating and ripening control**
11. Role of **bioactive compounds and essential oils** in food preservation
12. The evaluation of **individual presentations** and mid-term tasks.
13. Written **exam**

Required and *recommended* **reading**:

Handouts supplied by the course leader
Ohlsson T. and Bengtsson N. (2002): Minimal Processing Technologies in the Food Industries. Woodhead Publishing Limited.
Shafiur Rahman, M.S., Siddiqui, M.W., (2015): Minimally Processed Foods, Technologies for Safety, Quality, and Convenience 10.1007/978-3-319-10677-9.

Responsible instructor: István Dalmadi PhD., associate professor

Teacher(s) involved in teaching of the subject: Klára Pásztor-Huszár, PhD, György Kenesei PhD, Adrienn Varga-Tóth PhD, Tamás Zsom PhD, Gábor Jónás PhD., Khabat Noori Hussein PhD

7.15 Physical Properties of Food

Course title: **Physical Properties of Foods** **Subject code: ELTUD209N**	**Credits: 4**
Nature of the course: **optional course** (C)	
„Training character": lecture (credit%)	
Course type: lecture course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: case reports, role play, thematic presentations	
Evaluation: presentation of measurements **Other ways** to be applied in evaluation: reports about the measurements	
Place in training: **fall and spring**	
Prerequisites: high school level of physics	

Course description:

presentation of physical properties used in food processing and in quality safety of foods; presentation of physical methods applied in research work at Physics and Control Department: measurement of geometrical (volume, shape) properties, mechanical properties (elasticity, viscosity), measurement of thermal properties (thermal conductivity, specific heat capacity), electrical properties (permittivity, conductivity), and colour of foods.

1. week: Mechanical properties (size, shape, density, porosity) measurement of density
2. week: Basic rheological methods (force and deformation, mechanical histeresis, elasiticity, viscosity)
3. week: Viscosity of solution and pulps, measurement with rotation viscosity meter
4. week: Thermal properties of foods (thermal conductivity and heat capacity)
5. week: Measurement of thermal conductivity of vegetables and fruits
6. week: Measurement of thermal conductivity of solutions

7-8. week: Electrical impedance

9. week: Electrical impedance spectra of vegetables, fruits and foods
10. week: Model circuit discribing the impedance spectra.
11. week: Electrical permittivity measurement. determination of moisture content of foods
12. hét: Optical properties
13. hét: Measurement of NIR spectrum of food

Required and *recommended* **reading**:

Rao M.A., Rizvi S.S.H.: Engineering Properties of Foods, Marcel Dekker Inc.1995.
Figura, L.O., Teixeira A.A. Food Physics, Springer, 2007.
Grimnes S. Martinsen O.G. *Bioimpedance and bioelectricity, Basics*, Elsevier, 2015 ISBN: 978-0-12-411470-8 N
Scientifical articles, tudományos cikkek

Responsible instructor: Dr. Kaszab Tímea PhD

Teacher(s) involved in teaching of the subject: Dr. Vozáry Eszter

7.16 Sensory Analysis I.

Course title: **Sensory Analysis I.** **Subject code: ELTUD224N**	**Credits: 4**
Nature of the course: **optional course** (C)	
„Training character": lecture (credit%)	
Course type: lecture course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: sensory tests	
Evaluation: written test at the end of the semester **Other ways** to be applied in evaluation: students prepare a short presentation on the basis of a chosen article	
Place in training: **fall and spring**	
Prerequisites: -	

Course description:

The course gives an overview on the field of sensory analysis. The participant will learn the major types of sensory test methods and the principles of assessor's evaluation, according to the following major areas:
The initiation and the development of sensory science; Panelist screening tests, color recognition test; Overview of the relevant ISO sensory standards; Physiological basis of sensory evaluation; Frequent faults in sensory tests; Odor recognition tests; Difference tests ; Ranking tests; Descriptive tests; Product sepcific odor tests

Required and *recommended* **reading**:

Compulsory:
Kókai, Z. (2006) Sensory Analysis I-II., Corvinus University of Budapest – provided in pdf format for the students
Recommended:
Stone, H., Bleibaum, R. N., Thomas, H. A. (2014) Sensory Evaluation Practices (Fourth Edition), Academic Press, London, http://www.sciencedirect.com/science/book/9780123820860

Responsible instructor: Kókai Zoltán, egyetemi docens, PhD

Teacher(s) involved in teaching of the subject:

