KÖVETELMÉNYRENDSZER
2019/2020. tanév I. félév

A tantárgy neve, kódja: Informatika (Informatics), MTB7008A
A tantárgyfelelős neve, beosztása: Dr. Várallyai László, egyetemi docens
A tantárgy oktatásába bevont további oktatók:
Szak neve, szintje: Élelmiszermérnöki BSc angol nyelven
Tantárgy típusa: kötelező
A tantárgy oktatási időterve, vizsga típusa: 0+2 G
A tantárgy kredit értéke: 3

A tárgy oktatásának célja: The course is designed to reach a basic level of business informatics knowledge. These knowledge will help them in the following courses and as well as in the practice. They have to learn how to collect data from the internet, and they have to solve complex exercises with the use of Office program family. The course is mainly application and practice oriented.

A tantárgy tartalma (14 hét bontásban):

1. The use of spreadsheet: basic, formatting, data format
2. The use of spreadsheet: links, (SUM, COUNT, MIN, MAX, AVERAGE)
3. The use of spreadsheet: logical operators (IF, AND, OR); Search functions (VLOOOUP, INDEX, MATCH).
4. The use of spreadsheet: Matrix functions.
5. The use of spreadsheet: Pivot tables
6. Database : Creation of relation tables, the role of keys.
7. Database creation, sheet, form creation.
8. Database queries (QBE, SQL).
9. Database creation (action-oriented)
10. Database forms and subforms creation
11. Database report creation.
12. Independent practical problem solving, task presentation I.
13. Independent practical problem solving, task presentation II.
14. Independent practical problem solving, task presentation II..

Évközi ellenőrzés módja: The students get theoretical basic knowledge on the practices. The students get presentations on the parctices get spreadsheets and database knowledge tasks.

Számonkérés módja *(félévi vizsgajegy kialakításának módja – beszámoló, gyakorlati jegy, kollokvium, szigorlat):* Participation at practices is mandatory. For the completion of the semester students have to pass a problem solving practical test during the semester.
50% Excel practical exam, 50% Database practical exam
The sum of points the notes are the followings:
0 - 60 % fail,
61 -70 % pass,
71 -80 % satisfactory,
81 -90 % good,
91 – 100 % excellent.

Oktatási segédanyagok: practical tasks

Ajánlott irodalom:
R. Elmasri: Fundamentals of Database Systems, Pearson, 2016, ISBN: 9781292097619, pp. 1272

Ullman, J.D., Widom J.: Adatbázisrendszerek, Alapvetés, Panem Kft., 2009, 9789635454815, pp. 600.
Date, J. C.: An Introduction to Database Systems, Pearson, 2003, ISBN13 (EAN): 9780321197849, pp. 1024.

REQUIREMENTS
2019/2020 academic year I semester

Name and code of the subject: Regulation and administration of agriculture MTBE104
Name and title of the person responsible for the subject: Dr Andorkó Imre PhD
senior lecturer
Additional instructors involved in teaching the subject: -
Name and level of the program: Food Engineering BSc
Subject type: 2+0 (lecture and practice) compulsory
Teaching timetable of the subject, type of examination: exam
Credit value of the subject: 3

Purpose of teaching the subject:

In this course, students will get any basic legal knowledge and an overview of the legal system of the EU and Hungary. The course will give students basic information about the institutions and the history of EU. They will get an overview of the past and present of the legal regulation on food law and on agricultural law. The students will be able to understand and use the special legal term of food law. The students will gain an overview of the legal concepts relevant to the control and administration of the food industry. The students will be able to understand the purposes and background of food law, both domestic and EU.

Content of the subject (14 weeks):

1. Prelude, basic concepts of law, hierarchy of the Hungarian legal system, legislators.
2. Fundamentals of Civil Law and Civil Procedure Law, the legal action, the Hungarian judicial system, orders, the lawsuit process.
3. The European Union I. – a historical and institutional overview
4. The European Union II. - The legal system of the European Union, the primacy of European Union law
5. The general principles and requirements of EU food law - Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 Januar y2002 laying down, establishing the European Food Safety Authority and laying down procedures in matters of food safety, The European Food Safety Authority (EFSA), RASFF - Food and Feed Safety Alerts
6. The history of legal regulation on food production
7. The Hungarian national legal regulation on food safety. The Act XLVI. of 2008 on the Food Chain, Codex Alimentarius Hungaricus
8. The European consumer law and its importance
9. Fundamental of substantive law; property, protection of property, asset, immovable estate, original and derivative feature of ways of acquisition, overbuilt, use.
10. Legal capacity
11. Fundamentals of contract law I.
12. Fundamentals of contract law II.
13. The Structure of Hungarian Soil Use, regulation, delimination of acquisition of soil, special Rules of Acquisition, in the sylviculture, water management, regulation of Soil Use, contracts of soil use.
14. Agricultural Register, history, development, operative rules.

Type of mid-term examination:
Attendance at lectures is compulsory.

Method of assessment (semester examination mark - report, practical grade, colloquium, examination): colloquium

Teaching aids:

Help to be familiar with the structure and legal regulation of the agricultural system of the European Union and the Hungarian institutions.

Recommended literature:

1. Joseph A. McMahon: EU Agricultural Law and policy, Edward Elgar Pub, 2016. ISBN-13: 978-1781002544

2. Bernd van der MEULEN: EU Food Law Handbook, Wageningen Academic Publishers Books, 2012. ISBN 978-90-8686-246-7

3. Jens Hartig Danielsen: EU Agricultural Law, Wolters Kluwer, Holland, 2013. ISBN: 9789041132802

REQUIREMENTS
2019/2020. academic year I. semester

Name and code of the subject: Élelmiszer analitika (Food analytics), MTBE124
Name and title of the person responsible for the subject: Dr. János Csapó, professor; Dr. Nikolett Czipa, associate professor,
Additional instructors involved in teaching the subject: Loránd Alexa, PhD student
Name and level of the program: Food Engineering BSc
Subject type: compulsory
Teaching timetable of the subject, type of examination: 3+2, examination
Credit value of the subject: 6

Purpose of teaching the subject: The main aim of the lectures is to know the classic analytical methodologies and their theoretical background. The students get knowledge about different methods which are suitable for the determination of physicochemical parameters of food.

Content of the subject (14 weeks):

1. Food ingredients; Sampling and sample preparation
2. Determination of moisture content, ash content and electrical conductivity
3. Determination of lipids
4. Determination of proteins
5. Determination of carbohydrates
6. Determination of fibre content
7. Determination of vitamin
8. Determination of enzyme
9. Determination of antioxidant
10. Determination of amino acid
11. Determination of acid content and acidity
12. Determination of alcoholic beverages' nutritional parameter
13. Sensory analysis
14. Calculation of nutritional value calculation

Type of mid-term examination: Attendance in the case of practical courses is compulsory. The acceptable extent of absences is 3 practical courses / semester.
Criterion of signature: Active attendance on the practical courses.

Method of assessment (semester examination mark - report, practical grade, colloquium, examination): examination

Teaching aids: Slides of lectures

Recommended literature:
Nikolett Czipa (2017): Food analytics. Practical exercises for the course of food analytics. Debreceni Egyetem
János Csapó, Éva Visi Vargáné (2011): Introduction to the Chemistry of Foods and Forages. Digitális tankönyvtár
Bogdanov, S. (2002). Harmonised Methods of the Interantional Honey Commission. Swiss Bee Research Centre. FAM, Liebefeld, CH-3003 Bern, Switzerland
Codex Alimentarius; Directives

REQUIREMENTS
2019-2020 academic year, 1st semester

Name and code of the subject: Molecular cell biology, MTBE7001A
Name and title of the person responsible for the subject: Dr. Endre Máthé, associate professor PhD
Additional instructors involved in teaching the subject: -
Name and level of the program: Food engineering BSc
Subject type: compulsory;
Teaching timetable of the subject, type of examination: 2 lect. + 2 pract., oral

Credit value of the subject: 4

Purpose of teaching the subject:
System biology type of interpretation of the molecular and cellular organization levels of living matter and life phenomena. Structural and functional features of pro- and eukaryotic cells. Genome structure and expression of genetic information. The cell cycle and its regulation. Presentation of molecular relationships related to cell structure and function and the most important molecular research methods.

