MENDELU
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COURSES TAUGHT AT THE FACULTY OF AGRISCIENCES

	CODE	TITLE OF THE COURSE	SEMESTER	ECTS	Limit
1	Z-AZE	Alternative Energy Sources (CURRENTLY NOT AVAILABLE)	S	5	∞
2	Z-AMOR	Anatomy and Morphology of Plants	W or S	5	∞
3	Z-ABIOKL	Applied Bioclimatology	W	5	∞
4	Z-CBI	Biochemistry	W	8	∞
5	Z-CPO	Food Chemistry	W	4	∞
6	Z-FYPAT	General Phytopathology	W or S	6	∞
7	Z-OPR	General Plant Production	W	5	∞
8	Z-HERB	Herbology	W	4	∞
9	Z-GEZI	Animal Genetics	W	6	∞
10	Z-CHKON	Horse Husbandry	W	5	10
11	Z-HYDH1	Hydrology and Hydraulics (in Spanish)	W	6	25
12	Z-CHEM	Chemistry	W or S	8	∞
13	Z-CAA	Inorganic and Analytical Chemistry (CURRENTLY NOT AVAILABLE)	W	6	∞
14	Z-KREKO	Landscape Ecology If there are more than 10 students interested in this course, those enrolled at the Faculty of AgriSciences are given priority.	W	5	10
15	Z-OAG	Organic Agriculture	W	5	20
16	Z-COR	Organic Chemistry (CURRENTLY NOTAVAILABLE)	W	6	∞
17	Z-FYENM	Phytopathology and Entomology	W or S	8	∞
18	Z-SLR	Plant Breeding	W	7	∞
19	Z-SFPAT	Special Phytopathology	W or S	6	15
20	Z-ZEMI	Agriculture Microbiology	W or S	6	∞
21	Z-AGRT	Agrotourism	W or S	4	∞
22	Z-AFYZ	Anatomy and Physiology of Farm Animals	W	7	∞
23	Z-AFYR	Plant Anatomy and Physiology	S	6	∞
24	Z-BBT	Beer and Beverage Technology	W	6	30
25	Z-DT	Dairy Technology (CURRENTLY NOT AVAILABLE)	W	6	18
26	Z-FYZ	Physics I	W or S	6	∞

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27	Z-FYR	Plant Physiology	W	5	∞
28	Z-PRZE	Precision Agriculture	W or S	5	at least 6
29	Z-REHZ	Reproduction of Farm Animals	W	7	7
30	Z-CHOK	Sheep and Goat Breeding	W	4	3
31	Z-RADEK	Radioecology	W	5	at least 4
32	Z-ZOOL	Zoology	W or S	6	∞
33	Z-CAL-P	Analytical Chemistry (CURRENTLY NOTAVAILABLE)	W or S	4	∞
34	Z-ENET	Environmental Ethics If there are more than 10 students interested in this course, those enrolled at the Faculty of AgriSciences are given priority.	W or S	5	10
35	Z-FOD	Principles of Fodder Production	W	4	∞
36	Z-OCHZP	Environmental Protection If there are more than 10 students interested in this course, those enrolled at the Faculty of AgriSciences are given priority.	S	5	10
37	Z-INET	Insemination and Embryo Transfer	S	8	10
38	Z-RUDT	Rural Development	S	4	∞
39	Z-PED	Soil Sciences	S	6	∞
40	Z-WCPW	Water contamination and protection of water sources (in Spanish)	S	5	20
41	Z-OSAB	Organic Systems of Animal Breeding	S	6	∞
42	Z-AGKLI	Agroclimatology	S	6	∞
43	Z-RADO	Radioactive Waste	S	5	at least 4
44	Z-FE	Food Engineering	S	5	∞
45	Z-CAP	Food Analysis	S	8	∞
46	Z-RCHOV	Fish Culture	S	5	∞
47	Z-OPT2	Optimising of Diets with PC	S	4	∞

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Instructions

- *Please be careful with selecting courses. "W" stands for winter semester, which is semester from September to February, and "S" stands for summer semester, which is semester from February to August.*
- *Each course will be offered only if there are enough students registered (usually the minimum is 4 students per course).*
- *If there are more than 10 students interested in the Z-KREKO Landscape Ecology, Z-ENET Environmental Ethics, Z-OCHZP Environmental Protection course respectively, those enrolled at MENDELU Faculty of AgriSciences are given priority.*

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1 Z-AZE Alternative Energy Sources (CURRENTLY NOT AVAILABLE)

Course supervisor: doc. Ing. Martin Fajman, Ph.D. (Department of Technology and Automobile Transport)

Instructor: doc. Ing. Martin Fajman, Ph.D.

Semester: S

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/hours of seminars per week)

ECTS Credits: 5

Assessment methods: Written test and oral examination

Aim of the course and learning outcomes:

The goal of the course is to get students acquainted with basic terms in the scope of energetics and technics in connection with economy and provide them an orientation in energy sources structure, energy demands and energy savings in connection with ecological aspects. Meaning of renewable energy sources is emphasized, namely business opportunities in the field on the base of legislation and economical conditions.