7.17 Sensory analysis II.

Course title: **Sensory Analysis II.** **Subject code: ELTUD225N**	**Credits: 4**
Nature of the course: **optional course** (C)	
„Training character": lecture and practice 50 (credit%)	
Course type: lecture course number of **hours** per semester: **26 (lecture)** language: **English** **Other ways** and **characteristic** to be applied in transferring of the given knowledge: sensory tests	
Evaluation: written test at the end of the semester **Other ways** to be applied in evaluation: students prepare a short presentation on the basis of a chosen article	
Place in training: **each fall and spring**	
Prerequisites: -	

Course description:

The course gives an insight into the application of sensory methods. During the semester the participants will learn several statistical procedures for analyzing sensory data. The following topics will be discussed in details: The role of sensory evaluation in quality control; Relationship of electronic and human senses, principles of the human senses; Monitoring of sensory quality, IT support of sensory tests; Setting up a sensory panel; Statistical evaluation of ranking tests; Friedman test and Page test; ANOVA and pairwise significant differences; Pairwise ranking – modified Friedman analysis. Cluster analysis; How to design a sensory test. The use of human senses as instruments; The effect of brand on sensory perception; Panel performance monitoring methods; Consumer tests and the practical application of preference mapping

Required and *recommended* **reading**:

Compulsory:
Kókai, Z. (2006) Sensory Analysis I-II., Corvinus University of Budapest – provided in pdf format for the students
Recommended:
Stone, H., Bleibaum, R. N., Thomas, H. A. (2014) Sensory Evaluation Practices (Fourth Edition), Academic Press, London, http://www.sciencedirect.com/science/book/9780123820860

Responsible instructor: Kókai Zoltán, full professor, PhD

Teacher(s) involved in teaching of the subject:

7.18 Digital Photography and Photo Editing for Image Processing

Course title: **Digital Photography and Photo Editing for Image Processing** **Subject code: ELTUD206N**	**Credits: 4**
Nature of the course: **optional course** (C)	
„Training character": lecture (credit%)	
Course type: lecture course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: sweekly assignment, making portfolio, picture exhibition and workshop	
Evaluation: workshop **Other ways** to be applied in evaluation: making pictures with 4-6 given topics and present them on workshop	
Place in training: **spring**	
Prerequisite: -	

Course description:

During this course, the following areas are discussed: advantages of different camera systems, including sensor types and image file formats; basic rules of composition, illumination, the exposure triangle; usage of creative and advanced exposure modes; effect of zoom, sharpness, depth of field. Image editing is introduced in GIMP software (free software) based on standard tools and blending layers.
Topics of the semester:

- Basics of camera (CMOS, CCD sensors) and image types (JPG, TIFF, RAW)
- Compositional rules (center alignement, rule of thirds, golden ratio)
- The exposure triangle (ISO, shutter speed, aperture)
- Sharpness and depth of field
- White balance and color adjustment
- Aperture and shutter priority modes
- Special needs for topics: still life, sport, night (blue hour), light painting, etc.
- Free picture editor software: GIMP
- Crop of images and automatic corrections
- Levels, curves and tone mapping
- Selection tools
- Layer and mask, blending modes
- Personalization with frames

Required and *recommended* **reading**:

- Scott Kelby: The Digital Photography Book, Vol. 3. Peachpit Press, 2009. ISBN 0321617657
- Digital Photography School eBooks: https://resources.digital-photography-school.com/ebooks/
- Phillip Whitt: Beginning Photo Retouching & Restoration Using GIMP. Apress, 2014. ISBN 978-1-484204-04-7

Responsible instructor: Dr. Baranyai László, professor, PhD

Teacher(s) involved in teaching of the subject: Dr. Bodor-Pesti Péter, associate professor, PhD

7.19 Infectious Diseases*

Course title: **Infectious Diseases** **Subject code: ELTUD218N**	**Credits: 4**
Nature of the course: **optional course** (C) **(a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture + laboratory practice** (credit%)	
Course type: lecture course number of **hours** per semester: 26 (lectures) language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: exam **Other ways** to be applied in evaluation**:** case studies	
Place in training: **2nd semester (spring)**	
Prerequisites: -	
Course Objectives:	
The course cover the general concepts of epidemiology: the study of the determinants, occurrence, distribution, and control of health and disease in a defined population; definition of the parameters of a disease, including risk factors, development the most effective measures for control; large outbreaks in the past and their effect on the society, economy and history; emerging pathogens. 1. History of microbiology 2. Epidemiology 3. Virulence factors 4. Prevention and control of outbreaks of pathogenic microorganisms 5. Large outbreaks in the past: cholera, thypus, plague 6. Large outbreaks in the past: ergotism, leprosy, tuberculosis, pox 7. Gram-negative pathogenic bacteria 8. Gram-positive pathogenic bacteria 9. Viruses 10. Parasites 11. Emerging pathogens: pathogenic *E. coli* strains, listeriosis, legionellosis 12. Emerging pathogens: bird flu, Creutzfeldt-Jakob disease 13. Emerging pathogens: AIDS, Ebola, Marburg	
Recommended **readings**: Baron, S. (Ed.): Medical Microbiology, 4th edition. University of Texas Medical Branch at Galveston, Galveston, Texas Galveston (TX): University of Texas Medical Branch as Galveston; 1996. ISBN-10: 0-9631172-1-1 Montville, T.J., Matthews, K.R.: Food Microbiology. An Introduction. Second Edition. ASM Press, Washington DC, 2008. ISBN 978-1-55581-396-3	
Responsible instructor: Gabriella Kiskó, full professor, PhD	
Lecturers: Gabriella Kiskó, full professor, PhD	