Content of the subject (14 weeks):
LECTURES:
Course objectives:
1-3. Analysis of cellular and molecular levels of organization of living material, and combined cellular and molecular investigation methods.
4-5. Eukaryotic compartments, cellular organelles and homeostasis.
6-8. Cell nucleus, nucleolus, chromosomes. Gene expression. DNA replication and repair. Nuclear transport.
9-10. Cytoskeleton: actin, intermediate filaments, microtubules, centrosomes, mitotic spindle.
11-12. Mitochondria. Regulation of cellular metabolism: glycolysis, Krebs cycle, ETC, beta-oxidation, ATP synthesis.
13-14. Spatial and temporal regulation of cellular events, the cell cycle.

PRACTICALS:
1-2. Microscopic analysis of chromosomes.
3-5. Molecular investigation methods. Genomic and plasmid DNA isolation. PCR techniques.
6-8. Molecular cloning and analysis of transgenic organisms.
9-11. Immunofluorescence analysis of eukaryotic cell related structures.
12-14. *In silico* genome-, proteome- and interactome analysis.

Type of mid-term examination: participation in the practicals is mandatory. Attendance at 70% of the practicals is mandatory. In case of absence, a report must be submitted by the student within two weeks from the missed practice (theoretical and practical description).
Participation in the practicals is a precondition for the final exam.

Method of assessment (semester examination mark - report, practical grade, colloquium, examination): colloquium

Teaching aids: lecture specific PPTs, research/review papers

Recommended literature:

• Alberts, B., Brey, D., Hopkin, K., Johnson, A., Lewis, J., Raff, M., Roberts, K., Walter, P. (2016). Essential cell biology. 4th edition. Garland Science, Taylor & Francis Group, New York, USA. ISBN-13: 978-0815344544
• Alberts, B., Johnson, A, Lewis, J. Morgan, D., Raff, M., Roberts, K., Walter, P. (2014). Molecular Biology of the Cell. Sixth Edition. Garland Science, Taylor & Francis Group, New York. ISBN-13: 978-0815344322
• Pollard, T.D., Earnshaw, W.C., Lippincott-Schwartz, J. and Johnson, G. (2017). Cell Biology, 3rd Edition, Elsevier, ISBN: 9780323341264
• PUBMED database

REQUIREMENTS
2019/2020. academic year I. semester

Name and code of the subject: Élelmiszerbiztonság alapjai (Introduction to food safety), MTBE7004A
Name and title of the person responsible for the subject: Dr. Nikolett Czipa, associate professor
Additional instructors involved in teaching the subject: Loránd Alexa, PhD student, Andrea Kántor, PhD student
Name and level of the program: Food Engineering BSc
Subject type: compulsory
Teaching timetable of the subject, type of examination: 2+0, practical course mark
Credit value of the subject: 3

Purpose of teaching the subject: The main aim of this course is to know the organisations, regulations and requirements which aim the production of safe food. Student will know the methodology of hazard analysis and risk assessment of chemical and microbiological hazards.

Content of the subject (14 weeks):

1. Regulations for food quality and food safety
2. European food safety policy, ÉLBS
3. Influencing factors of food quality and food safety
4. Biological and microbiological hazards in foods
5. Chemical hazards (heavy metals, arsenic, mycotoxins)
6. Chemical hazards (plant and animal toxins)
7. Vulnerable groups
8. Introduction to toxicology, influencing factors of toxicity
9. Determination of safe human dose, human exposure assessment
10. Chemical risk assessment
11. Labelling of food
12. Geographical indicators and trade marks
13. Authorization of food business
14. RASFF and INFOSAN

Type of mid-term examination: The Students have two tests in the session. At least 60% is required to satisfactory mark. If the Student fails to fulfil this we provide an occasion to repeat it in the educational period. Should the student fail this occasion as well, a new occasion must be offered until the end of the third week of the exam period to repeat the mid-term exam.

Method of assessment (semester examination mark - report, practical grade, colloquium, examination): practical course mark

Teaching aids: Slides of lectures

Recommended literature:
Nikolett Czipa (2017): Practical exercises for the course of introduction to food safety. Dbreceni Egyetem
Hungary – 2016 Report on trends and sources of zoonoses (2016): Trends and sources of zoonoses and zoonotic agents in foodstuffs, animals and feeding stuffs
INFOSAN activity report 2016-2017. Geneva: World Health Organization and Food and Agriculture Organization of the United Nations

REQUIREMENTS
2019/2020 academic year I. semester

Name and code of the subject: Basics of quality management. MTBE7010A
Name and title of the person responsible for the subject: Dr. Ferenc Peles, assistant professor
Additional instructors involved in teaching the subject: -
Name and level of the program: food engineering BSc
Subject type: obligatory
Teaching timetable of the subject, type of examination: 2+0 C
Credit value of the subject: 3

Purpose of teaching the subject: The aim of the subject is the introduction of the basic concepts and characteristics of quality and quality management, furthermore the basics of the quality and environmental management systems and related standards.

Content of the subject (14 weeks):

1. Concept and importance of quality
2. History of quality development
3. Quality assurance professionals
4. Process of meeting the market demands
5. Quality regulating system
6. Good practices
7. Basics of GLOBALGAP
8. Basics of HACCP
9. Basics of quality management system
10. Basics of environmental management system
11. Integrated management systems
12. Basics of TQM
13. Quality awards
14. Quality tools and techniques

Type of mid-term examination: mid-year written exams

Method of assessment (semester examination mark - report, practical grade, colloquium, examination): colloquium

Teaching aids: PPT slides

Recommended literature:
Peles, F. – Juhász, Cs. (2014): Quality assurance. University lecture notes. University of Debrecen. /ISBN 978-963-473-656-1/ TÁMOP 4.1.2.A/1-11/1-2011-0009. 177p.
Vasconcellos, J.A. (2004): Quality Assurance for the Food Industry. A Practical Approach. CRC Press. 448 p.
Jacxsens, L. – Devlieghere, F. – Uyttendaele, M. (2009): Quality Management Systems in the Food Industry. Ghent University. 153p.

REQUIREMENTS
2019/2020. academic year I. semester

Name and code of the subject: Basic principles of food mechanics, MTBE7011A
Name and title of the person responsible for the subject: Dr. Vántus András, associate professor
Additional instructors involved in teaching the subject: Dr. Csatári Nándor, assistant research fellow
Name and level of the program: Food engineering BSc
Subject type: obligatory
Teaching timetable of the subject, type of examination: 2+2 practical grade
Credit value of the subject: 4

Purpose of teaching the subject: The aim of the subject is to let the student know how to apply the most important technological operations in the food industry and know those machines which are in the practice.
The objective of the subject is to become familiar with the most important technological operations applied in the scope of food industry, their theoretical connections and the machinery utilised in practice.
The student will become up to date with the task, field of utilisation and conditions of the given item of machinery. Important, that the graduated specialists have to know to select the suitable most typical machines for the accomplishment of the single operations.

Content of the subject (14 weeks):

1. Introduction; Machines of conveyance I. *(gravitational and mechanical conveyance)*
2. Machines of conveyance II.*: (conveyance in air flow)*
3. Machines of washing *(vegetables, fruits)*
4. Machines of chopping, cutting and grinding I. *(meat, vegetables, fruits)*
5. Machines of chopping, cutting and grinding II. *(cereals)*
6. Technology of meat processing, slaughterhouse
7. Devices of classification and sorting I. *(screens and sieves)*
8. Devices of classification and sorting II. *(cylinder and air flow separators, hydro cyclone)*
9. Separation processes I. *(settling, filtering)*
10. Separation processes II. *(centrifugation)*
11. Mixer devices, agitators, homogenisation
12. Devices of pressing, squeezing
13. Refrigerators, refrigerating devices, heat exchangers
14. Evaporation devices

Type of mid-term examination: participation is compulsory on seminars, maximum 30% absence is allowed
The requirements for course signature

1. attending the seminars
2. submitting and presenting a project work in food technology

Method of assessment (semester examination mark - report, practical grade, colloquium, examination): practical grade

Teaching aids:
- Lecture slides
- Smith, P. G.: Introduction to Food Process Engineering. Springer Science+Business Media. 2011. ISBN: 978 1 4419 7661 1

- Serna-Saldivar, Sergio O.: Cereal Grains. Properties, Processing, and Nutritional Attributes. Taylor and Francis Group, LLC. 2010. ISBN: 978 1 4398 1560 1
- Hui, Y. H. – Ghazala, Sue – Graham, Dee M. – Murrell, K. D. – Nip, Wai-Kit: Handbook of Vegetable Preservation and Processing. Taylor and Francis Group. 2003. ISBN: 9780824743017

Recommended literature:
Sinha, Nirmal K. – Sidhu, Jiwan S. - Barta, J. - Wu, James S. B. - Cano, Pilar M.: Handbook of Fruits and Fruit Processing. Wiley-Blackwell. 2012. ISBN: 978-0-8138-0894-9

REQUIREMENTS
2019/2020 academic year I. semester

Name and code of the subject: Food colloids, MTBE7012A
Name and title of the person responsible for the subject: Prof. Dr. Béla Róbert Kovács, professor
Additional instructors involved in teaching the subject: -
Name and level of the program: Food Engineering BSc, 2
Subject type: Main subjects
Teaching timetable of the subject, type of examination: 2+0, Colloquium
Credit value of the subject: 3

Purpose of teaching the subject:

Historical overview. Classifications of colloidal systems. General characterization of colloidal systems. General descriptions of the most important laws. Food colloid systems.