Course content:

1. Energetics Introduction – terminology, introduction. (allowance 1/1)
2. Energy – forms of energy and their transformations. (allowance 1/1)
3. Energetics and its relation to environmental impacts. Sustainability in terms of energy. (allowance 2/2)
4. EU policies. Legislation of the RES support. (allowance 2/2)
5. Energy Intensity – production systems, transportation sector, calculations. (allowance 2/2)
6. Earth's Energy Budget and solar energy utilization. Direct technical usage and natural transformations of solar energy. (allowance 1/1)
7. Active and Passive Solar Systems. Low-energy and passive houses. (allowance 2/2)
8. Heat Pumps and geothermal energy. (allowance 2/2)
9. Wind energy utilization. (allowance 2/2)
10. Energy of water – small water power-plants, energy of oceans. (allowance 2/2)
11. Biomass – biomass energy utilizations, thermo-chemical and bio-chemical biomass transformations. (allowance 2/2)
12. Biofuels – production and utilization of liquid biofuels. (allowance 2/2)
13. Co-generation – combined heat and power in connection with biomass. (allowance 2/2)
14. Summary on economical evaluation of renewable energy sources. (allowance 1/1)

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2 Z-AMOR Anatomy and Morphology of Plants

Course supervisor: Mgr. Martin Jiroušek Ph.D. (Department of Plant Biology)

Instructor: Mgr. Martin Jiroušek Ph.D.

Semester: W or S

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/hours of seminars per week)

ECTS Credits: 5

Assessment methods: Attendance in the classroom (2 excused absences are tolerated). Oral exam at the end of the semester, where the questions are based on both, the theoretical knowledge and the practical skills related to the microscopic preparation and description of plant anatomy directly on preparates.

Aim of the course and learning outcomes:

The structure of vascular plants from the level of single cell to the level of whole organism will be presented. Anatomical and morphological descriptions of plant organs important for agricultural use. The skills in speciman preparation for microscopic observation, light microscopy will be attained in the practical training.

Course content:

1. Plant Cell (allowance 2/2)

a. Introduction, fundamental botanical terminology

b. Cell Nucleus, DNA, Cell division

c. Cell Wall, Biological membranes

2. Plant Cell Organelles (allowance 2/2)

a. Plastids

b. Vacuole

c. Other Cell Organelles

3. Plant Tissues (allowance 2/2)

a. Parenchyma

b. Collenchyma

c. Sclerenchyma

d. Prosenchyma

e. Aerenchyma

4. Function of Plant Tissues (allowance 2/2)

a. Meristematic and Somatic Tissues

b. Ground Tissues (Chlorenchyma, Mechanical Tissues, Storage Parenchyma, Glandulous Parenchyma)

5. Conducting Tissues (allowance 2/2)

a. Xylem

b. Phloem

c. Vascular Bundles

6. Dermal Tissues (allowance 2/2)

a. Epidermis

b. Guard Cells

c. Trichomes

7. Leaf (allowance 2/2)

a. Leaf Morphology

b. Leaf Anatomy

c. Leaf Metamorphosis

8. Stem (allowance 2/2)

a. Stem Morphology

b. Stem Anatomy (differences between Monocots and Dicots)

c. Stem Metamorphosis

9. Root (allowance 2/2)

a. Root Morphology

b. Root Anatomy (differences between Monocots and Dicots)

c. Root Metamorphosis

10. Secondary Structure of Plant Organs (allowance 2/2)

a. Cork Cambium, Periderm, Bark, Lenticels

b. Vascular Cambium, Secondary Xylem and Phloem, Medullary Rays

c. Secondary Anatomical Structure of the Stem

d. Secondary Anatomical Structure of the Root

11. Flower (allowance 2/2)

a. Perianth

b. Stamen Anatomy and Morphology

c. Pistil Anatomy and Morphology

d. Pollen Grain, Pollination

12. Seed, Fruit, Life Cycle (allowance 2/2)

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a. Double Fertilisation in Flowering Plants

b. Seed Anatomy and Morphology

c. Fruit Anatomy and Morphology, Fruit Diversity

d. Seed Germination

e. Life Cycle of Angiosperms

f. Anatomy, Morphology, and Life Cycle of Gymnosperms

g. Anatomy, Morphology, and Life Cycle of Sporogenous Plants

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3 Z-ABIOKL Applied Bioclimatology

Course supervisor: Ing. Milan Fischer, Ph.D. (Department of Agrosystems and Bioclimatology)

Instructor: Ing. Milan Fischer, Ph.D.

Semester: W

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/hours of seminars per week)

ECTS Credits: 5

Assessment methods: Oral Examination

Aim of the course and learning outcomes:

Aim of the course: In this course we apply system approach in order to analyse interactions between living organisms, soil, and atmosphere from the level of individual crops and populations of plants and animals up to the interactions between segments of landscapes or regions. As the system is looked upon from bioclimatological perspective the course tends to concentrate on the role of climate (and weather) in these processes. After the course the students will be able to understand better to impacts of various meteorological situations and climate parameters that are determining the landscape stability and often limit the agrosystem productivity. Almost one half of the lectures is then dedicated to explain causes and impacts of global climate change and to extreme meteorological events both in the region of the Central Europe and globally.
The seminar work consists of case studies aimed at exercising practical methods of agriculture meteorology that enable e.g., to predict crop yield, estimate date of infestation of pests or to determine climatic niche of selected plants and animals. Key part of the seminars is to introduce students into the advanced meteorological instruments through interactive demonstration and especially during individual student's assignments using modern measurement devices. The content of English courses depends on number and background of the students.

