REQUIREMENTS
2021/22 academic year 2. semester

Name and code of the subject: Professional Language Skills II. (English) MTB7NY2A
Name and title of the person responsible for the subject: Mariett Papp, Judit Szepesi, language teacher
Additional instructors involved in teaching the subject: -
Name and level of the program: Food Engineering BSc, I.
Subject type: practice, compulsory
Teaching timetable of the subject, type of examination: 0-4
Credit value of the subject: 3

Purpose of teaching the subject: To provide students with the knowledge and the skills with which they can confidently and effectively complete their courses. The students get to know the basic grammatical and stylistic requirements and peculiarities of the written genres in higher education, as well as acquire the essential structural and linguistic formulas of debate and sharing of opinions.
Content of the subject (14 weeks):

1.	Revision of previous semester's vocabulary
2.	Practice
3.	Making presentations
4.	Presentations
5.	Describing research methods, Classifying
6.	Making connections, Comparing and contrasting
7.	Describing problems, Evaluation and emphasis
8.	Midterm exam
9.	Complex cases studies – speaking and writing
10.	Complex cases studies - speaking and writing
11.	Complex cases studies - speaking and writing
12.	Revision
13.	End term
14.	Evaluation

Type of mid-term examination: written
Completing assignments / exercises; The presence on 2/3-rd of the classes; Active participation in group discussion.

Method of assessment (semester examination mark - report, practical grade, colloquium, examination): Continuous tests orally and written. A term mark to be given at the end of the semester. Monitoring the progress, mid-term paper, final practical mark.

Teaching aids: handouts, ppts

Recommended literature:
ANDREWS, P. H. & BAIRD, J. E. (2000): Communication for Business and the Professions 8th Edition. Waveland Press, Long Grove, IL. ISBN-13: 978-1577663799, 720 old.
WIWCZAROSKI, T.B. (2007): Writing and Professional Communication. Debrecen, 97 old.
Michael McCarthy, Felicity O'Dell: Academic Vocabulary in Use

REQUIREMENTS
2021/22 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
2021/2022. academic year II. semester

Name and code of the subject: Economic Sciences II. (farm business management part) MTB7024A
Name and title of the person responsible for the subject: Hajnalka Madai assistant professor

Additional instructors involved in teaching the subject:
Name and level of the program: Food engineer BSC
Subject type: obligatory
Teaching timetable of the subject, type of examination: 1+1, lecture and practice/weekly. practical grade (50% of finance and accounting part of the course and 50% of farm business part of the course)
Credit value of the subject: 1,5

Purpose of teaching the subject: The general aim of the course is to introduce the basic knowledge of Farm Business Management. Student should be able to apply basic evaluation and planning methods of agricultural enterprises, to be familiar with the basic knowledge of Farm Business Management. Student have to be able to make the basic business calculations in the fields of income – cost and profit analyses, investment analyses, and they have to be familiar with the main concepts of planning in the case of agricultural enterprises.

Content of the subject (14 weeks):

1. Resources in agriculture and its' specialities
2. Calculation of the agricultural production
3. Costs of production and cost-concepts for agriculture
4. Efficiency and it's measurement in agriculture
5. Decision-making and risk management in agricultural production
6. Economic principles: choosing production levels
7. Economic principles: choosing input and output combinations
8. Enterprise budgeting and planning of cash flow
9. Investment analysis
10. Farm business organizations
11. Complex planning of agricultural production
12. Farm business and enterprise analysis
13. Economics of plant production
14. Economics of animal production

Type of mid-term examination: The condition for signing is visiting lecture.

Method of assessment (semester examination mark - report, practical grade, colloquium, examination): The semester ends with a practical grade 50% of finance and accounting part of the course and 50% of farm business part of the course The students shall write a test in the last week of the semester. The prerequisitive of the signature of the course is that the score of this test will reach, or exceed 60% of the maximum score.

Teaching aids: slides and seminar materials

Recommended literature:

1. Ronald D. Kay William M. Edwards Patricia A. Duffy: Farm Management. McGraw-Hill , 2006.
2. John Soloman-Elisabeth Jones: Essential Economics for Business, Pearson, Pearson, 4th Edition, 2014
3. John Soloman-Kevin Hinde-Dean Garratt: Economics for Business 6th edition, 2013.
4. F.R. David: Strategic Management, Cases and Concepts, McGraw Hill, 2012.

5. Berk, Jonathan: Fundamentals of Corporate Finance. Global Edition. 2014.

REQUIREMENTS
2021/2022. academic year II. semester

Name and code of the subject: Economic Sciences II. (accounting and financial knowledge) MTB7024A
Name and title of the person responsible for the subject: Nagy Tünde Orsolya, research assistant
Additional instructors involved in teaching the subject:
Name and level of the program: Food engineer BSC
Subject type: obligatory
Teaching timetable of the subject, type of examination: 1+1, lecture and practice
Credit value of the subject: 1,5

Purpose of teaching the subject: The general aim of the course is to introduce students to the theoretical foundations of finance and accounting. Within this, the logic of the most important calculation tasks related to the financial area, as well as the structure of the accounting balance sheet and income statement. The course also introduces students to the accounting for changes in corporate assets based on double-entry bookkeeping and provides insight into the processes of compiling parts of a company's financial statements, particularly the balance sheet and income statement. It also introduces students to a group of financial analysis tools: the use of indicators.

Content of the subject (14 weeks):

1. Time Value of Money, Role of time value in finance
2. Future Value versus Present Value
3. Future value calculation for single amounts
4. Present value calculation for single amountsx
5. Present value of Annuity
6. Futures value of Annuity
7. Perpetuities
8. Value maximalisation of Investments
9. Weighted Average Cost Of Capital
10. Value maximalisation of Shares
11. Value maximalisation of Bonds
12. Introduction to financial analysis, theoretical foundations of accounting, balance sheet and income statement
13. Analyis with ratios and indicators
14. Property analysis, Financial analysis

Type of mid-term examination: The condition for signing is visiting lectures (an unjustified absence is allowed).