7.20 Basics of Brewing Technology

Course title**: Basics of Brewing Technology** **Subject code: ELTUD197N**	**Credits: 4**
Nature of the course: **optional course** (C)	
„Training character”: **lecture** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: **written exam** **Other ways** to be applied in evaluation**: individual assignment (essay)**	
Place in training: **fall and spring semester**	
Prerequisites: -	
Course Description:	
Basic knowledge of raw materials and technologies of malting, brewing and fermentation. Introduction to the English terminology of brewing. Beer types. Regulations. Raw materials of brewing (water, malt, hops, yeast). Malt production (Intake of barley and equipment. Biochemical processes, technology and equipment of steeping, germination and kilning.) Wort production (Malt milling. Biochemical process and technology of mashing. Wort separation. Chemical and physical processes of wort boiling.) Beer production (Cooling and clarifying wort. Brewer’s yeast: metabolism. Yeast management. Changes during fermentation and maturation. Equipment and technology of fermentation.) Beer filtration and clarification. Filling Production of special beer types (alcohol-free, gluten-free) Nutritional aspects of beer	
Recommended **reading**: Wolfgang Kunze: Technology brewing and malting, International edition, VLB, Berlin, 2nd revised edition, 1999 (or newer) Dennis E. Briggs, Chris A. Boulton, Peter A. Brookes, Roger Stevens: Brewing: Science and Practice, CRC Press, Boca Raton, Fl., 2004 Hans Michael Eβlinger (ed.): Handbook of Brewing. Wiley-WCH, Weinheim, 2009	
Responsible instructor: Gabriella Kun-Farkas, PhD	
Teacher(s) involved in teaching of the subject: Gabriella Kun-Farkas, PhD	

7.21 Nutritional Biochemistry

Course title**: Nutritional Biochemistry** **Subject code: ELTUD198N**	**Credits: 2**
Nature of the course: **optional course** (C)	
„Training character”: **lecture** (credit%)	
Course type: lecture course and lab course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark: exam **Other ways** to be applied in evaluation**:**	
Place in training: **fall and spring semester**	
Prerequisites: -	
Course Description:	
Purpose of the subject: To show how the various ingredients found in food can affect human metabolism, and how the symptoms of people with a sluggish metabolism can be alleviated with proper nutrition. Transfer of biochemical aspects that serve the production and consumption of healthy foods. Biochemical aspects of nutrition of special diets. Biochemical aspects of harmful passions and self-destructive lifestyles and their relationship with dietary habits. In the case of BSc students, the condition for admission to the subject is a successful organic and biochemistry or biochemistry exam.	
Required and recommended reading: 1. Bender, D.A.: Nutritional biochemistry of the vitamins. Cambridge University Press Cambridge New York Port Chester Melbourne Sydney 1992. 2. Luckner, M.: Secondary metabolism in microorganisms, plants and animals. Springer-Verlag Berlin Heigelberg New York London Paris Tokyo Hong Kong 1990. 3. Stryer, L.: Biochemistry (3rd Edition) W.H. Freeman & Company New York 1988. 4. Crozier, A., N. Clifford, M.N., Ashihara, H.: Plant Secondary Metabolites. Blackwell Publishing Oxford 2006	
Responsible instructor: Judit Kosáry, PhD	
Teacher(s) involved in teaching of the subject: Judit Kosáry, PhD	