Course content:

1. On applied bioclimatology, global radiation, and soil temperature (allowance 2/2)
2. Temperature the most powerful variable in bioclimatology? (allowance 2/2)
3. Water - water cycle and water balance (allowance 2/2)
4. Temperature - clock of living systems & Bioclimatological niche - potential niche of plants and animals (allowance 2/2)
5. Modeling the growth and development of key agriculture crops (allowance 2/2)
6. Weather forecast and Chaos? (allowance 2/2)
7. Risks and Impacts of hydrometeorological extreme events (allowance 2/2)
8. Hydrometeorological extreme events II - storms, floods, and high winds (allowance 2/2)
9. Climate change and its impacts (allowance 6/6)
10. Climate and hydrometeorological extremes of the last millennium (allowance 2/2)

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4 APGEN Applied Genetics

Course supervisor: doc. Ing. Tomáš Vyhnánek, Ph.D. (Department of Plant Biology)

Instructor: doc. Ing. Pavel Hanáček, prof. Ing. Tomáš Urban, Ph.D. doc. Ing. Tomáš Vyhnánek, Ph.D.

Semester: W

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/hours of seminars per week)

ECTS Credits: 5

Assessment methods: Credit: credit test - obtaining at least 60% of the points for credit. Exam: The exam consists of a written and an oral part (2 thematic units). The written part is a test in the form of questions and short answers, min. success rate 60%.

Aim of the course and learning outcomes: Meet students with basic principles of classical and modern molecular genetics with applicable research results in practice, laboratory and breeding.

Course content:

1. Genetics and its importance in agriculture (allowance 2/2)
2. The principles of classical genetics and their application (allowance 6/6)
3. Principles of molecular genetics and their applications (allowance 10/10)
4. Principles of population genetics and quantitative traits and their applications (allowance 8/8)
5. Genetic Engineering and Biotechnology (allowance 2/2)

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5 Z-CBI Biochemistry

Course supervisor: Ing. Soňa Křížková, Ph.D. (Department of Chemistry and Biochemistry)

Instructors: Yazan Abdulmajeed Eyadh Haddad Ph.D., Ing. Soňa Křížková Ph.D., Miguel Ángel Merlos Rodrigo MSc, Ph.D., Ing Petr Michálek Ph.D., Ing. Hana Michálková Ph.D., Mgr. Zbyněk Šplíchal Ph.D.

Semester: W

Mode of delivery and timetable classes: 2/4 (2 hours of lectures per week/4 hours of seminars per week)

ECTS Credits: 8

Assessment methods: Credit, written and oral examination

Aim of the course and learning outcomes:

To get knowledge about the elementary terms of compound composition and organization of the living organisms, biocatalysis and compound and energetic transformation in living systems and to provide familiarity with basic biochemistry laboratory techniques.

Course content:

1. **Development and current role of biochemistry (allowance 2/0)**

a. The basic terms and main biochemical methods

b. Fundamental cell structures and their metabolic processes

c. Biomembranes and membrane transport

2. Structure of living systems (allowance 2/0)

a. Water

b. Proteins

c. Nucleic acids

d. Carbohydrates

e. Lipids

f. Metabolites

g. Biogenic elements

3. Vitamins and enzymes cofactors (allowance 2/0)

a. The mostly biologically important water and fat-soluble vitamins

b. Vitamins-like compounds and anti-vitamins

4. Biocatalysis (allowance 4/0)

a. Structure of enzyme molecules (cofactors of oxidoreductases, cofactors of transferases, and cofactors of other enzyme classes; active centres enzymes; higher structures of enzymes)

b. Localization and forms of enzymes

c. Mechanism of enzyme catalysis

d. Introduction to enzyme kinetics (influence of substrate concentration, influence of physico-chemical parameters, influence of enzyme inhibitors and activators)

e. Regulation of enzyme activity

f. Classification and nomenclature of enzymes. Estimation of their catalytic activity

g. Laboratory and industrial utilization of enzymes

5. Principles of compound and energetic conversion in the organisms (allowance 2/0)

a. Catabolism and anabolisms

b. Energetic of biochemical reactions

c. Macroergic compounds

d. Respiratory chain and oxidative phosphorylation

e. Citric acid cycle and its modifications

f. Glyoxylate pathway

6. Carbohydrate metabolism (allowance 4/0)

a. Glycolysis - the initial pathway in carbohydrates catabolism

b. Pentose phosphate pathway

c. Fate of pyruvate in anaerobic conditions, types of fermentation, its regulation and energetic balance.

d. Carbohydrates biosynthesis (gluconeogenesis, precursors for glucose biosynthesis).

e. Photosynthesis, Light and dark phase of photosynthesis, Calvin and Hatch Slack cycle, Photorespiration -- its localization and significance

f. Assimilation nitrate and sulfate reduction (nitrate reductase, nitrite reductase, nitrogen fixation, sulfate reductase complex)

7. Lipid metabolism (allowance 2/0)

a. Metabolisms of fatty acids and triacylglycerols (fatty acids activation, beta -- oxidation of fatty acids

b. Biosynthesis of energetic stock compounds (fatty acids, triacylglycerols, gluconeogenesis, glycogenesis)

c. Biosynthesis of steroid compounds, their function and importance

8. Metabolism of nitrogen (allowance 6/0)

a. Amino acid catabolism (reaction on alpha-carbon, principles of side chain degradation)

b. Ammonia detoxification ornithine (ureogenic) cycle, glutamine formation

c. Proteosynthesis

d. Nucleic acids - their structure and function

e. Mechanisms of the transfer of genetic information and its change (DNA synthesis, transcription, translation, genetic code, mutation)

f. Proteosynthesis (amino acid activation, initiation, elongation, termination, posttranslational modifications)

g. Proteolysis (groups of proteolytical enzymes, food proteins hydrolysis, protein turnover)

h. Anabolism and catabolism of purines, pyrimidines, and porphyrins

i. Disorders of nitrogen metabolism

9. Secondary metabolism (allowance 2/0)

a. Secondary metabolites and their importance

b. Chemical structure and biosynthesis of secondary metabolites

10. Regulation of biochemical pathways (allowance 2/0)

a. Intracellular regulation (proteosynthesis regulation, metabolic regulation

b. Neurohumoral regulation

c. Hormones and their action (regulation of their synthesis and secretion, hormone's action and its mechanism

d. Plant hormones and the mechanism of their action.