Method of assessment (semester examination mark - report, practical grade, colloquium, examination): The semester ends with a practical grade. A test will be written at a pre-arranged

time. On the first week of the examination period a student who is able to prove the absence from the test has an opportunity to replace the test. On the second week of the examination period can be corrected the test only once.

Teaching aids: slides and seminar materials

Recommended literature:

Aerts, W. (2017): Global financial accounting and reporting: principles and analysis. Thomson Learning, London, p. 501. ISBN: 978-147-372-952-0
Brealey, R. A. (2007): Fundamentals of corporate finance. Academic Internet Publishers, London, p. 273. ISBN: 142-880-491-9

REQUIREMENTS
2021/22 academic year 2. semester

Name and code of the subject: Regulation and administration of agriculture, MTB7029A
Name and title of the person responsible for the subject: Dr. Bujdos Ágnes
Additional instructors involved in teaching the subject: Dr. Szilágyi Péter
Name and level of the program: Bsc
Subject type: compulsory subject
Teaching timetable of the subject, type of examination: theoretical lessons
Credit value of the subject: 3

Purpose of teaching the subject: The aim of the course is to familiarise students with the Hungarian agricultural law system. After taking the course they are able to navigate independently in the Hungarian agricultural law system.

Content of the subject (14 weeks):

1. Presentation of agriculture as a production sector. Basic issues of Hungarian agricultural and rural development. Environmental and nature conservations directives, legislation.
2. The Common Agricultural Policy and its operation in the European Union and the foundations of integration processes.
3. Structure of the Hungarian government system, presentation of policies. The concept of public administration, its separation from other state activities. Tasks and functions of the public administration.
4. Areas and institutional system of agricultural administration. Duties and powers of the Ministry of Agriculture.
5. Management methods of public administration. Operation, tasks and powers of government offices.
6. The future of agriculture. National Agricultural Research and Innovation Centre (NARIC), the structure and tasks of Hungarian agricultural research.
7. Tasks and powers related to food chain safety. The National Food Chain Safety Office. Legal protection of the origin of food, GM organizations, tobacco production and pálinka production. Grape growing and wine production.
8. The role and tasks of the Hungarian State Treasury in agriculture. Tasks and powers of the Hungarian Chamber of Agriculture (HCA).
9. The common’s nature protection system of the European Union (Natura 2000), the domestic system and requirements of nature protection law.

10. The subject and basic concepts of environmental law. Common rules for the protection of the environment.
11. Land use and land protection (utilization for other purposes, change of cultivation branch), Soil protection, common rules for soil and water protection.
12. Forest protection and environmental rules related to game management, as well as tasks and regulations related to hunting.
13. Tasks and powers of the National Land Center.
14. Rules for the acquisition of ownership of agricultural land, rules for the use of agricultural land, Tasks related to the real estate register.

Type of mid-term examination: Attendance at the lectures is compulsory, according to university regulations.

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

Teaching aids: The presentations and slides

Recommended literature:

An official website of the European Union
https://european-union.europa.eu/index_en

Collection of legislation in force:
https://net.jogtar.hu/

KÖVETELMÉNYRENDSZER
21/22 tanév 2. félév

A tantárgy neve, kódja: Állatélettan, MTBE7005A
A tantárgyfelelős neve, beosztása: Dr. Knop Renáta, adjunktus
A tantárgy oktatásába bevont további oktatók:
Szak neve, szintje: Élelmiszermérnök MSc . Angol
Tantárgy típusa: kötelező
A tantárgy oktatási időterve, vizsga típusa: 2+2 K
A tantárgy kredit értéke: 4

A tárgy oktatásának célja: to provide information on the anatomy and function of the animal body especially those affecting the quality of raw materials of animal origin.

A tárgy oktatásának általános célja, hogy megismertesse a hallgatókat az emlősállatok bonyolult szervezetének oly részletességi felépítésével és működésével, amely a termelés szakszerű befolyásolásához elengedhetetlenül szükséges.

A tantárgy tartalma (14 hét bontásban):

1. Current trends in meat consumption.
2. Main parts of the animal body and their function
3. Tissues of the animal body and their function and homeostasis
4. Animal digestive system and its function
5. Movement and locomotion
6. Animal endocrine system and its function
7. Animal respiratory system and its function
8. Animal circulatory system and its function
9. Animal reproduction
10. Lactation physiology
11. Physiology of egg production
12. Physiology of meat production
13. Hygiene in animal production
14. Animal welfare

Évközi ellenőrzés módja:

Beszámoló készítése, gyakorlati elemzés.

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

Oktatási segédanyagok: a kurzus diasorai, a hallgatók jegyzetei.

Ajánlott irodalom:

R.D. Frandson, W.L. Wilke, A.D. Fails, Anatomy and Physiology of Farm Animals, 7th ed., Wiley-Blackwell, Iowa, 2009, ISBN9780813813943, 512 pp.

P.B.Reddy: Text Book of Animal Physiology. Ratna Prasad Multidisciplinary Research & Educational Society 2015 DOI: 10.13140/RG.2.1.4807.9441

REQUIREMENTS
2021/22 academic year 2. semester

Name and code of the subject: ***(MTBE7006A) Electrotechnics***
Name and title of the person responsible for the subject: ***Sarvajcz Kornél***
Additional instructors involved in teaching the subject: -
Name and level of the program: ***Food engineer, Bsc***
Subject type: ***compulsory***
Teaching timetable of the subject, type of examination: ***2 hour(s) lecture and 1 hour(s) practice per semester, practical course mark***
Credit value of the subject: ***2***

Purpose of teaching the subject:
Introduction to DC circuits: voltage, current, basic components. Network analysis: Ohm's Law, Kirchhoff's Law, current and voltage divider, superposition, Thevenin and Norton's Law. Alternating current circuits: sinusoidal wave, calculation on the complex plane, power and effective values. Transient signals in the AC circuits: series and parallel RLC circuits. 3 phases circuit.