Content of the subject (14 weeks):

Lecture 1: The science of colloid, historical overview, the concept of the colloidal state, the grouping of material systems.
Lecture 2: Classifications of colloidal systems, grouping on the basis of the dispersed nature and the interactions between the particles.
Lecture 3: Factors determining properties of colloidal systems, the shape of a disperse system, the size of the dispersed parts, general characterization of the major systems, incoherent systems.
Lecture 4: Aero disperse systems, liquid medium disperse systems, gas dispersions, foams.
Lecture 5: Suspensions, emulsions, solid medium disperse systems, macromolecular colloidal solutions, association colloids.
Lecture 6: Coherent systems, gels, liquid medium concentrated disperse systems
Lecture 7: Dry powder agglomerations, solid foams, solid macromolecules, kinetic regularities
Lecture 8: General descriptions of the most important laws. Brownian motion, diffusion, osmosis, sedimentation, stability of disperse systems.
Lecture 9: Coagulation, stability and coagulation of suspensions, stability of foams, status changes of gels. Rheological properties, rheological basic concepts, deformations, elastic deformations, flows.
Lecture 10: The concepts of strength and consistency, behaviour of non-Newtonian liquids, rheology of colloidal systems, viscosity of disperse systems, flow of suspensions.
Lecture 11: Viscosity of solutions of yarn shaped polymer molecules, viscosity of emulsions, and structural viscosity of disperse systems, main food colloidal systems, and food suspensions.
Lecture 12: Food emulsions, food gels.
Lecture 13: Protein gels, polysaccharide gels, food foams.
Lecture 14: Food complex colloidal systems, food dual systems, other colloidal stabilizers.

Type of mid-term examination: Assignments to be submitted

Method of assessment (semester examination mark - report, practical grade, colloquium, examination): Colloquium

Teaching aids: *Powerpoint*

Recommended literature:

- Cosgrove T.: 2005. Colloid Science, Principles, Methods and Applications. Bristol, UK. Blackwell Publishing Ltd.
- Belitz D., Grosch W., Schieberle P.: 2004. Food Chemistry, Springer Verlag.
- Fennema O.: 1996. Food Chemistry, Marcel Dekker.
- Mohsenin N.N.: 1986. Physical properties of plant and animal materials, Gordon and Breach Science publishers, New York.
- Ludger O. Figura, Arthur A. Teixeira: 2007. Food Physics, Springer, Heidelberg.

KÖVETELMÉNYRENDSZER
2019/2020. tanév I. félév

A tantárgy neve, kódja: Unit operations in food processing I., MTBE7013A
A tantárgyfelelős neve, beosztása: Prof. Dr. Kovács Béla – egyetemi tanár
Szak neve: Élelmiszermérnök BSc
Tantárgy típusa: kötelező
A tantárgy oktatási időterve, vizsga típusa: 3. félév (2+2), kollokvium
A tantárgy kredit értéke: 5

A tárgy oktatásának a célja:

Within the framework of Unit operations in food processing the flow of fluids, separation, homogenization and transport processes are educated. In the lectures mathematical description, equipment and conditions of the flow of fluids, separation processes, homogenization processes and transport (solid agglomerations) processes operations are discussed.

A tantárgy tartalma (14 hét bontásban):

1. General description of the flow of fluids
2. Reynolds number, equivalent pipe diameter, principle of continuity
3. Bernoulli equation
4. Fluid transport (pumps, fans, compressors)
5. General description of the mechanical separations, gravity sedimentation
6. Centrifugal sedimentation, types of centrifuges, cyclones, hydrocyclones
7. Filtration, filtering equipments
8. Pressing, pressing machines
9. Homogenization, mixing, mixers
10. Emulsification, emulsifying equipments
11. Crushing, crushers
12. Pounding, pounding machines
13. Fluidization
14. Pneumatic transport

Évközi ellenőrzés módja (*a foglalkozásokon való részvétel előírásai és félévközi ellenőrzésének módja, a vizsgára bocsátás és aláírás feltételei*):
During the semester, the students may write theoretical 3 tests, based on which they may get an offered mark for the exam. In addition, students have to write 2 tests to the topics of the practice (seminar), and they will get the mark for the practice (seminar) based on these tests.

Számonkérés módja (*félévi vizsgajegy kialakításának módja – beszámoló, gyakorlati jegy, kollokvium, szigorlat*): kollokvium

Oktatási segédanyagok:
ppt presentation, books

Ajánlott szakirodalom:

Food Process Engineering and Technology. 2nd Edition. Authors: Zeki Berk. Hardcover ISBN: 9780124159235. eBook ISBN: 9780124159860

Unit Operations in Food Processing, Second Edition 2nd Edition by R.L.Earle eBook ISBN: 9781483293103

Introduction to Food Engineering, Fifth Edition (Food Science and Technology) 5th Edition by R Paul Singh (Author), Dennis R. Heldman (Author) ISBN-13: 978-0123985309

Fundamentals of Food Process Engineering (Food Science Text Series) 4th ed. 2018 Edition by Romeo T. Toledo (Author), Rakesh K. Singh (Author), Fanbin Kong (Author), ISBN 978-3-319-90091-1

KÖVETELMÉNYRENDSZER
2019/20. tanév I. félév

A tantárgy neve, kódja: Mikrobiológia alapjai, MBTE7016
A tantárgyfelelős neve, beosztása: Dr. Karaffa Erzsébet Mónika, egyetemi docens
A tantárgy oktatásába bevont további oktatók: Dr. Pál Károly, tudományos főmunkatárs,
Szak neve, szintje: Élelmiszermérnöki BSc
Tantárgy típusa: kötelező
A tantárgy oktatási időterve, vizsga típusa: 2+1, K
A tantárgy kredit értéke: 3

A tárgy oktatásának célja:
Within the course, students will learn about the structure, metabolism, and genetics of microbial cells. The evolution of microbes, the prokaryotes and the main phylogenetic groups of eukaryotic microbes and their characteristics are described. We present the ecological, environmental, food, biotechnological role of microbes, plant, animal and human diseases.

A tantárgy tartalma (14 hét bontásban):

1. Microorganisms and Microbiology
2. Brief History of Microbiology
3. Cell Chemistry
4. Metabolism
5. Microbial Growth
6. Environmental effects of microbial growth
7. Molecular Biology of Microorganisms – Genes and Replication
8. Molecular Biology of Microorganisms –Transcription
9. Molecular Biology of Microorganisms – Translation
10. Protein synthesis
11. Microbial Evolution and systematics
12. Taxonomy of the Prokaryotes
13. Taxonomy of the Eukaryotes
14. Viruses

Évközi ellenőrzés módja: a gyakorlatokon való részvétel kötelező. A gyakorlatok 70%-án való részvétel kötelező. A gyakorlatokhoz kapcsolódóan jegyzőkönyvet kell leadni a hallgatónak. Az aláírás megszerzésnek feltétele a gyakorlatokon való részvétel.