11. Laboratory practices (allowance 0/56)

a. Sampling of biological material and its preparation for biochemical analysis

b. Theoretical introduction to basic biochemical methods - spectrophotometry, refractometry, centrifugation, electrophoresis, nucleic acids manipulation

c. Study of vitamins

d. Study of lipids and nucleic acids

e. Study of proteins

f. Study of enzymes

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6 CBIPR Biochemical processes

Course supervisor: Ing. Dalibor Húska, PhD. (Department of Chemistry and Biochemistry)

Instructors: Mgr. Roman Guráň, Ph.D., Ing. Dalibor Húska, Ph.D., Ing. Pavel Chaloupský, Ph.D., Mgr. Nela Jandová, Ing. Jiří Kudr, Ph.D., Ing. Marek Straka, Ing. Jana Tomeková

Semester: W

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 5

Assessment methods: none

Course content:

1. Photosynthesis I (allowance 4/4)

a. Hill reaction, photophosphorylation, and CO2 reduction

b. Metabolism of C3, C4 and CAM plants

2. Photosynthesis II (allowance 4/4)

a. Photosystems I and II, their location, electromagnetic radiation capture mechanism, energy transfer

3. among photo-systems – chlorophyll, ferredoxin, plastocyanin, phylloquinone, carotenoids.

4. Metabolism of proteins and nucleic acids (allowance 2/4)

a. DNA structure and DNA Replication

b. RNA synthesis (Transcription, Translation)

c. Degradation of Nucleic Acids (Pyrimidine and Purine Catabolism)

d. Protein Catabolism

5. Metabolism of carbohydrates (allowance 2/4)

a. Anaerobic glycolysis in plants

b. Metabolism of sucrose

c. Breakdown and synthesis of starch

d. Decomposition of lignin and cellulose

6. Metabolism of nitrogenous substances (allowance 2/4)

a. Fixation of atmospheric nitrogen

b. Assimilation of nitrate, nitrite and ammonia

c. Transport and storage forms of nitrogen

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7. Secondary metabolites (allowance 4/4)

a. Introduction to primary and secondary metabolism
b. Secondary metabolites and their significance for the plant

8. Secondary metabolites II (allowance 2/4)

a. Secondary metabolites derived from acetate (fatty acids and polyketides)
b. Secondary metabolites derived from shikimic and mevalonic acid (phenolic and polyphenolic substances; phenylpropanoid metabolism)
c. Secondary metabolites derived from amino acids (alkaloids)

9. Biochemistry of extracellular and intracellular communication (allowance 2/0)

a. Biomembranes – structure, arrangement and function
b. Mechanisms of cellular internalization and signaling
c. Classification and action of hormones

10. Biochemistry of nucleic acids (allowance 4/0)

a. Structure and function of DNA, RNA and small non-coding RNAs
b. DNA replication and repair, mRNA maturation changes, alternative splicing
c. Mechanism of proteosynthesis, post-translational modification

11. Biochemistry of the cell cycle (allowance 2/0)

a. Cell cycle and cell cycle checkpoints
b. Mitosis
c. Meiosis

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7 Z-CPO Food Chemistry

Course supervisor: Ing. Vedran Milosavlejvič, Ph.D. (Department of Chemistry and Biochemistry)

Instructors: Ing. Vedran Milosavlejvič Ph.D.

Semester: W

Mode of delivery and timetable classes: 3/0 (3 hours of lectures per week/0 hours of seminars per week)

ECTS Credits: 4

Assessment methods: Final examination consists of written test and oral exam

Aim of the course and learning outcomes:

After completion of the course student will have general knowledge about chemical, physical and biological properties of compounds in foodstuffs, their technological and health aspects, and about reactions taking place in foodstuff during storage and technological treatment. Student will be able to understand to effects of chemical components on nutritional, sensorial and toxicological quality of foodstuff. Participant of course will be able to solve practical tasks and make valid decision about quality of foodstuff in the relation to both Czech and European legislation.

Course content:

1. Amino acids, peptides and proteins in foods. (allowance 6/0)

a. Amino acids of proteins, not coded and less usual amino acids in foods. Significant peptides of foods. Proteins in foods, their nutritional value, occurrence, constitution, and changes during stocking and processing.

b. Important chemical reactions of amino acids and proteins. Intra- and inter-molecular reactions. Reactions of amino acids with components of foods.

2. Fats and other lipids in foods. (allowance 6/0)

a. The structure of fatty acids present in fats and waxes of foods. Lipids in foods: structure, occurrence, biochemical and physiological properties, nutritional value, biological effects. Heterolipids. Accompanying compounds of lipids.

b. Important reactions of fatty acids in foods. Their influence on organoleptic properties, health and nutrition value of foods. Reactions of fatty acids with constituents of foods. Reactions of homo- and hetero-lipids and steroids.

3. Saccharides in foods. (allowance 6/0)

a. Monosaccharides and their derivatives, oligosaccharides, polysaccharides and composed polysaccharides: structure, occurrence, properties, physiology and nutritional value.

b. Reactions of saccharides (monosaccharides, oligosacharides and polysaccharide) in foods. Reactions in acidic and basic milieu. Oxidizing and reducing reactions. Maillard reaction. Caramelization.