Introduction to electronics: features of electronic circuits, solid state devices. Transistors, unipolar and bipolar transistors. Operation, characteristics, and basic circuits. Amplifiers: 4 port theory, transfer functions, feedback: positive and negative. Semiconductors, diode, special diode. Common emitter amplifier. Differential amplifier: operational modes, circuit. Class A and AB amplifiers. Power amplifiers. Operational amplifiers: inverting and non-inverting type. Filters: Low and high pass filter, band pass filter.
Content of the subject (14 weeks):

1st week Registration week

2nd week:

Lecture: Electrostatics, DC networks: basic electrical concepts of electric charge, electric current (amperage), electric field, electric field work, electric voltage (potential), electric circuit

Practice: General description, laboratory regulations, Safety regulations and safety instruction

3rd week:

Lecture: Power source (ideal real), Power Source (ideal for real), Consumer, Ohm's Law, Resistance - design, characteristic data, division, marking according to IEC standard. Passive resistance of bipolar networks, Star-delta, delta-star conversion, Electrical work, electric power, efficiency

Practice: introduction to measurements and instrumentation (measuring error, power supply, digital multimeter, signal generator)

4th week:

Lecture: Network analysis: Kirchhoff's laws, Voltage divider, potentiometer, extending measuring range of a Volt meter current divider, extending measuring range of an Amp meter, Wheatstone bridge. Nodal analysis, Mesh analysis.

Practice: 1st measurement: measuring the characteristics of DC voltage (U, I, RB, P)

5th week:

Lecture: Network analysis: superposition theory, Northon and Thevenin theory.

Practice: Perform a complex DC measurement and calculation task. Report writing.

using Ohm's Law. Measuring the values of DC circuit. Using Kirchhoff's lows. Report writing.

6th week:

Lecture: AC circuit, complex number, AC circuit mean value (RMS). Behavior of a resistance in AC circuit, inductance behavior in AC circuit, capacitance behavior in AC circuit.

Practice: introduction to AC measurements and instrumentation (AC type digital multimeter, signal generator, oscilloscope, LRC meter). Report writing.

7th week:

Lecture: Performance of AC circuits, power factor correction, Three-phase systems

Practice: measurements of AC power. Report writing.

8th week: 1st drawing week

9th week:

Lecture: Pure and doped semiconductor characteristics, PN junction behavior at forward and reverse bias conditions.

Practice: Silicon diode opening and closing characteristics measurements. Analysis of rectifier circuits. Report writing.

10th week:

Lecture: Characteristics and applications of semiconductor diodes, the rectifier circuit operation, the one-way, two-way rectifier circuits operation.
Practice: Analysis of rectifier circuits. Report writing.

11th week:

Lecture: Bipolar transistor structure, gain, transistor parameters and characteristics, the FE connection, adjusting the set point. Areas of application of bipolar transistor, circuits transistor basic (CB, CC circuits),

Practice: Analysis of common emitter basic circuit. Report writing.

12th week:

Lecture: Principles of operation of field-effect transistors.

Practice: Analysis of common source basic circuit. Report writing.

13th week:

Lecture: Operation and characteristics of basic operational amplifier circuits (inverting, non-inverting, follower, summing, differential, differentiator and integrator basic circuit)

Practice: Analysis of summing operational amplifier basic circuit. Report writing.

14th week:

Lecture: Filters: Low and high pass filter, band pass filter.

Practice: Analysis of filters basic circuit. Report writing.

15th week: 2nd drawing week

Type of mid-term examination: -
Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up a practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. Missed practice classes must be made up for at a later date, being discussed with the tutor. Active participation is evaluated by the teacher in every class. If student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate his/her participation as absence because of the lack of active participation in class. During the semester there are one test. Students have to sit for these tests.
Preparing measurement reports until deadline.

Method of assessment (semester examination mark - report, practical grade, colloquium, examination):
test+laboratory reports average
Teaching aids:
Exercises Electrotechnics, Kornél Sarvajcz, 2021
Recommended literature:
1. Electronic Circuits: Handbook for Design and Application, U. Tietze, Ch. Schenk, 2nd edition, 2008, ISBN-10: 3540004297

REQUIREMENTS
2021/2022 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

Debrecen, 2022.02.01.

Dr. Vágó Imre
associate professor

REQUIREMENTS
2021/22 academic year II. semester

Name and code of the subject: Physical chemistry
Name and title of the person responsible for the subject: Dr. Prokisch József, 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+2
Credit value of the subject: 4

Purpose of teaching the subject:
Introduce the basics of physical chemistry through lectures and computational exercises on the following topics
Content of the subject (14 weeks):

1. Basic concepts of chemical thermodynamics (system, wall, property). Extensive and intense properties. Temperature, internal energy.
2. The first law of thermodynamics. Work, volume work, cycle. Enthalpy. Hess's theorem. Kirchoff equation. Material and energy balances.
3. The second photo theorem of thermodynamics. Entropy and its calculation. Thermodynamic potential functions. Systematization of thermodynamic relations. Euler and Gibbs-Duhem equation. Equilibrium conditions formulated with extensive and intensive parameters.
4. One-component systems: Gases. Perfect gas state changes.
5. Volumetric work in isothermal and adiabatic processes. Poisson equation. Equations of state for real gases. Van der Waals equation. Critical condition.