Számonkérés módja (*félévi vizsgajegy kialakításának módja – beszámoló, gyakorlati jegy, kollokvium, szigorlat*): kollokvium

Oktatási segédanyagok: az előadások diasorai

Ajánlott irodalom:
Madigan, M. T, Martinko, J. M., Bender K., Buckley, D., Stahl, D (2015): Brock Biology of Microorganisms, Benjamin Cumming, 14th edition 1030 oldal, ISBN 978-1-292-01831-7
Hogg S (2005): Essential Microbiology, John Wiley & Sons Ltd, 481 oldal, ISBN 0 471 49753 3
Talaro, K. P. (2015): Foundations in microbiology, Pasadena City College, Barry Chess, Pasadena City College. – Ninth edition. 929 oldal, ISBN 978–0–07–352260–9Deák Tibor,

REQUIREMENTS
2019/2020. academic year I. semester

Name and code of the subject: Élelmiszer analitika (Food analytics), MTBE7023A
Name and title of the person responsible for the subject: Dr. János Csapó, professor; Dr. Nikolett Czipa, associate professor,
Additional instructors involved in teaching the subject: Loránd Alexa, PhD student
Name and level of the program: Food Engineering BSc
Subject type: compulsory
Teaching timetable of the subject, type of examination: 2+2, examination
Credit value of the subject: 4

Purpose of teaching the subject: The main aim of the lectures is to know the classic analytical methodologies and their theoretical background. The students get knowledge about different methods which are suitable for the determination of physicochemical parameters of food.

Content of the subject (14 weeks):

1. Food ingredients; Sampling and sample preparation
2. Determination of moisture content, ash content and electrical conductivity
3. Determination of lipids
4. Determination of proteins
5. Determination of carbohydrates
6. Determination of fibre content
7. Determination of vitamin
8. Determination of enzyme
9. Determination of antioxidant
10. Determination of amino acid
11. Determination of acid content and acidity
12. Determination of alcoholic beverages' nutritional parameter
13. Sensory analysis
14. Calculation of nutritional value calculation

Type of mid-term examination: Attendance in the case of practical courses is compulsory. The acceptable extent of absences is 3 practical courses / semester.
Criterion of signature: Active attendance on the practical courses.

Method of assessment (semester examination mark - report, practical grade, colloquium, examination): examination

Teaching aids: Slides of lectures

Recommended literature:
Nikolett Czipa (2017): Food analytics. Practical exercises for the course of food analytics. Debreceni Egyetem
János Csapó, Éva Visi Vargáné (2011): Introduction to the Chemistry of Foods and Forages. Digitális tankönyvtár
Bogdanov, S. (2002). Harmonised Methods of the Interantional Honey Commission. Swiss Bee Research Centre. FAM, Liebefeld, CH-3003 Bern, Switzerland
Codex Alimentarius; Directives

REQUIREMENTS
2019/2020 academic year I. semester

Name and code of the subject: Food microbiology. MTBE7024A
Name and title of the person responsible for the subject: Dr. Ferenc Peles, assistant professor
Additional instructors involved in teaching the subject: -
Name and level of the program: food engineering BSc
Subject type: obligatory
Teaching timetable of the subject, type of examination: 2+2 P
Credit value of the subject: 4

Purpose of teaching the subject: The aim of the subject is the introduction of the subject, task and history of food microbiology, internal and external factors that influence the safety and quality of raw materials and finished products. Students will also learn about the most important microbiological contaminants of the food, the major preservation methods, furthermore the disease and spoilage causing microorganisms.

Content of the subject (14 weeks):

1. The subject, task and history of food microbiology
2. Microbial ecology of food. Sources of contamination
3. Characteristics of microorganisms. The inherent characteristics of food
4. External environmental factors. Interactions of ecological factors
5. Growth and destruction of microorganisms
6. Diseases caused by food (food infection, food poisoning)
7. Food borne pathogens
8. Mycotoxin-producing moulds, mycotoxins
9. Preserving operations. Heat treatment, heat removal, dehydration, radiation
10. Chemical and combined preservation methods
11. Food-fermentation. Useful microorganisms
12. Indicator and spoilage microorganisms
13. Microbiology of plant products
14. Microbiology of animal products

Type of mid-term examination: mid-year written exams

Method of assessment (semester examination mark - report, practical grade, colloquium, examination): practical grade

Teaching aids: PPT slides

Recommended literature:
Karaffa, E. – Peles, F. (2015): Microbiological aspects of food quality and safety. University lecture notes. University of Debrecen. TÁMOP-4.1.2.D-12/1/KONV-2012-0008. 110p.
Doyle, M.P. - Buchanan, R.L. (2013): Food Microbiology: Fundamentals and Frontiers. 4th edition. ASM Press, Washington. 1118p.
Adams, M.R. - Moss, M.O. (2008): Food Microbiology. 3rd edition. RSC Publishing. 478p.

REQUIREMENTS
2019/20 academic year2. semester

Name and code of the subject: Plant Physiology, MTB7014A
Name and title of the person responsible for the subject: Dr. Veres Szilvia, associate professor
Additional instructors involved in teaching the subject: -
Name and level of the program: Food Engineer, BSc
Subject type: compulsary
Teaching timetable of the subject, type of examination: 2+1 K
Credit value of the subject: 3

Purpose of teaching the subject: The study of plants as producers really important because of their position at the energy and elemental intake portion of the energy pyramid and the food net. The lecture with practise is designed to provide comprehensive exposure to the subject of plant physiology. The students learn about function of plants throughout their development from seeds through reproduction. Lectures and laboratory practises are cover from the biochemical level to the organism level. The laboratory exercises complement the lectures.

Content of the subject (14 weeks):

week	Lecture	Laboratory
1	Basics in plant physiology, structure and funtion	Investigation of basic characteristics of enzyme
2	Leaves, light absorption in photosyntheis	Photosynthetic pigments
3	Carbon acquisition and fixation	CO_2 fixation
4	Respiration (photo-, and dark)	Intensity of respiration
5	Plant water relations: stomata, transpiration and plants in water-limited environments	Plant water relations
6	Functions of nutrients in plant I.	Mineral nutrition and plant growth
7	Functions of nutrients in plant II.	Mineral nutrition and plant growth
8.	Symbiotic relationships for nutrient capture, Nitrogen assimilation	Mineral nutrition and plant growth
9.	Plant hormones – regulation of development and Plant hormones – environmental acclimation I.	Plant hormones
10.	Plant hormones – regulation of development and Plant hormones – environmental acclimation II.	Plant hormones
11.	Flowering	Plant hormones
12.	Fruit and seeds	Plant storage products
13.	Seed germination/dormancy	Germination and shooting
14.	Senescence	*In vivo* physiological measurements

Type of mid-term examination: -

Method of assessment (semester examination mark - report, practical grade, colloquium, examination): practical guide and lab notes, oral/writing exam

Teaching aids:
ppt presentation

Recommended literature:

Taiz, L., Zeiger, E. (2007) Plant Physiology. 4th ed. Sinauer Associates, Inc. ISBN 0-87893-823-0 or online version
Buchanan, B. B., Gruissem, W., Jones, R. L. (2015) Biochemistry and Molecular Biology of Plants. John Wiley & Sons, Inc. ISBN: 978-0-470-71421-8
Lambers, H., Chapin, F. S. and Pons, T. L. (2011) Plant Physiological Ecology. Springer, New York. ISBN 0-387-98326-0

REQUIREMENTS
2019/20 academic year II. semester

Name and code of the subject: Environmental management MTB7015A
Name and title of the person responsible for the subject: Dr. habil Attila Nagy, Associate Professor
Additional instructors involved in teaching the subject:
Name and level of the program: Food Engineering BSc
Subject type: compulsory
Teaching timetable of the subject, type of examination: 2 K
Credit value of the subject: 3

Purpose of teaching the subject:

Content of the subject (14 weeks):

1. Definition of environment, environmental protection, environmental management, environmental pollution. Classification of environmental elements. Characteristics and major types of systems. The concept of model and modelling, the characteristics of the model. Principles of environmental protection.
2. Concept and classification of natural resources. Biogeochemical cycles (Carbon-, Nitrogen-, Oxygen- cycle).
3. The impact of societies on the environment (agricultural societies, urbanization, technological advances, their negative environmental effects).
4. International environmental protection is organized. Overview of major environmental conferences. Concept of sustainable development.
5. Global problems (war and peace, overpopulation, food crisis, material and energy crisis, environmental crisis).
6. Global environmental problems in details
7. Pollution of the environment, classification of pollutants, types and causes of pollution
8. Soil protection. The concept of soil, its functions. The concept of soil degradation, its causes, factors preventing soil fertility. Sources of soil contamination. Heavy metal and oil pollution of soils. Remediation technologies, phytoremediation. Self-cleaning of soils.
9. The concept, structure and composition of the atmosphere. Thinning of the ozone layer, greenhouse effect, odorous substances in the atmosphere, air pollution caused by landfills. Atmospheric aerosols. Smog grouping, characteristics. Self-cleaning of the air.
10. Basics of water protection, Classic water rating, Collection and treatment of communal wastewater, placement of by-product
11. The effects of agricultural production. Erosion, deflation, salinization, acidification. Effects of crop production and animal husbandry on soil, water and air
12. Definition of waste, waste management and classification of waste
13. The causes of radioactive contamination. Effects of radioactive contamination on humans, flora and fauna
14. Characteristics and propagation of noise and sound. Noise protection laws, load limits. Noise measurement. Effects of noise on humans. Methods of noise reduction.