7.22 Snack on the go**

Course title**: Snack on the go** **Subject code: ELTUD446N**	**Credits: 4**
Nature of the course: **compulsory elective course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture**	
Course type: lecture course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: test on technical terms, exam mark **Other ways** to be applied in evaluation**:**	
Place in training: from **4th semester** (**spring)**	
Prerequisites:	
Course Description:	
In today's world, everyone is always in a rush—whether it's to class, work, meetings, catching a bus, or attending an appointment. Sometimes we don't even have time to sit down for a proper meal and just grab a quick bite on the go. The food industry, however, has adapted to this lifestyle. The increasingly popular "nutrition on the go" trend offers solutions for these situations. As part of this course, students will become familiar with this trend, review the current product offerings, and ultimately have the opportunity to design and create one themselves.	
Required and *recommended* **reading**: 1. Suvendu Bhattacharya (2023): Snack Foods – Processing and Technology, Academic Press/Elsevier, ISBN: 978-0-12-819759-2 2. Sergio O. Serna-Saldivar (ed.) (2022): Snack Foods – Processing, Innovation, and Nutritional Aspects, CRC Press, ISBN: 978-0-367-64687-5 (hbk)	
Responsible instructor: Ivett Jakab Molnárné	
Teacher(s) involved in teaching of the subject:	

7.23 Knowledge of Preservation Technologies 1**

Course title**: Knowledge of Preservation Technologies 1** **Subject code: ELTUD173N**	**Credits: 3**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture** (credit%)	
Course type: lecture course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: 30% evaluation of the student's presentation and 70% written exam **Other ways** to be applied in evaluation**:**	
Place in training: **5th semester (fall)**	
Prerequisites: -	
Course Description:	
The topics under discussion are concerned with the processes of heat removing preservation technologies. At the beginning of the semester, students are provided with an overview of cooling technologies, covering the fields of postharvest activities, different cold storage methods and the characteristics of consumer-packaged chilled products. Majority of the semester is dedicated to the complete study of food freezing technologies. • Week 1: General aspects of food cooling • Week 2: Cold treatment of vegetables and fruits • Week 3: Cold treatment of livestock and dairy products, RTE meals • Week 4: Basic aspects of food freezing 1. • Week 5: Basic aspects of food freezing 2. • Week 6: Food freezing methods • Week 7: Stability of frozen food • Week 8: Cold chain • Week 9: Students' presentation of individual topics • Week 10: Production of frozen vegetables • Week 11: Production of frozen fruits • Week 12: Production of frozen pasta and ice cream • Week 13: Written exam	
Required and *recommended* **reading**:	
Responsible instructor: István Dalmadi, PhD	
Teacher(s) involved in teaching of the subject: István Dalmadi, PhD; Tamás Zsom, PhD	

7.24 Knowledge of Preservation Technologies 2*

Course title**: Knowledge of Preservation Technologies 2** **Subject code: ELTUD174N**	**Credits: 3**
Nature of the course: **obligatory course (a limited number of ERASMUS students can be admitted)**	
„Training character”: **lecture** (credit%)	
Course type: lecture course number of **hours** per semester: **26 (lecture)** language: English **Other ways** and **characteristic** to be applied in transferring of the given knowledge: -	
Evaluation: 30% evaluation of the student's presentation and 70% written exam **Other ways** to be applied in evaluation**:**	
Place in training: **6th semester** (**spring)**	
Prerequisites: -	
Course Description:	
The topics covered relate to the processes of heat treatment and different preservation technologies. At the beginning of the semester, students will be given an overview (basics) of heat treatment technologies and water removal technologies. The major part of the semester will be devoted to a full study of the production technologies of heat and water-removal preserved foods. • Week 1: General aspects of heat preservation • Week 2: General aspects of preservation with water removing • Week 3: Water removing methods 1: evaporation • Week 4: Water removing methods 2: drying methods • Week 5: Drying technologies in fruit and vegetable processing. Effect of technological operations on the finished product quality of the final product. • Week 6: Production of jams. Manufacture of pulp and fruit compote products, the role of vacuum extraction in the quality of the finished product, efficiency of degassing and of preserves, product composition • Week 7: Quality requirements for semi-manufactured fruit-based products: concentrate, aseptic puree. Finished products production technologies: filtered and concentrated juice products (juice, nectar, etc.) • Week 8: Quality canned vegetables (green peas, green beans, corn, etc.), quality requirements and production technologies • Week 9: Students' presentation of individual topics • Week 10: Production technology for canned food • Week 11: Production technologies for tomato concentrate and tomato products, quality requirements • Week 12: Production technologies for pickles • Week 13: Written exam	
Required and *recommended* **reading**:	
Responsible instructor: Beatrix, Szabó-Nótin, PhD	
Teacher(s) involved in teaching of the subject: Beatrix, Szabó-Nótin, PhD; Mónika, Máté, PhD	