6. One-Component Systems: Liquids. Gibbs phase rule. Clausius-Clapeyron equation. Water phase diagram.
7. Multicomponent systems. Mixtures. Partial molar amounts. Ideal mixtures. Dalton's law. The chemical potential. Realistic mixes, activity. Vapor-liquid balance of biner mixtures. Raoult's law. Azeotropic mixtures. Basics of distillation.
8. Colligative properties. Decreased vapor pressure and boiling point of dilute solutions. Freezing point decrease. Osmosis pressure and its biological significance. Dissolution of gases in liquids. Henry's Law. Mutual solubility of liquids. Limited miscible liquids. Immiscible liquids. Steam distillation.
9. Partition coefficient. Solubility of solids in liquids and change in solubility with temperature. Mutual solubility of solids. Mixed crystal, eulectic and compound forming systems.
10. Chemical equilibria. Equilibrium constant and change in standard free enthalpy of the reaction. Van't Hoff equation, exothermic and endothermic reactions. Constant change of equilibrium with pressure, Lechatelier-Braun principle.
11. Basic reaction kinetics concepts: reaction rate, order, half-life. Velocity equations for simple reactions.
12. Complex reactions. Velocity equations for successive, parallel and equilibrium reactions. Chain reactions. Arrhenius equation. Homogeneous and heterogeneous catalysis. Enzyme catalysis. Photochemical reactions. Photosynthesis.
13. Basic electrochemical concepts. Electrolytic dissociation, conduction, Kohlrausch rule. Ostwald's law of dilution. Solubility product. Galvanic cells and electrode potentials. Gas electrodes, second type electrodes. Redox potentials. Concentration elements.
14. Kinetics of electrode processes. Faraday's law. Electrolysis. Passivity. Manifestations of corrosion. Corrosion current and potential. Corrosion protection.

CALCULATION PRACTICES
1. Calculation of volume work, heat and internal energy
2. Thermodynamic cycles.
3. Calculation of thermodynamic potential functions and change in entropy.
4. Ideal gases I .: isothermal, isobar and isochorous state changes.
5. Ideal gases II .: adiabatic state changes. Calculations with realistic gases.
6. Calculation of properties of mixtures. Application of Dalton's Law.
7. Phase balance of one-component systems. Application of the Clausius-Clapeyron equation.
8. Phase equilibrium of multicomponent systems: calculation of vapor-liquid equilibrium
9. Gas-liquid (Henry's law), liquid-liquid equilibrium (partition coefficient) calculations.
10. Water vapor distillation, colligative properties I .: vapor pressure drop
11. Colligative properties II .: freezing point reduction, calculation of osmotic pressure.
12. Calculation of chemical equilibria.
13. Electrochemical tasks: electrode potentials, galvanic cells.
14. Reaction kinetics calculations....

Type of mid-term examination:
Test from calculations in each practice

Method of assessment (semester examination mark - report, practical grade, colloquium, examination):
At the end of the year, a written examination of tasks, theoretical questions and problem solving.
Teaching aids:

Theoretical summary 60-page word file, calculation tasks with solutions, summary collection of formulas, educational films

Recommended literature:

Atkins,W.,P.: Physical Chemistry, Oxford University Press, 1990.
Chang, R.: Physical Chemistry with Applications to Biological Systems, Macmillan Publishing Co. New York, 1977.
Howard DeVoe: Thermodynamics and Chemistry Second Edition Version 7a, December 2015. www.chem.umd.edu/thermobook

KÖVETELMÉNYRENDSZER
2021/2022. tanév 2. félév

A tantárgy neve, kódja: Analitikai kémia (MTBE7009)

A tantárgyfelelős neve, beosztása: **Prof. Dr. Kovács Béla, egyetemi tanár**
A tantárgy oktatásába bevont további oktatók: Dr. Ungai Diána, Kiss Dóra, **Topa Emőke, Zurbó Zsófia**
Szak neve, szintje: Élelmiszermérnöki BSc, 1. évfolyam
Tantárgy típusa: kötelező
A tantárgy oktatási időterve, vizsga típusa: 2+2 K
A tantárgy kredit értéke: 4

A tárgy oktatásának célja:

A tantárgy alapvető célkitűzése, hogy a hallgatókat megismertesse az élelmiszerek és az élelmiszer előállításhoz szükséges alapanyagok minőségének, összetételének megállapításához szükséges fontosabb általános analitikai ismeretekkel.

A tantárgy tartalma (14 hét bontásban):

1. hét: Bevezetés az analitikai kémiába. Az analitikai kémia története.
2. hét: Alapfogalmak. Prefixumok. Fizikai, kémiai mértékegységek és mértékegység rendszerek.
3. hét: Az SI alap-, kiegészítő- és származtatott egységei.
4. hét: A hosszúság, a tömeg, az idő, az elektromos áramerősség, a termodinamikai hőmérséklet, az anyagmennyiség és a fényerősség.
5. hét: Mérésügy.
6. Az analitikai eredmények megadásának formája és azok hibái.
7. hét: A multielemes kémiai analízis folyamata.
8. hét: Kalibráció, standard addíció, belső standard módszer, spiking.
9. hét: A kationok és anionok Fresenius-féle osztályozási rendszere.
10. hét: A mennyiség mérésének általános módszerei.
11. hét: Az analitika minőségbiztosításának általános alapelvei.
12. hét: Klasszikus analitika, titrimetria. Sav-bázis titrálás. Komplexometria.
13. hét: Kelatometriai titrálás. Csapadékos titrálás. Redox titrálás.
14. hét: Klasszikus analitika, gravimetria.

Évközi ellenőrzés módja: (*a foglalkozásokon való részvétel előírásai és félévközi ellenőrzésének módja, a vizsgára bocsátás és aláírás feltételei*):

TVSZ kiegészítés: *„A gyakorlati foglalkozásokon történő hiányzás megengedhető mértékét, illetve azok pótlási lehetőségét a tantárgyi követelményekben kell meghatározni. Az ezekről való hiányzás megengedhető mértéke* ***azon tárgyak esetében, amelyekhez heti gyakorlati óra tartozik, félévente három, amelyekhez kéthetenkénti gyakorlati óra tartozik, félévente két hiányzás****. A hiányzás következményeiről, illetve pótlásuk módjáról a tantárgyi követelményrendszerben kell rendelkezni.*

A tantárgyi követelményekben, megfelelő időpontok biztosításával a gyakorlatok pótlása is előírható. A hiányzást a gyakorlatvezetők kötelesek nyilvántartani."