4. Vitamins in foods (allowance 2/0)

a. Structure, biochemistry, physiology, nutrition aspects and occurrence of vitamins in foods. Reactions and changes of vitamins at processing and stoking of food raw materials and foods.

5. Minerals in foods. (allowance 2/0)

a. Interaction of minerals with organic compounds of foods. Essential elements: biochemistry, physiology, occurrence in foods, and nutritional aspects. Not essential elements. Toxic elements: occurrence in life environment and foods, their transport, distribution, metabolism and toxic effects.

6. Water in foods (allowance 3/0)

a. Classification of waters and requirements on water quality. Water in foods and changes of water content. Influence of water on physico-chemical properties of foods. Interactions of water in foods.

7. Flavor in groceries (allowance 3/0)

a. Odorous compounds: classification, structure, occurrence, reactions, physiology and nutritional aspects. Tasty compounds: quality and intensity of taste, physiology, occurrence and using.

8. Dyes in foods (allowance 3/0)

a. Tetrapyrrols dyes and others nitrogen dyes, flavonoids, stilbens, xanthons, quinoids, curcuminoids, carotenoids, iridoids: structure, properties, occurrence, physiology, nutritional aspects and utilization.

9. Antinutritional and toxic compounds in food. (allowance 3/0)

a. Antinutritional compounds: inhibitors of enzymes, anti-vitamins, compounds binding mineral elements and others antinutritional compounds. Toxic compounds, compounds evocating food intolerance.

10. Additive and contaminant substances in food (allowance 3/0)

a. Additive substances: compounds prolonging storage time, modifying colour, texture, and raising biological value of foods and others dyes used in food processing industry.

b. Contaminant substances. Toxins of microorganisms, toxic mineral substances, nitrosocompounds, polycyclic aromatic carbohydrates, polychlorinated aromatic carbohydrates, pesticides, veterinary pharmaceuticals, etc.

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8 Z-FYPAT General Phytopathology

Course supervisor: Ing. Mária Neoralová (Department of Crop Science, Breeding and Plant Medicine)

Instructors: doc. Mgr. Ing. Eva Hrudová Ph.D., Ing. Mária Neoralová, prof. Ing Radovan Pokorný, Ph.D.

Semester: W or S

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 6

Assessment methods: Oral Exam

Aim of the course and learning outcomes:

Significance of plant disease. Parasitism and disease development. Main groups of pathogens: viruses, phytoplasmas, fungi, bacteria etc. Non-infectious diseases. Chemical weapons and mechanical forces during pathogenesis (enzymes, toxins, growth regulators). Effect of pathogens on plant physiological functions. Genetics of plant diseases. Gene-for-gene concept (Floor). Plant disease epidemiology. Genetics of virulence in pathogens and of resistance in host plants. Hypersensitive reactions. Environmental effects on the development of infections plant diseases (temperature, moisture, soil, pH, nutrition). Plant disease epidemiology. Plant disease control (eradication, chemical treatment, biological control, resistant cultivars, crop rotations etc.).

Course content:

1. Significance of plant disease. (allowance 6/6)

a. Parasitism and disease development.
b. Main groups of pathogens: viruses, phytoplasmas, fungi, bacteria etc.
c. Non-infectious diseases.
d. Chemical weapons and mechanical forces during pathogenesis (enzymes, toxins, growth regulators).
e. Effect of pathogens on plant physiological functions.

2. Genetics of plant diseases. (allowance 6/6)

a. Gene-for-gene concept (Floor).
b. Plant disease epidemiology.
c. Genetics of virulence in pathogens and of resistance in host plants.
d. Hypersensitive reactions.

3. Environmental effects on the development of infections plant diseases (allowance 4/4)

a. Environmental effects on the development of infections plant diseases: temperature, moisture, soil, pH, nutrition.
b. Plant disease epidemiology.
c.

4. Plant disease control (allowance 8/8)

a. Eradication.

b. Chemical treatment, biological control.
c. Resistant cultivars.
d. Preventive measures.

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7. Z-OPR General Plant Production

Course supervisor: prof. Ing. Jan Křen CSc. (Department of Agrosystems and Bioclimatology)

Instructors: prof. Ing. Jan Křen CSc.

Semester: W

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 5

Assessment methods: A class ticket (credit) and oral examination. Condition for credit is a student activity at seminars, knowledge of field crop seeds and the quality of crop rotation project processing.

Aim of the course and learning outcomes:

To enable students to obtain knowledge about effective use of the soil, vegetation and production factors in crop growing and farming in the landscape. To teach bases of plant production, to emphasize impacts on the environment and soil.

Course content:

1. Vegetation and production factors and their use in plant growing. Site characteristics and productivity, carrying capacity of the environment, soil fertility, soil bioenergetic potential. (allowance 2/2)

2. Partition of the production territory into production regions and crop production zoning as a basis of effective farming (allowance 2/2)

3. Systemic approach to crop production. History of development of agricultural systems. (allowance 4/0)

4. Possibilities of soil tillage to manage air, temperature and moisture regimes in the rhizosphere, importance of soil tillage. Soil maturity. Basic operations in the soil tillage system, organic matter incorporation into the soil, soil compaction. (allowance 4/8)

5. Seedbed preparation. Conventional, conservation and minimum soil tillage practices for establishing stands of field crops. (allowance 4/8)

6. Principles of crop alternation on the soil and crop rotations as a factor that enables to maintain soil fertility and equilibrium in the landscape. Ecological importance of crop alternation, inter crops as protection of the soil fund. (allowance 6/8)

7. Basic knowledge about field crops, fodder crops and weeds including their recognition (growing plants and seeds). Weeds in agrophytocenoses, possibilities and methods for their management. Integrated plant protection. Herbicides, their importance and impacts on the environment. (allowance 3/0)

8. Problems of sustainability of crop production systems at different farming practices on the soil (conventional, integrated, low input, ecological, precision farming). Current issues of plant production in the CR, comparison with advanced western countries (EU, USA). (allowance 3/0)

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8. Z-HERB Herbology

Course supervisor: doc. Ing. Vladimír Smutný Ph.D. (Department of Agrosystems and Bioclimatology)

Instructors: doc. Ing. Vladimír Smutný Ph.D.