Type of mid-term examination:
1. Active participation in the lessons
2. Submitting report at the end of the semester

Method of assessment (semester examination mark - report, practical grade, colloquium, examination): Written exam

Teaching aids:

Recommended literature:

1. J. C. Lovett- D. G. Ockwell.: 2010. A Handbook of Environmental Management.
2. J.M. Blais, M. Rosen, J.P. Smol.: 2015. Environmental Contaminants.
3. A. S. Kalamdhad, J. Singh, K. Dhamodharan.: 2016. Advances in Waste Management.
4. V. I. Grover.: 2006. Water: Global Common and Global Problems.

REQUIREMENTS
2019/2020. academic year II. semester

Name and code of the subject: Iparági élelmiszertechnológia és minőségügy (Food industry technologies and quality assurance) MTBE122
Name and title of the person responsible for the subject: Dr. Nikolett Czipa, associate professor
Additional instructors involved in teaching the subject: Loránd Alexa, PhD student, Andrea Kántor, PhD student
Name and level of the program: Food Engineering BSc
Subject type: compulsory
Teaching timetable of the subject, type of examination: 2+1, practical course mark
Credit value of the subject: 5

Purpose of teaching the subject: The main aim of the lectures is to know the hygiene requirements in relation to plant origin food production, the structure of HACCP plan and the methodology of hazard identification, hazard analysis, flow diagram preparation and corrective action determination. To the end of the semester, students will be able to identify physical, chemical and microbiological hazards in plant origin food production, and they will be able to prepare a HACCP plan.

Content of the subject (14 weeks):

1. Food hygiene (852/2004/EC regulation) and HACCP system
2. Hazards in food production
3. Hazard analysis of production of bakery products
4. Hazard analysis of production of non-alcoholic drinks
5. Hazard analysis of production of alcoholic beverages (beer)
6. Hazard analysis of production of pálinka (regulation for pálinka)
7. Hazard analysis of production of alcoholic beverages (wine)
8. Hazard analysis of production of confectionery products
9. Hazard analysis of production of pickles
10. Hazard analysis of production of canned foods
11. Hazard analysis of production of quick-frozen foods
12. Hazard analysis of production of vegetable oils
13. Hazard analysis of production of delicatessen foods
14. Hazards of animal origin foods

Type of mid-term examination: Attendance in the case of practical courses is compulsory. The acceptable extent of absences is 3 practical courses / semester. The Students have one test in the session. At least 60% is required to satisfactory mark. If the Student fails to fulfil this we provide an occasion to repeat it in the educational period. Should the student fail this occasion as well, a new occasion must be offered until the end of the third week of the exam period to repeat the mid-term exam.
Criterion of signature: Active attendance on the practical courses.

Method of assessment (semester examination mark - report, practical grade, colloquium, examination): practical course mark (individual project)

Teaching aids: Slides of lectures

Recommended literature:
Nikolett Czipa (2017): Practical exercises for the course of food industry technologies and quality assurance. Debreceni Egyetem

2016/C 278/01 EU Commission notice on the implementation of food safety management systems covering prerequisite programs (PRPs) and procedures based on the HACCP principles, including the facilitation/flexibility of the implementation in certain food businesses
852/2004/EC regulation
Lelieved, H., Holah, J., Gabric, D.: (2016): Handbook of Hygiene Control in the Food Industry. ISBN: 978-0-08-100197
Codex Alimentarius Commission: Food hygiene. Basic texts. (http://www.fao.org/docrep/012/a1552e/a1552e00.pdf)

REQUIREMENTS
2019/2020 academic year II. semester

Name and code of the subject: Biochemistry (MTBE7007A)
Name and title of the person responsible for the subject: Dr. Vágó Imre, associate professor
Additional instructors involved in teaching the subject: Kincses Sándorné Dr, assistant professor; Erdeiné Dr. Kremper Rita, assistant professor; Dr. Béni Áron assistant professor
Name and level of the program: Food Engineering BSc
Subject type: obligatory
Teaching timetable of the subject, type of examination: 2+1 E
Credit value of the subject: 3

Purpose of teaching the subject: Learning the basics of "Biochemistry" for related subjects

Content of the subject (14 weeks):
1. The foundations of biochemistry. Subjects, methods, role, structure, functions and importance of biochemistry in the living organisms and int he food science.
2. Macrobiomolecules: Part one
Carbohydrates. Functional groups of aldo- and ketosugars. α- and ß-anomery. Mono-, di- and trisaccharides. Polysaccharides, their structure and role in the living organisms.
3. Macrobiomolecules: Part two
Amino acids, peptides, and proteins. Working with Proteins. The Covalent Structure of Proteins. The Three-Dimensional Structure of Proteins: overview of protein primery structure. Secundary, tertiary and quaternery structure of proteins. Stability and denaturation of proteins.
4. Macrobiomolecules: Part three
Lipids. Structure of lipids: alcohol and fatty acid components. Neutral and amphipatic molecules. Storage lipids and functions. Structural lipids in membranes. Working with lipids.
5. Macrobiomolecules: Part four
Nucleotides and nucleic acids. Basics knowledges: RNA and DNA. Nucleic acid structure and their chemistry. Functions of nucleotides. DNA-based information technologies. DNA cloning
6. Enzymes.
Introduction to enzymes. How enzymes work. Enzyme kinetics and mechanisms. Enzymatic reactions in the living organisms and foods. Enzyme activation and inhibition methods. Regulatory enzymes.
7. Biological membranes.
Passive and active transport. The composition and architecture of membranes. solute transport across membranes.
8. Bioenergetics and metabolism.
Principles of bioenergetics. Bioenergetics and thermodynamics. Phophoryl group, role in the energy transfers and energy storage. Structure of ATP
9. Biological oxidation-reduction reaction.
Glycolysis, gluconeogenesis and the pentose. Pentose phosphate pathway of glycose oxydation. Feeder pathways for glycolysis. Fates of pyruvate under anaerobic conditions: fermentation.
10. Principles of metabolic regulation.
The metabolism of glycogen in animals. regulation of metabolic pathways. Coordinated regulation of glycolysis and gluconeogenesis. Coordinated regulation of glycogen synthesis and breakdown.
11. The citric acid cycle.
Production of Acetyl-CoA (activated acetate), reactions of the citric acid cycle. Energetic results of the Szent-Györgyi – Krebs cycle.
12. Fatty acid catabolism
Digestion mobilization and transport of fats. Oxidation of fatty acids. Ketone bodies. Energetic results of the biochemical decomposition of stearic acid.
13. Amino Acid Oxidation and the Production of Urea.

Metabolic fates of amino groups. Types of nitrogen excretion. The reactions and energatic demand of urea cycle. Pathways of amino acid degradation.
14. Biosynthesis of amino acids and proteins.
Molecules derived from amino acids. Biosynthesis and degradation of nucleotides. Information pathways: genes and chromosomes. DNA metabolism: replication, repair, recombination. RNA metabolism: DNA-dependent synthesis of RNA, processing. Protein metabolism. Genetic code, protein synthesis, protein targeting and degradation.