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

Oktatási segédanyagok:

Ajánlott irodalom: Pokol György, Gyurcsányi E. Róbert, Simon András, Bezúr László, Horvai György, Horváth Viola, Dudás Katalin Mária: (2011) Analitikai kémia. Typotex Kiadó, Budapest. ISBN 978-963-279-466-2.
Kőmíves J.: (2000) Környezeti analitika. Műegyetemi Kiadó.
Tatár Enikő, Záray Gyula: (2012) Környezetminősítés. Typotex Kiadó, Budapest. ISBN 978-963-279-544-7.
Heltai György, Kristóf János: (2011) Környezeti analitika. Pannon Egyetem, Veszprém. ISBN: 978-615-5044-30-4.
Kovács Béla, Csapó János: (2015) Az élelmiszervizsgálatok műszeres analitikai módszerei. Debreceni Egyetem. ISBN 978-963-473-831-2.

REQUIREMENTS
2021/22 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: 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
2021/2022. tanév II. félév

A tantárgy neve, kódja: Unit operations in food processing I., MTBE7013BA
A tantárgyfelelős neve, beosztása: Prof. Dr. Kovács Béla – egyetemi tanár
Szak neve: Élelmiszermérnök BSc
Tantárgy típusa: kötelező
A tantárgy oktatási időterve, vizsga típusa: 2. félév (2+2), kollokvium
A tantárgy kredit értéke: 4

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, and 3 tests to the topics of the practice (seminar) based on which they may get an offered mark for the exam. Students are required to write tests during the semester. The student who does not obtain or accept a offered mark, during the examination period can take an examination.

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

Prof. Dr. Kovács Béla s.k.
tárgyfelelős oktató

KÖVETELMÉNYRENDSZER
2021/2022 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

Requirements
2021/22 year 2. semester

Title of the subject, code : Modern methods of bio-analitics, MTBE7018A
Responsible lecturer: Dr. Judit Remenyik, Senior research fellow
Other lecturer(s): Dr. Judit Homoki, Dr. Arnold Markovics, Dr. Attila Biró, Georgina Pesti-Asbóth
Name of training,level: Food Engineering BSc
Type of lecture: otpional
Type **and number of classes per semester, form of examination:: 1+2 written exam**
Credit: 2

The aim of the course :
The aim of the course is to acquaint students with the most modern methods and instruments of analytical chemistry, especially the fields of application of bioanalysis. During the lectures, in addition to the basic knowledge material, students can get acquainted with the most up-to-date analytical methods.
During the laboratory exercises they acquire the practice necessary for the precise execution of basic analytical measurements, they get acquainted with the most modern and widespread bioanalytical methods.

Summary of content (14week):
1. Determination of Proteins
2. Organic Micro Pollutants and Their Determination
3. Extraction Techniques
4. Ultraviolet Visible (UV-VIS) Spectrophotometry, Infrared (IR) Spectrophotometry
5. Chromatography (HPLC, GC)
6. Connected Analytical Techniques
7. Mass Spectrometry (MS)
8. Determination of Lipids
9. Determination of Carbohydrates
10. Determination of Antioxidants
11. World of Vitamins
12. DNA/RNA Detection
13. DNA/RNA Detection
14. DNA/RNA Detection

Method of mid-year reporting: Performance of practice. successful writing exam, Performance of practice, submission of experimental report

Form of examination: written exam
Teachin aids: Slide shows
Literature, handbooks <u>in English :</u>
Bioanalytical Techniques, 2015, Abhilasha Shourie

KÖVETELMÉNYRENDSZER
2021/22. 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:
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
2021/2022 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
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.

MINTA KÖVETELMÉNYRENDSZER
2021/2022. tanév II. félév

A tantárgy neve, kódja: PROCESSING TECHNOLOGIES OF AGRICULTURAL CROPS MTBE7021A
A tantárgyfelelős neve, beosztása: Dr. Diósi Gerda, egyetemi adjunktus
A tantárgy oktatásába bevont további oktatók:
Szak neve, szintje: élelmiszermérnök BSc
Tantárgy típusa: kötelező
A tantárgy oktatási időterve, vizsga típusa: 2+0 K
A tantárgy kredit értéke: 4

A tantárgy tartalma (14 hét bontásban):

1. Food safety, Food quality, Food processing, Food economic
2. Food, non-food, new-food

3. *Quality of cereals (wheat, rye, triticale, oats, barley, corn/maize, rice, sorghum, millet)*
4. Storage of cereals, mill technology
5. Quality and quantity parameters of wheat flour
6. Baking technology (bread, pasta), flour
7. Corn/maize processing
8. Starch technology
9. Quality and quantitive parameters of potato, potato processing and products
10. Oil technology, quality and quantitive parameters of oils
11. Sugarbeet processing, sugar technology
12. Confection industry (candy, chocolate)
13. Production of malt, beer production

Fermentation industries: alcohol, fuel (bioethanol), yeast production**Számonkérés módja** (*félévi vizsgajegy kialakításának módja – beszámoló, gyakorlati jegy, kollokvium, szigorlat*): gyakorlati jegy

Oktatási segédanyagok: az előadások diasorai, prezi anyagok

Ajánlott irodalom:

- Pyler, Ernst J. - Baking Science and technology (2 volume set), published by Sosland Pub Co 1988 ISBN: 1882005023
- Satnley P Cauvain, Rosei H Clark - Baking Technology and Nutrition: Towards a Healthier World
- James E. Kruger, Robert B Matsuo, Joel W. Dick - Pasta and Noodle Technology
- Pomeranz Y. (1988): Wheat Chemistry and Technology. The AACC Inc., 504 p.
- H. Faridi, J. Faubion (1995):, Wheat End Uses Around the World. AACC Inc. 292 p.
- K. J. Quail 1996: Arabic Bread Production. AACC, 148 p.
- G. Kaletung, K. J. Breslauer 2003: Characterization of Cereals and Flours: Properties, Analysis, and Applications. Marcel Dekker, Inc. 620 p.