Semester: W

Mode of delivery and timetable classes: 2/1 (2 hours of lectures per week/1 hours of seminars per week)

ECTS Credits: 4

Assessment methods: Identification of weeds seeds. Seminar work about weed management in crop (student will make a choice of crop). Exam.

Aim of the course and learning outcomes:

This course introduces the biology, ecology and management of weeds and invasive species. Weeds are a major impediment to crop production, livestock production and human health and a significant effort and expense go into managing unwanted plants each year. The topics covered in the course (weed identification, ecology and management) are important for students who are interested in or plan a career in applied plant science, agronomy, agroecology or other forms of vegetation management.

Course content:

1. Weeds - definitions, groups of important weeds in CZ. (allowance 4/0)

2. Identification of main weed species. Determination of weed seeds and seedlings. (allowance 0/6)

3. Volunteer crops. Practical examples from different cropping systems. (allowance 2/0)

4. Dormancy, germination, longevity of weed seeds. (allowance 0/2)

5. Preventive methods in weed management. (allowance 4/0)

a. Crop rotation.
b. Soil tillage.
c. Cover crops.

6. Direct methods of weed management (allowance 4/2)

a. Mechanical methods.
b. Chemical methods.

7. Herbicides (allowance 4/4)

a. Groups of herbicides - mechanisms of action
b. Fate of action in soil - persistence, residues in soil.
c. Use of herbicides in main crops.

8. Herbicide resistance. (allowance 2/2)

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9. Herbicide-tolerant crops. (allowance 2/2)

10. Practical excursion in the field conditions - weeds and herbicide application. (allowance 0/6)

9. Z-GEZI Animal Genetics

Course supervisor: Ing. Petra Bartoňová, Ph.D. (Department of Animal Morphology, Physiology and Genetics)

Semester: W

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 6

Assessment methods: Credit (attendance, laboratory protocol) and written examination

Aim of the course and learning outcomes:

Animal genetics is the study of the units of heredity that make up an animal. Students learn about genes that influence the physical characteristics of animals. To understand how animals inherit traits, you study how the DNA and RNA molecules work. You learn laboratory techniques for analysing gene sequences. You learn how genes are expressed as physical characteristics. You study the mathematical principles used in scientific breeding programs. You also study mathematical models of how genes are distributed in a population.

Course content:

Classical Genetics - Basic Principles (2/2)

Molecular Genetics – Basic Principles (2/2)

Molecular Genetics Method methods (4/4)

Population Genetics; Quantitative Genetics and Animal Breeding (2/2)

Genetics of Cattle, Pig a Horse (2/2)

Recommended reading and other learning resources:

Alberts et al. (2002): Molecular biology of the cell. ISBN 0-8153-4072-9
Snustad D.P., Simmons M.J. (2023): Principles of Genetics. ISBN 0-471-44180-5

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10. Z-CHKON Horse Husbandry

Course supervisor: Ing. Eva Sobotková Ph.D. (Department of Animal Breeding)

Instructors: Ing. Eva Sobotková Ph.D.

Semester: W

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 5

Assessment methods: Evaluation of participation in seminars (80%), submission of a seminar work, written tests in duration 50 minutes (70% of the total mark), oral final examination in duration 50 minutes.

Aim of the course and learning outcomes:

Acquire knowledge about horse breeding of required types of horses to gain complex knowledge in the most important areas of the use of horses.

Course content:

1. **Horse conformation - colours, markings** (allowance 2/2)
2. **Horse body conformation** (allowance 4/4)
3. **Mechanics of horse movements and their evaluation** (allowance 2/2)
4. **Principles of practical handling of horses and safety of work in horse breeding** (allowance 2/2)
5. **Characteristics of the most important horse breeds** (allowance 4/4)
6. **Organization of horse breeding** (allowance 2/2)
7. **Reproduction of Horses** (allowance 2/2)
8. **Stabling, pasture management** (allowance 2/2)
9. **Equestrian sports and racing** (allowance 2/2)

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11. Z-HYDH1 Hydrology and hydraulics (in Spanish)

Supervisor del curso: Ing. Petra Oppeltová Ph.D. (Departamento de Ecología Aplicada y Paisajística)

Instructores: Ing. Petra Oppeltová Ph.D.

Semester: W

Modalidad de impartición y horario clases: 2/2 (2 horas lectivas semanales/2 horas seminarios semanales)

ECTS Credits: 6

Métodos de evaluación: Exámen oral. Presencia en las prácticas. Entrega de tareas.

EL número de estudiantes en el curso está limitado, máximo 25 estudiantes.

Objetivo del curso y resultados del aprendizaje: Estudiantes ganarán información fundamental de hidraulica e hidrología. También calcularán ejemplos prácticos.