Type of mid-term examination: Report on laboratory exercises

Method of assessment (semester examination mark - report, practical grade, colloquium, examination): oral colloquium

Teaching aids: ppt

Recommended literature:
Victor Rodwell – David Bender – Kathleen Botham – Peter Kennelly – P. Anthony Weil (2021): Harper's illustrated biochemistry. Lange publ. ISBN 1259837939

REQUIREMENTS
2019/20. academic year 2 nd semester

Name and code of the subject: Analytical chemistry, MTBE7009A
Name and title of the person responsible for the subject: Prof. Dr. Béla Kovács
Additional instructors involved in teaching the subject: Dr. Diána Ungai, Emőke Topa
Name and level of the program: Food Engineering BSc, 1
Subject type: compulsory
Teaching timetable of the subject, type of examination: 2+2, exam
Credit value of the subject: 4

Purpose of teaching the subject:

The basic objective of the course is to acquaint students with the most important general analytical knowledge required to determine the quality and composition of the food and food ingredients.

Content of the subject (14 weeks):

1. Introduction to analytical chemistry. History of analytics.
2. Basic concepts. Prefixes. Units and standards. Units of measurement. Metric system.
3. SI units, SI supplementary units and SI derived units.
4. Length, weight, time, electric current, thermodynamic temperature, amount of the substance and luminous intensity.
5. Metrology.
6. The errors of an analysis results.
7. The main steps of a multielemental analysis.
8. Calibration method. Standard addition method. Internal standard method. Spiking method.
9. The Fresenius's classification criteria of cations. The Fresenius's classification criteria of anions.
10. The general methods of quantification.
11. The fundamentals of quality assurance of analyses.
12. Classical analysis, titrimetric. Acid-base titrations. Complexometry.
13. Celatometries titration. Precipitation titration. Redox titration.
14. Classical analysis, gravimetry.

LABORATORY PRACTICES

1. Accident prevention education.
2 Formulas of chemical compounds, balancing chemical equations.
3. Balancing chemical equations based on oxidation numbers.
4. Concentration calculation.
5. Intruduction of laboratory equipments.
6. Qualitative analysis.
7: Acid-base titration I.
8: Acid-base titration II.
9: Complexometric titration I.
10: Complexometric titration II.
11: Permanganometric titration I.
12: Permanganometric titration II.
13. Precipitation titration.
14. Opportunity given for doing a missed laboratory practice.

Type of mid-term examination:
Assignments to be submitted

Method of assessment (semester examination mark - report, practical grade, colloquium, examination):
70 % attendence and fulfilment of the tasks is compulsory for the signature. Final grad is deduced from results of mid-term accomplishments and the results of the final exam.

Teaching aids:
To be find in e-learning

Recommended literature:

Giinzler H. and A. Williams: 2001. Handbook of Analytical Techniques. WILEY-VCH, Weinheim, Germany.
Ebbing D.D. and Gammon S.D.: 2009 General chemistry. Houghton Mifflin Company. Boston. USA.
Danzer K.: 2007. Analytical chemistry. Theoretical and metrological fundamentals. Springer-Verlag. Berlin Germany.
Skoog D.A., D.M. West, F.J. Holler: 1992. Fundamentals of Analytical Chemistry. ed. Saunders College Publ. Fort Worth, Texas (USA).

KÖVETELMÉNYRENDSZER
2019/2020 tanév II. félév

A tantárgy neve, kódja: Unit Operations in Food Processing II. MTBE7017A
A tantárgyfelelős neve, beosztása: Dr. Kovács Béla Róbert
A tantárgy oktatásába bevont további oktatók: Dr. Bérczesné Szojka Anikó
Szak neve, szintje: élelmiszermérnök BSc
Tantárgy típusa: kötelező
A tantárgy oktatási időterve, vizsga típusa: 2+2 Gy
A tantárgy kredit értéke: 5

A tárgy oktatásának célja:
Within the framework of Unit Operations in Food Processing III subject the mass transfer operations are educated. In the lectures mathematical description, equipments and conditions of the mass transfer operations are discussed. Application of fundamental laws and equations takes place in the seminars.

A tantárgy tartalma (14 hét bontásban):
1. Introduction. Mass transfer operations in the food industry.
2. The purpose of mass transport. Intoduction to mass transfer and diffusion.
3. Characterization of diffusion processes.
4. Gas absorption (processes, conditions, equipments).
5. Distillation, rectification (processes, conditions, equipments).
6. Adsorption, ion exchange (processes, conditions, equipments).
7. Classroom test
8. Extraction: liquid-liquid extraction, solid-liquid extraction (processes, conditions, equipments).
9. Supercritical extraction (processes, conditions, equipments).
10. Crystallization (processes, conditions, equipments).
11. Drying (processes, conditions, equipments).
12. Membrane separation (processes, conditions, equipments).
13. Classification operations
14. Classroom test

Évközi ellenőrzés módja:
A szorgalmi időszakban lehetőség van 2 db elméleti jegymegajánló dolgozat megírására. Emellett 2 db gyakorlati zárthelyi dolgozatot is írnak a hallgatók. A gyakorlatok 70%-án való részvétel kötelező. Az aláírás megszerzésnek feltétele a gyakorlatokon való részvétel és a gyakorlati zárthelyi dolgozatok teljesítése.

Számonkérés módja (*félévi vizsgajegy kialakításának módja – beszámoló, gyakorlati jegy, kollokvium, szigorlat*): gyakorlati jegy

Oktatási segédanyagok: Az előadások és a gyakorlatok diasorai.

Ajánlott irodalom:

1. Christie John Geankoplis: Transport Processes and Unit Operations (3rd Edition), Prentice Hall PTR, New Jersey, 1993. ISBN-13: 978-0139304392 ISBN-10: 0139304398 4.
2. George D. Saravacos, Zacharias B. Maroulis: Food Process Engineering Operations, CRC Press, 2011. ISBN 9781420083538 5.
3. Zeki Berk: Food Process Engineering and Technology, 2nd Edition, Academic Press, 2013. ISBN 9780124159235

KÖVETELMÉNYRENDSZER
2019/20. tanév II. félév

A tantárgy neve, kódja: Industrial microbiology, MTBE7019A
A tantárgyfelelős neve, beosztása: Dr. Pál Károly, tudományos főmunkatárs
A tantárgy oktatásába bevont további oktatók: Dr. Fekete Erzsébet, egyetemi docens
Szak neve, szintje: élelmiszermérnöki BSc
Tantárgy típusa: kötelező
A tantárgy oktatási időterve, vizsga típusa: 2+1, K
A tantárgy kredit értéke: 3

A tárgy oktatásának célja:
Based on biochemical and microbiological studies, the general objective of the subject is to provide more detailed knowledge about the biochemical and physiological processes of "industrial" micro-organisms used in biotechnology. The course covers the technical and technological basics of industrial microbiology, the most important operations and processes, and the qualitative and quantitative relationships between them.

A tantárgy tartalma (14 hét bontásban):
1. History of fermentation I. Classical fermentations.
2. History of fermentation II. Modern biotechnology.
3. Characteristics and measurement of microbial cells.
4. The effects of environmental parameters on the microbial growth.
5. Phylogenetics of industrial microbes.
6. Cultivation media.
7. Bioreactors: upstream processes.
8. Bioreactors: downstream processes.
9. Unit operation.
10. Production of antibiotics.
11. Production of organic acids.
12. Production of enzymes.
13. Production of amino acids and polysaccharides.
14. Production of yeast and biofuels.

Évközi ellenőrzés módja: a gyakorlatokon való részvétel kötelező. A gyakorlatok 70%-án való részvétel kötelező. A gyakorlatokhoz kapcsolódóan, önállóan feldolgozott cikkből készített PowerPoint formátumú kiselőadás anyagot kell leadnia a hallgatóknak.
Az aláírás megszerzésnek feltétele a gyakorlatokon való részvétel.

Számonkérés módja (*félévi vizsgajegy kialakításának módja – beszámoló, gyakorlati jegy, kollokvium, szigorlat*): kollokvium

Oktatási segédanyagok: az előadások diasorai, szakcikkek, animációk.

Ajánlott irodalom:
Nduka Okafor, Benedict C. Okeke: Modern Industrial Microbiology and Biotechnology, CRC Press, 2nd edition, 2018. ISBN: 9781138550186.

REQUIREMENTS
2019/2020 academic year 2. semester

Name and code of the subject: Instrumental analytics, MTBE7020A
Name and title of the person responsible for the subject: Prof. Dr. Béla Róbert Kovács, professor
Additional instructors involved in teaching the subject: Emőke Topa, Zsófia Zsurbó
Name and level of the program: Food Engineer BSc, 2
Subject type: Main subjects
Teaching timetable of the subject, type of examination: 2+2, Colloquium
Credit value of the subject: 4

Purpose of teaching the subject:
The basic objective of the course is to acquaint students with the most important instrumental analytical knowledge required to determine the quality and composition of the food and food ingredients.