REQUIREMENTS
2021/22 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
2021/2022. academic year II. semester

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

Purpose of teaching the subject: The main aim of this subject is to gain knowledge about the composition of food such as macro and micro nutrients, protective nutrients, adventitious substances etc. During the practices, the students are carrying out analytical methods to determine the parameters of various food samples.

Content of the subject (14 weeks):

1. Composition of food
2. Moisture and dry matter content
3. Lipids
4. Proteins
5. Carbohydrates
6. Fibers
7. Vitamins
8. Minerals
9. Antioxidant compounds
10. Amino acids, proline
11. Complex analysis of food
12. Quality analysis of honey
13. Quality analysis of beer
14. Sensory analysis

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 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.
Criterion of signature: Active attendance on the practical courses.

Method of assessment (semester examination mark - report, practical grade, colloquium, examination): final grade is given based on the mean result of the tests written during the semester

Teaching aids: Slides of lectures

Recommended literature:
H.-D. Belitz, W. Grosch, P. Schieberle, M.M. Burghagen (2004): Food Chemistry. Third Edition. Springer. (ISBN: 978-3540408185)
S. Suzanne Nielsen (2010): Food Analysis. Fourth Edition. Springer. (ISBN: 978-1-4419-1477-4)

REQUIREMENTS
2021/22 academic year 2nd 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, associate professor,
Name and level of the program: **Food Engineering BSc**
Subject type: **compulsory**
Teaching timetable of the subject, type of examination: 2+1, exam,
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 accomplished

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,

- www.OIV.int

REQUIREMENTS
2021/22 academic year 2. semester

Name and code of the subject: Food hygiene MTBE7030A
Name and title of the person responsible for the subject: Nora Dr. Palfyne Dr. Vass senior lecturer
Additional instructors involved in teaching the subject: Dr. Peter Keserű
Name and level of the program: Food engineering BsC
Subject type: compulsory
Teaching timetable of the subject, type of examination: 1+1
Credit value of the subject: 3

Purpose of teaching the subject:

The importance and development of food hygiene continuously growing in the last few decades. One of the most important priorities in the European Union to provide healthy and safe food to the citizens. The aim of this subject is: 1. enable food engineer students to look through the food industry's judicial and theoretical background. 2. make them realize how big influence the animal health has on the consumers' health through foods of animal origin. After the introductory and general lessons, the main topics are milk and meat hygiene. Further aim of the subject is to present the zoonotic diseases, and the impact of food on the pathogenesis of chronic diseases.

Content of the subject (14 weeks):

1. Basic definitions. History of food hygiene.
2. Connection between food hygiene, food health and quality inspection.
3. Food safety and it's authorities.
4. Food hygiene regulations. Food-borne diseases.
5. Primary production. Establishing food producing works.
6. General hygienic terms, regulations in food manufacturing.
7. Characteristics of milk and phisiology of milk production from the point of view of animal health.
8. Hygienic milking and milk handling. Mastitis, and it's impact on milk production.
9. Cleaning and sterilising milking equipment and devices. Milk handling in the farms. Ranking of raw milk.
8. Milk-borne diseases, zoonozes.
9. Definition and attributes of meat, veterinary inspection of meat production.
10. Definition and steps of veterinary meat inspection. Meat-borne human diseases.
11. Animal wellbeing regulations in connection with meat-producing animals and slaughterhouses. Meat inspection of mammals.
12. Septicaemias. Disorders of meat (flavour, colour, texture and smell).
13. Meat inspection in poultry and other animals. Technological hygiene (poultry, rabbit, game animals).
14. Micotoxins. The role of food in pathology of chronic diseases.

Practicals:

1. Basic agricultural knowledge: primary production (meat and milk)
2. Raw milk and processed milk products' quality inspection.

3. Animal hygiene from the milk productions' point of view.
4. Somatic cell and standard plate and coliform number count of the raw milk with Lactoscan combo
5. Raw meat and processed meat quality inspection.
6. Inspection of trichinellosis in meat with a trichioscope.
7. Hygienie of egg production.
8. Egg inspection with a lamp.
9. Farm visit.
10. Farm visit
11. Slaughterhouse visit (poultry)
12. Slaughterhouse visit (mammals)
13. Consultation.
14. Consultation

Type of mid-term examination:

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

Teaching aids:

Recommended literature:

The most important is to make notes during the lessons and practices: exam questions are going to be composed according to the knoledge based ont he lectures and practices.

1. H. L. M. Lelieveld, John Holah, Domagoj Gabric: Handbook of Hygiene Control in the food industry (second edition)
2. Yasmine Motarjemi, Huub Lelieveld: Food safety management, a practical guide for the food industry
3. Jim McLauchlin, Christine Little, Betty C. Hobbs: Food poisoning and food hygiene, seventh edition
4. Neelam Khetarpaul: Food microbiology

REQUIREMENTS
2021/2022. academic year II. semester

Name and code of the subject: Iparági élelmiszertechnológia és minőségügy (Food industry technologies and quality assurance) MTBE7031A
Name and title of the person responsible for the subject: Dr. Nikolett Czipa, associate professor
Additional instructors involved in teaching the subject: Loránd Alexa, assistant lecturer
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
2021/2022. academic year II. semester

Name and code of the subject: Sör- és szeszesipari technológia (Technologies of Brewing and Distilling Industries), MTBE7032A
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
Name and level of the program: Food Engineering BSc.
Subject type: compulsory
Teaching timetable of the subject, type of examination: 1+2, practice mark
Credit value of the subject: 3

Purpose of teaching the subject: Main aim of this subject is to provide knowledge about methods, equipment, legislation of different alcoholic beverages production and the raw materials. The students will practice the production technology of beer and liquors, and the different mistakes during the production which might influence their physicochemical parameters and organoleptic characteristics. The analytical measurements of the above-mentioned products are also going to be carried out.