Contenido del curso:

1. Introducción a Hidrología (asignación de tiempo 0/0)

a. Procesos y depósitos en el ciclo hidrológico.
b. Importancia del agua en la Tierra.
c. Cuenca hidrológica – definición, características.
d. Ciclo hidrológico del agua

2. Lluvia, nieve, rocio y evaporacion: el agua en la atmosfera (asignación de tiempo 0/0)

a. Rasgos principales de la atmosfera.
b. Procesos de condensacion y evaporacion del agua en la atmosfera.
c. Formacion de rocio, lluvia y nieve.
d. Interceptacion de la lluvia por la vegetacion.
e. Agua en la nieve
f. Lluvia media de la cuenca

3. Distribución temporal y espacial en Hidrología (asignación de tiempo 0/0)

a. Probabilidad en Hidrología.
b. Respuesta hidrológica de la cuenca: Hidrograma unitario.

4. Infiltración y generación de escorrentía: el agua en el suelo (asignación de tiempo 0/0)

a. Compotrtamiento hidrológico del suelo.
b. Generacion del exceso de lluvia.
c. Redistribución y evaporación del agua en el suelo.
d. Circulación subterránea del agua.

5. Escorrentía superficial (asignación de tiempo 0/0)

a. Caracterizacion hidrológica de la cuenca. Balances de agua.
b. Circulación del agua en la cuenca. Efectos de canales y embalses.

6. Extremos hidrológicos – inundaciones y sequía. (asignación de tiempo 0/0)

7. Introducción a Hidraulica (asignación de tiempo 0/0)

a. Propiedades de líquidos
b. Viscosidad
c. Tensión superficial

8. Hidrostática (asignación de tiempo 0/0)

a. Principio de Arquímedes
b. Flotación de los cuerpos

9. Hidrodinámica (asignación de tiempo 0/0)

a. Canales abiertos
b. Curva de capacidad (dotace 0/0)

10. Cálculo de tuberías (asignación de tiempo 0/0)

a. Fórmula de Chézy
b. Ecuación de continuidad
c. Principio de Bernoulli
d. Pérdidas

11. Cálculo de canales (asignación de tiempo 0/0)

a. Tipos de movimiento, número de Reynolds
b. Fórmula de Chézy
c. Ecuación de continuidad
d. Tipos de pérfiles

12. Problemática de riego y drenajes (asignación de tiempo 0/0)

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12. Z-CHEM Chemistry

Course supervisor: doc. RNDr. Lukáš Richtera, Ph.D. (Department of Chemistry and Biochemistry)

Instructors: to be announced

Semester: W

Mode of delivery and timetable classes: 3/3 (3 hours of lectures per week/3 hours of seminars per week)

ECTS Credits: 8

Assessment methods: Oral exam: Final exam is defence of the project - 20min. presentation in Powerpoint and 5 min. discussion. Prerequisite for the exam is 90% attendance in the lectures

Aim of the course and learning outcomes:

Aim of study is to obtain knowledge about general chemistry and chemistry of inorganic, organic, natural and macromolecular compounds, their structures, characters and their role in nature. Students should be able to understand the relationship between structure of compounds and their physico-chemical properties.

Course content:

1. ATOMIC STRUCTURE (allowance 2/2)

a. Introduction
b. Atomic Structure. Nucleus and its stability, radioactivity. Electron shell, orbital. Ionization potential, electron affinity, electronegativity.
c. PERIODIC SYSTEM OF ELEMENTS. Periodic law, periodicity of properties.

2. MOLECULES (allowance 2/2)

a. MOLECULES, BOUNDING. Types of chemical bounding, covalent, ionic, metal and hydrogen bound, polarity, hybridization.

3. THERMODYNAMICS I (allowance 2/2)

a. State of matter. Gas: empirical laws, ideal and real gas eqns. Liquids: vapor pressure, surface tension.
b. Solid state: crystal structure, allotropic modification, (symmetry, types of crystal forms), isomorphism, polymorphism, amorphous substances.
c. Introduction, First, Second law of thermodynamics, enthalpy. entropy. Gibbs energy. Thermodynamics and living organism.

4. THERMODYNAMICS II (allowance 2/2)

a. Reaction Kinetics: Reaction rate, Activation energy, Catalysis, Inhibition.
b. Chemical Equilibrium: Equilibrium of chemical reaction, thermodynamics, e, Guldberg-Waag's law, eqn. constant. How to influence the equilibrium
c. Raoult's law, Osmotic pressure, Diffusion I. a II. Fick's law.

5. SOLUTIONS (allowance 2/2)

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a. Acidobasic reactions. Acids and bases, dissociation, pH, isoelectric point.
b. Precipitation Solubility product, Reaction stoichometry.

6. LECTROCHEMISTRY, PROPERTIES of ELEMENTS (allowance 2/2)

a. Complex forming reactions. Central ion, ligand.
b. Electrochemistry. Basic TERMS, Nernst eqn. , Nernst-Peters eqn
c. Elements and substances, according to periodic table

7. ORGANIC CHEMISTRY . (allowance 2/2)

a. Introduction, bounding, elements, types of bounds. Isomers.
b. Reaction mechanism. Mesomeric effect. nucleophile, electrophile, radical).

8. ORGANIC CHEMISTRY (allowance 2/2)

a. Organic Chemistry Hydrocarbons and derivatives O, S and N

9. ORGANIC CHEMISTRY (allowance 2/2)

a. Carbonyl compounds

10. ORGANIC CHEMISTRY (allowance 2/2)

a. Aminoacids, peptides

11. ORGANIC CHEMISTRY (allowance 2/2)

a. Carbohydrates

12. ORGANIC CHEMISTRY (allowance 2/2)

a. Polymers, biopolymers, environmental pollution.