Content of the subject (14 weeks):

Lecture 1: Performance characteristics of the analytical methods 1.
Lecture 2: Performance characteristics of the analytical methods 2.
Lecture 3: The UV/VIS photometry. Apparatuses, methods and applications.
Lecture 4: Flame photometry (FES). Flame atomic absorption spectrometry (FAAS).
Lecture 5: Graphite furnace atomic absorption spectrometry (GF-AAS).
Lecture 6: Inductively coupled plasma optical emission spectrometry (ICP-OES). Apparatuses, methods and applications.
Lecture 7: Inductively coupled plasma mass spectrometry (ICP-MS). Apparatuses, methods and applications.
Lecture 8: Comparing of analytical methods.
Lecture 9: Chromatographic methods principles, classification, fields of application 1.
Lecture 10: Chromatographic methods principles, classification, fields of application 2.
Lecture 11: Gas chromatography (GC) methods, apparatuses, fields of application 1.
Lecture 12: Gas chromatography (GC) methods, apparatuses, fields of application 2.
Lecture 13: Liquid chromatography (HPLC) methods, apparatuses, fields of application 1.
Lecture 14: Liquid chromatography (HPLC) methods, apparatuses, fields of application 2.

Topics of laboratory practices
Lecture 1: Information of fire-protection and laboratory accident. Training of laboratory safety, system of laboratory and the description of practices.
Lecture 2: Simple analytical calculation. Units of concentration, unit conversion.
Lecture 3: Calculations for making of solutions.
Lecture 4: Sampling, sample preparation. Determination of mass, volume and density.
Lecture 5: Potentiometry.
Lecture 6: Conductometry.
Lecture 7: Spectrophotometry.
Lecture 8: Determination of nitrate in water samples and food ingredients.
Lecture 9: Microwave-assisted sample preparation.
Lecture 10: Sample preparation used by block digestion apparatus.
Lecture 11: Application of FAAS for determination of calcium and sodium contents in food and food ingredients.
Lecture 12: Analysis of inorganic components with an ICP-OES equipment in food and food ingredients.
Lecture 13: Analysis of inorganic components with an ICP-MS equipment in food and food ingredients.

Lecture 14: Analysis of organic components with an HPLC equipment in food and food ingredients.

Type of mid-term examination: Assignments to be submitted

Method of assessment (semester examination mark - report, practical grade, colloquium, examination): Colloquium

Teaching aids: *Powerpoint*

Recommended literature:

- Boss, C. B. & Fredeen, K. J., 1997. Concepts, instrumentation, and techniques in inductively coupled plasma optical emission spectrometry. Perkin Elmer. USA.
- Cresser, M. S., 1994. Flame spectrometry in environmental chemical analysis. The Royal Society of Chemistry. Cambridge.
- Montaser, A. & Golightly, D. W., 1987. Inductively coupled plasmas in analytical atomic spectrometry. VCH Publishers. New York.
- Montaser, A., 1998. Inductively coupled plasmas mass spectrometry. VCH Publishers. New York.
- Pare J. R. J. &. Belanger J. M. R., 1997. Instrumental methods in food analysis. Environment Canada, Environmental Technology Centre, Ottawa, Ontario, Canada, Elsevier, Amsterdam - Lausanne - New York - Oxford - Shannon - Tokyo.
- Heftmann E., 1992. Chromatography, fundamentals and applications of chromatography and related differential migration methods. Part A: fundamentals and techniques. Elsevier, Amsterdam - Oxford - New York - Tokyo.

REQUIREMENTS
2019/20 academic year 2 semester

Name and code of the subject: MTBE7022A Measuring-technics and automatization
Name and title of the person responsible for the subject: Péter Sipos
Additional instructors involved in teaching the subject:
Name and level of the program: food engineer BSc
Subject type: complusory
Teaching timetable of the subject, type of examination: 2+2 kollokvium
Credit value of the subject: 5

Purpose of teaching the subject:

Content of the subject (14 weeks):
1. Introduction of PLC: main internal parts, external modules.
2. Introduction to sensors and actuators: theory of operation.
3. Electrical wiring of PLCs – Source wiring with examples, theory.
4. Electrical wiring of PLCs – Sink with examples, theory.
5. Applied sensor technology: temperature, displacement, pressure. Theory of operation.
6. Applied actuator technology: pumps, valves, fans, mixers. Theory of operation.
7. Introduction to digital logic: basic logic gates. Theory.
8. PLC programming basics: implementation of basic logic.
9. PLC programming: timers: TON, TOF with examples.
10. PLC programming: counters and examples.
11. Introduction to PLC program development environment.
12. PLC program development: process design methods.
13. PLC program development: programming methods.
14. PLC program development: program verification methods.

Type of mid-term examination:
Accepted assignment. Submit Assignment: Development of industrial process control with PLC. The process should have minimum 5 operation steps, with minimum 10 sensors and 10 actuators.

Method of assessment (semester examination mark - report, practical grade, colloquium, examination):
Written or oral exam

Teaching aids:
slides of lectures

Recommended literature:
J. G. Webster “The Measurement, Instrumentation and Sensors handbook”, IEEE PRESS, 1999
Mitsubishi Electric, Structured Text (ST) Programming Guide Book, ST-GUID-E, http://dl.mitsubishielectric.com/dl/fa/document/manual/plc/sh080368e/sh080368eh.pdf
J. Karl-Heinz ed. “IEC 61131-3: Programming Industrial Automation Systems”, Springer, ISBN 978-3-642-12015-2

REQUIREMENTS
2019/2020. academic year II. semester

Name and code of the subject: Technology of wine and soft drinks MTBE7029A
Name and title of the person responsible for the subject: Nándor Rakonczás, PhD, assistant professor
Additional instructors involved in teaching the subject: Judit Gálné Remenyik, PhD, senior research fellow
Name and level of the program: Food Engineering BSc
Subject type: compulsory
Teaching timetable of the subject, type of examination: 2+1 E
Credit value of the subject: 3

Purpose of teaching the subject:
Practical and theoretical overview of the basis of wine and fruit juice technologies. Fundamental understanding of critical points in wine, fruit juice and soft drink technologies, together with its chemical, microbiological and instrumental background. Ability to participate, and control technological processes. Basic ability of quality control and organoleptic evaluation of fruit juice, soft drinks and wines.

Content of the subject (14 weeks):
1. week: Fruit and vegetable juice, concentrates
2. week: Production and processing of filtered and fined juice
3. week: Application of extractors and extraction methods in fruit juice technologies
4. week: Theoretical basics of preservation, thermal preservation of fruit juice
5. week: Technology of unfiltered fruit juice
6. week: Production of apple juice concentrate
7. week: Chemical changes under storage of fruit juice and concentrates

8. week: Technology of white wines, Factors affecting fermentation
9. week: Technology of red and rosée wines
10. week: Technological criteria of first racking, racking and sulfitization
11. week: Filtration and fining of wines
12. week: Controlling evolution and ageing of wines, bottling
13. week: Special wine technologies
14. week: Basis of wine tasting

Type of mid-term examination: Assignments to be submitted

Method of assessment (semester examination mark - report, practical grade, colloquium, examination):
70% attendance and fulfilment of the tasks is compulsory for the signature. Final grad is deduced from results of mid-term accomplishments and the results of the final exam.

Teaching aids: To be find in e-learning

Recommended literature:

- Gaurav R., Brijesh T. (2017): Fruit Juices, 1st Edition, Extraction, Composition, Quality and Analysis. Academic Press, ISBN: 9780128024911, 910.p.
- Ashurst P. Hargitt R., Palmer F. (2017): Soft Drink and Fruit Juice Problems Solved.
- 2nd Edition. ISBN: 9780081009185, Woodhead Publishing, 232.p.