Content of the subject (14 weeks):

1. Raw materials of alcohol production
2. Malt production and malt drying
3. Mashing, enzymatic process, hopped wort production, fermentation and maturation
4. Technologies of special beer production
5. Technologies of mixed beers production
6. Raw materials of "pálinka" production and legislation of "pálinka"
7. "Pálinka" production, mashing and distillation
8. Technologies of wine production
9. Champagne production
10. Liquor production
11. Grain-based spirits (whiskey, vodka, etc.)
12. Gin and cognac production
13. Ripening, storage and packaging of alcoholic beverages
14. Mistakes during alcoholic beverages' production

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 grade

Teaching aids: Slides of lectures

Recommended literature:

Ted Goldammer (2008): The Brewer's Handbook. A Complete Book to Brewing Beer. Apex Publishers. (ISBN: 978-0-9675212-3-3)
Andrew G.H. Lea, John Piggott (2003): Fermented Beverage Production. Kluwer Academic/Plenum publishers. (ISBN: 0-306-47275-9)
Keith Grainger (2008): Wine production. Vine to bottle. John Wiley and Sons Inc. (ISBN: 9781405173544)

MINTA KÖVETELMÉNYRENDSZER
2021/2022. tanév II. félév

A tantárgy neve, kódja: Technology of vegetable oil and animal fat industry MTBE7033A
A tantárgyfelelős neve, beosztása: Dr. Stündl László, egyetemi docens
A tantárgy oktatásába bevont további oktatók: Dr. Diósi Gerda egyetemi adjunktus és Kelemen Ferenc mesteroktató
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: Course objectives: to provide practical up-to-date information on oil and fat processing including chemical structure, conventional and special raw materials, typical sources for the industry, processing techniques and technologies and economics and market aspects, tendencies. The course provide information to improve the knowledge and the practical skills of the students.

A tantárgy tartalma (14 hét bontásban):

1. Raw materials of oil industry (plants, cereals, vegetables, fruits), properties of the oil (Chemical parameters)
2. Technology of oil production, oil refining
3. Oil groups, by-products of oil production
4. Quality and (physical and chemical) properties of oil
5. Special oil plants – pressed from different parts of plant (seed, pulp, flower, sprout, root, steam, leaf
6. Essential oils, aroma oils, oily extracts, squalene, other oils
7. Animal oils, plants/cereals//vegetables/fruits fat
8. Structure and classification of fat lipids
9. Animal fat as raw material and food ingredient
10. Fat processing technology
11. Fat types and by-products

12. Quality and properties of fat and oil
13. Special oils and fats
14. The oil and fat market

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

Oktatási segédanyagok: az előadások diasorai

Ajánlott irodalom:
Talati, A: Extraction Methods Of Natural Essential Oils. Method. February 2017. DOI: 10.13140/RG.2.2.18744.34564
Anon: Production Of Lipids From Natural Sources. http://ocw.nagoya-u.jp/files/1/chap2.pdf

REQUIREMENTS
2020/2021 academic year II. semester

Name and code of the subject: Technology of customer goods and confectionery industry, MTBE7034A
Name and title of the person responsible for the subject: Dr. Beáta Babka, senior lecturer
Additional instructors involved in teaching the subject: Dr. Szintia Jevcsák, research fellow
Name and level of the program: Food Engineering BSc
Subject type: compulsory
Teaching timetable of the subject, type of examination: 1+2 G
Credit value of the subject: 3

Purpose of teaching the subject: 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.

Content of the subject (14 weeks):

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.

Type of mid-term examination: Participation on practices, and making presentation.

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

Teaching aids: PowerPoint presentations

Recommended literature:
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.

MINTA KÖVETELMÉNYRENDSZER
2021/2022. tanév II. félév

A tantárgy neve, kódja: Sütő- és tésztaipari technológia MTBE7035A
A tantárgyfelelős neve, beosztása: Dr. Diósi Gerda, egyetemi adjunktus
A tantárgy oktatásába bevont további oktatók:
Szak neve, szintje: élelmiszermérnök BSc
Tantárgy típusa: kötelező
A tantárgy oktatási időterve, vizsga típusa: 1+0 G
A tantárgy kredit értéke: 3

A tárgy oktatásának célja: Bakery is one of the most important industries of secondary processing of cereals. The quantity of released products is significant. The course aims to introduce the science of raw materials and additives, processing technologies, properties and nutritional effects of the different products. The other aim of this subject is to get acquainted with the raw materials of pasta; the technological types of pasta industries and determine quality parameters.

A tantárgy tartalma (14 hét bontásban):

1. The history of bakery, product groups and properties, raw materials, flour types.

2. Physical, chemical and microbiological properties of raw materials, additives of baking industry and their effects on the product.
3. Basic operations of baking; methods and instruments of dough preparation.
4. Dough processing, baking, finishing operations.
5. Bakery products from watery and milky dough.
6. Flaky pastry products, egg enriched products and short pastry products.
7. Semi-finished products, frozen products.
8. Special bakery products in the world, requirements on the different product groups and products.
9. History of pasta industry, classification of noodles.
10. Raw materials, additives and packaging materials of noodle manufacturing.
11. Preparation of raw materials and additives, periodical or continuous manufacturing of noodles.
12. Moulding of noodles, extending, pressing, cutting.
13. Technology, as well as physical and chemical processes of noodle drying. Finishing operations.
14. Special noodles, home-made noodles, packaging and storing.

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

Oktatási segédanyagok: az előadások diasorai, prezi anyagok

Ajánlott irodalom:

- Pyler, Ernst J. - Baking Science and technology (2 volume set), published by Sosland Pub Co 1988 ISBN: 1882005023
- Satnley P Cauvain, Rosei H Clark - Baking Technology and Nutrition: Towards a Healthier World
- James E. Kruger, Robert B Matsuo, Joel W. Dick - Pasta and Noodle Technology
- Pomeranz Y. (1988): Wheat Chemistry and Technology. The AACC Inc., 504 p.
- H. Faridi, J. Faubion (1995):, Wheat End Uses Around the World. AACC Inc. 292 p.
- K. J. Quail 1996: Arabic Bread Production. AACC, 148 p.
- G. Kaletung, K. J. Breslauer 2003: Characterization of Cereals and Flours: Properties, Analysis, and Applications. Marcel Dekker, Inc. 620 p.

REQUIREMENTS

2021/2022 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*

Debrecen, 2022.02.01.

Dr. Vágó Imre
associate professor

REQUIREMENTS
2021/2022 academic year II. semester

Name and code of the subject: Basic Food Engineering Skills MTBE7044A
Name and title of the person responsible for the subject: Dr. Zoltan Hagymassy associate professor
Additional instructors involved in teaching the subject: Safwan Mohammed
Name and level of the program: Agricultural Water Management Engineering MSc
Subject type: compulsory
Teaching timetable of the subject, type of examination: 2+1 Colloquium
Credit value of the subject: 3

Purpose of teaching the subject:
Students learn about the materials, the machines structural elements. Students able to the operation of machine elements. Based on the studies Students able to know the main type of machine elements.

Content of the subject (14 weeks):

1. Machines, machine elements
2. Materials (Alloys of Iron, Steels)
3. Materials (Light metals, Non ferrous metals, Precious metals)
4. Detachable joints (screw, wedge, latch, pin nail, ribbed joint)
5. Permanent Joints (rivet, welding, soldering, gluing)
6. Bearings
7. Shafts
8. Axles
9. Coupling and Clutches
10. Mechanical Drive Systems (Gear, belt, chain)
11. Springs
12. Vessel system (Pipes, fittings)
13. Vessel system (Valves)
14. Vessel system (Tanks and Seals)

Type of mid-term examination:
Participation in practical classes is a condition for obtaining a signature. Absences are no more than 30**%.** Completing exercises.

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

Teaching aids: Power point slides of university lectures issued to students

Recommended literature:
Vörös: Gépelemek I.-IV. (TK, 1977)
Tochtermann- Bodenstein: Gépelemek I-II. (MK, 1986)
Zsáry: Gépelemek I-II (TK, 1989)
Tóth-Nagy- Marosfalvi: Gépelemek I. (BME kiadó, 2005)
Glenn J. Hoffman, Robert G. Evans, Marvin Eli Jensen, Derrel L. Martin, Ronald L. Elliott: Design And Operation Of Farm Irrigation Systems ISBN-13: 978-1892769640, ISBN-10: 1892769646
Brian Bell: Farm Machinery ISBN 1903366682
John Carrol: Tractors and Farm Machinery ISBN-13: 978-0754826583

REQUIREMENTS
2021/22 academic year 2nd semester

Name and code of the subject: Chemometrics in food analysis, MTMEL7041A

Name and title of the person responsible for the subject: János Elek PhD, master lecturer
Additional instructors involved in teaching the subject: -
Name and level of the program: Food engineer MSc
Subject type: facultative
Teaching timetable of the subject, type of examination: 4+4, C
Credit value of the subject: 3

Purpose of teaching the subject: Successful assessment of a product composition and the use of adequately sensitive and selective analytical methods are essential for successful food development and quality control. Recently, there has been a silent revolution in both automated monitoring and control of processes. Of course food industry is also a beneficiary of this development. Today, a variety of process control and analytical systems based on various image processing and spectroscopic sensors (RAMAN, NIR) are offered by various companies. The technical solutions and systems are presented by a group of colorful brochures and more or less well-trained service engineers. However there is little information given about how to get qualitative and quantitative data from the signal of such a spectroscopic sensor. Although this is the key for successful self-operation of our systems or if the goal is to develop an analytical method tailored to a product or manufacturing process in-house inside our own team of experts. The course provides a basic insight into the most widely used multivariate classification and calibration methods, presenting them through easy-to-interpret practical examples.

Content of the subject (14 weeks):
Themes of lectures:
1-2. Introduction to spectroscopic methods, the interaction of matter and electromagnetic radiation, spectroscopic methods, tools and sensors in daily practice.
3-4. Formation and characteristics of the infrared spectra. Compilation and visualization of data matrices, basic descriptive statistical tools
5-6. Classification methods (I): factor analysis, PCA (principal component analysis), LDA (linear discriminant analysis)
7-8. Classification methods (II) :), ANN (artificial neural networks), SIMCA (self-organizing group analogy modeling), SVM (support vector classification), cluster analysis

9-10. Regression methods (I): linear and multiple linear regression, PCR (principal component regression)
11-12. Regression methods (I): PLS, PLS-DA (partial least squares methods)
13-14. External and internal validation techniques

Topics of exercises:
1-4 Non-destructive X-ray fluorescence analysis and use of metal composition in classification models
5-8 Recording and evaluation of RAMAN spectra of different cheeses (PCA, LDA)
9-12. Determination of food dye concentration by photometric analysis (PLS, PCR)
13-14. Application of NIR spectroscopy in the analysis of different skin and tissue types. (LDA, SIMCA)

Type of mid-term examination: -

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

Teaching aids:
Chemometrics in food analysis.ppt
Factor analysis.ppt
Findig the optimal numbers of PLS components.ppt

Recommended literature: S.N. Deming, Y. Michotte, D.L. Massart, L. Kaufman, B.G.M. Vandeginste: Chemometrics: A Textbook, Elsevier, 1988