- Reynolds A. G.: Managing wine quality; 1: Viticulture and wine quality. Woodhead Publishing Limited, Canada

- Reynolds A. G.: Managing wine quality; 2: Oenology and wine quality. Woodhead Publishing Limited, Canada
- www.OIV.int

KÖVETELMÉNYRENDSZER
2019/2020. tanév II. félév

A tantárgy neve, kódja: Élvezeti cikkek és édesipari technológia, MTBE7034A
A tantárgyfelelős neve, beosztása: Dr. Babka Beáta, egyetemi adjunktus
A tantárgy oktatásába bevont további oktatók: Dr. Jevcsák Szintia, tudományos munkatárs
Szak neve, szintje: élelmiszermérnök BSc
Tantárgy típusa: kötelező
A tantárgy oktatási időterve, vizsga típusa: 1+2 G
A tantárgy kredit értéke: 3

A tárgy oktatásának célja: Consumer goods, luxury items (coffee, tea, cocoa and confectionery) are important products of food industry having relatively stable position in the consumption basket. This subject is aimed to make a systematic summary about their certification, primary and secondary processing, as well as health effects.

A tantárgy tartalma (14 hét bontásban):

1. Coffee. Origin, morphology, types, quality parameters, ingredients, chemical compounds.
2. Primary processing of coffee, dry and wet process, roasting.
3. After treatment of coffee, coffee extracts, decaffeinated coffee, alternative coffees, café cultures.
4. Cacao tree, cacao bean, ingredients, primary processing, roasting.
5. Storing of cacao liquor, producing chocolate mass.
6. Conching, rheological properties, tempering, polymorphism of cacao-butter.
7. Chocolate producing machines, quality parameters, cocoa powder production.
8. Tea-plant, active ingredients, tea varieties.
9. Quality of tea leaves, green and black tea production and classification.
10. Characteristic of blended tea, tea specialties, packaging, infusion types.
11. Methods of confectionery: solving, concentration, separation.
12. Methods of confectionery: drying, roasting, grinding, forming.
13. Manufacturing of sweets, marshmallow and jelly.
14. Manufacturing of caramel, brittle, marzipan and dragée, fruit processing for confectionery.

Évközi ellenőrzés módja:
Az aláírás megszerzésnek feltétele a gyakorlatokon való részvétel.
Számonkérés módja (*félévi vizsgajegy kialakításának módja – beszámoló, gyakorlati jegy, kollokvium, szigorlat*): gyakorlati jegy

Oktatási segédanyagok: az előadások diasorai

Ajánlott irodalom:
Emmanuel Afoakwa – Chocolate Science and Technology. 2010. Wiley-Blackwell. 9. 275.
F.Á. Mohos (2010) Confectionery and Chocolate Engineering (Principles and Applications), A John Wiley & Sons, Ltd., Publication. p. 688.
Astrid Nehlig – Coffee, Tea, Chocolate, and the Brain. Edited. 2004 by CRC Press LLC
Yukihiko Hara – Green Tea. Health Benefits and Applications. MARCEL DEKKER, INC. NEW YORK 2001.
Jean Nicolas Wintgers – Coffee: Growing, Processing, Sustainable Production: A Guidebook for Growers, Processors, Traders, and Researchers. Ed. Wiley-VCH, 2009.

REQUIREMENTS
2019/2020 academic year II semester

Name and code of the subject: Quality control of plant origin food products, MTBE7036A
Name and title of the person responsible for the subject: Dr. Diána Ungai, assistant lecturer
Additional instructors involved in teaching the subject:
Name and level of the program: Food Engineering BSc
Subject type: optional
Teaching timetable of the subject, type of examination: 1+1 K
Credit value of the subject: 3

Purpose of teaching the subject:
This subject purposes to improve the student's competence for to understand the importance of different quality parameters in agricultural or food use and to prepare them for the interpretation of process and results of quality control. Its first part is about the general issues of quality control; definitions, its aims and principles. The second part summarizes the possibilities of physical, chemical and microbiological analysis used in the quality control of agricultural products, the principles of main methods used in quality analysis. The third part presents the quality requirements of agricultural products, focusing on standards, recommendations and industrial demands, the role and effects of different parameters and the importance of different analytical properties..

Content of the subject (14 weeks):

1. Introduction. Quality assurance methods and tools.
2. About FAO-WHO and Codex Alimentarius.
3. Sampling methods
4. Lot, primary samples, bulk samples, laboratory samples
5. Testing laboratory, accreditation.
6. Organoleptic tests
7. Cereal qualification methods
8. Quality control of grains (physical methods)
9. Quality contol of wheat and flour (rheological methods)
10. Wheat and flour tests (protein content, wet gluten content, Hagberg-falling number)
11. Quality control of industrial crops (potato)
12. Quality control of industrial crops (sugar beet)
13. Quality control of industrial crop (oil plants, sunflower)
14. Quality control of industrial crop (oil plants, rapeseed)

Type of mid-term examination:

Method of assessment (semester examination mark - report, practical grade, colloquium, examination): colloquim

Teaching aids: ppt presentations
Recommended literature:

1. Kent K. Stewart-John R. Whitaker (1984): Modern Methods of Food Analysis. Avi Publishing Company, INC Westport, Connecticut. ISBN: 978-94-011-7381-0
2. Marwaha, K. (2010): Control and Analysis for Food and Agricultural Products. Gene-Tech Books New Delhi India. 664. 272 p. ISBN 978-81-89729-93-6

Sipos, P. (2013): Quality analysis of Agricultural Products. University of Debrecen. ISBN:978-963-473-660-8

REQUIREMENTS
2019/2020 academic year II. semester

Name and code of the subject: Nutrition knowledge (MTBE7038A)
Name and title of the person responsible for the subject: Dr. Vágó Imre, associate professor
Additional instructors involved in teaching the subject: -
Name and level of the program: Food Engineering BSc
Subject type: obligatory
Teaching timetable of the subject, type of examination: 2+0; oral exam
Credit value of the subject: 3

Purpose of teaching the subject: to provide the students knowledges which are the most suitable food raw materials and kitchen techniques for preparing foods

Content of the subject (14 weeks):
1st week: Content of "Nutrition Knowledge", organs their functions of the gastrointestinal tract
2nd week: Nutritional assessment and dietary planning. Dietary Reference Intakes (DRIs), Estimated Average Requirements (EARs)
3rd week: Recommended Dietary Allowances (RDAs), Adequate Intake (AI), Tolerable Upper Intake Levels (ULs), Safe Maximal Intakes, Energy Intake
3rd week: Chemical, biological and physiological aspects of nutrition. Acid-base equilibrium, passive and active transports, HCl synthesis in the stomach wall cells
4th week: Bio-catalysers. Role and structure of enzymes. Factors influencing enzyme activity: activators, inhibitors, destructors, temperature, pH-values, enzyme and substrate concentrations
5th week: Carbohydrates: structure and role of mono-, di- and oligosaccharides; functions of polysaccharides of plants and animals/human beings
6th week: Structure of protein building amino acids. Non-essential, essential and conditionally essential amino acids. Amid and peptide bonds. Protein structures and shapes, protein synthesis and hydrolysis. Complete and incomplete proteins, protein complementation, protein quality
7th week: Lipoids and lipids. Neutral lipids and phospholipids. Biosynthesis and metabolism of fatty acids and lipids. Essential and conditionally essential fatty acids, omega-3 fatty acids
8th week: Energy metabolism. Synthesis of ATP molecules: Reactions and energetic results of citric acid cycle (Szent-Györgyi - Krebs cycle) and the sequential oxidative phosphorylation processes
9th week: Lipid soluble vitamins (The "DEKA" vitamins) – their structure, chemical composition, physiological role, symptoms of hypo- and avitaminosis
10th week: Reason and symptoms of hypervitaminosis. Night blindness, rickets. Natural sources of A-, D-, E- and K-vitamins
11th week: Water soluble vitamins – their structure, chemical composition, physiological role, symptoms of hypo- and avitaminosis. RDA values
12th week: The major mineral nutrient elements of foods – C, O, H, N, P, K, Ca, Mg, S, Na. Sources and role of the macroelements.
13th week: The minor mineral nutrient elements of foods – Fe, Mn, Zn, Se, Ni, Cr, I, F. Sources and role of the microelements.
14th week: Main function of water in the human body. Aging and water content of human body. Water hardness: definition, measuring methods, optimum physiological level, water softening

Type of mid-term examination: Each student independently prepare a ppt presentation from a pre-arranged part of the subject

Method of assessment (semester examination mark - report, practical grade, colloquium, examination): oral colloquium

Teaching aids: ppt

Recommended literature:
Michelle McGuire – Kathy A. Beerman (2013): Nutritional sciences – From fundamentals to food. Wadsworth Cengage Learning. 3rd Edition