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13. Z-CAA Inorganic and Analytical Chemistry (CURRENTLY NOT AVAILABLE)

Course supervisor: doc. RNDr. Lukáš Richtera, Ph.D. (Department of Chemistry and Biochemistry)

Instructors: to be announced

Semester: W

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 6

Assessment methods: Oral exam: Final exam is defence of the project - 20min. presentation in Powerpoint and 5 min. discussion. Prerequisite for the exam is 90% attendance in the lectures

Aim of the course and learning outcomes:

Analytical and Inorganic Chemistry extend the knowledge of high school chemistry and makes chemistry more practically oriented. The undergraduate is being prepared for further studies in chemical disciplines such as Organic Chemistry, Physical Chemistry and Biochemistry.

Course content:

1. General chemistry (allowance 0/0)

a. Basic terms and categories

- the subject and development of chemistry, its differentiation, interdisciplinary relations.
- matter, field, motion and its forms, compounds, elements
- basic empirical chemical laws, chemical notation, basic terms concerning elements and compounds
- nomenclature of inorganic compounds

b. Atomic theory

- development of atomic theory
- contemporary atomic theory, subatomic particles, arrangement of electrons, protons, and neutrons, atomic models)
- atomic nucleus (proton number, nucleon number, nuclides, natural and artificial radioactivity, physical, chemical, and biological effects of nuclear radiation, applications of radioactive nuclides to pharmacy and medicine)
- arrangement of electrons (Bohr's atomic model, dualistic nature of electron, the quantum mechanical model of the atom)

c. Theory of chemical bonding

- ionic relation (origin of ions, ionisation energy, electronic affinity, structure of ionic compounds)
- the covalent bond (theory of valence bonds, theory of molecular orbitals, hybridisation of atomic orbitals, orientation of bonds in space, bond order, bond energy, polarity of covalent bonds, dipole moment, donor-acceptor bond)
- metal bond

- weak (non-)bond interactions (hydrogen bridge, van der Waals forces)

2. Inorganic chemistry (allowance 0/0)

a. The periodic law and the periodic table of elements

- classification of elements, importance of D. M. Mendeleev's periodic law
- the periodic table of elements
- the periodic law and the periodic table in relation to contemporary atomic theory

b. Chemistry of s- and p- elements and their compounds with regard to the biological and pharmaceutico-medical aspects

- hydrogen, water
- the noble gases
- the alkali metals
- the alkaline earth metals
- the boron group
- the carbon group
- the nitrogen group (the pnictides)
- the chalcogens
- the halogens

c. Chemistry of d- and f- transition elements and their compounds with regard to the biological and pharmaceutico- medical aspects

- the scandium subgroup, lanthanides, actinides
- the titanium subgroup
- the vanadium subgroup
- the chromium subgroup
- the manganese subgroup
- the iron triad
- the palladium triad; the platinum triad
- the copper subgroup
- the zinc subgroup

3. Physical states of matter, Dispersion systems (allowance 0/0)

a. States of matter

- gases
- liquids
- solids
- other states of matter

b. Dispersion systems

- basic terms, classification, importance for pharmaceutical sciences and practice
- suspensions and emulsions
- colloids

- solutions (preparation, properties of solutions, importance in biology and pharmacy)
- ionisation in solutions
- acids and bases (theories of acids and bases, relations between structure and acid-basic properties of compounds)
- ionic product of water, pH
- protolytic reactions
- solubility product

4. Chemical reactions and their intercourse (allowance 0/0)

- thermochemistry
- reaction kinetics
- oxidation-reduction reactions
- electrochemistry

5. The scope and function of analytical chemistry (allowance 0/0)

a. Chemical reactions in solution

- Acid-base equilibria
- Complexation equilibria
- Solvent extraction
- Redox equilibria
- Colour and precipitation reactions

b. Qualitative inorganic analysis

- Procedure for detection of ions in solution
- Sensitivity and detection limit

c. Quantitative analysis

- Analytical problems and their solution
- Sampling and sample pre-treatment
- The assessment of analytical data

6. Quantitative analysis (allowance 0/0)

a. Gravimetry

- Applications of gravimetry
- Titrimetry
- Titrimetric reactions
- Acid-base, redox, complexometric and precipitation titrations

b. Introduction to spectroscopic methods

- Ultraviolet and visible absorption spectroscopy
- Infrared spectroscopy
- Flame emission spectroscopy

- Refractometry and polarimetry

c. Introduction to electroanalytical methods

- Potentiometry, potentiometric titrations, ion selective electrodes
- Conductance titrations
- Polarography and voltammetry

d. Radiochemical methods

- Nuclear reactions
- Activation analysis
- Isotope dilution analysis

e. Chromatography

- Retention data for sample characterization
- Thin-Layer chromatography
- Gas chromatography
- High-performance liquid chromatography

f. Electromigration methods

- zone electrophoresis
- mowing boundary electrophoresis
- isotachophoresis
- isoelectric focusing

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14. Z-KREKO Landscape Ecology

Please note well, that if there are more than 10 students interested in this course, the priority in the enrollment is given to those enrolled at the Faculty of AgriSciences (MENDELU), even if the course was previously approved in the (O)LA.

Course supervisor: prof. Dr. Ing. Milada Šťastná (Department of Applied and Landscape Ecology)

Instructors: prof. Dr. Ing. Milada Šťastná

Semester: W

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 5

Assessment methods: Active participation at practices (exercises) - min. 80%. Oral exam containing answers and analyses of 2 different topics (duration 20 minutes)

Aim of the course and learning outcomes:

Aim of the course is to characterize the landscape as a phenomenon, to identify and recognize problems of an agricultural and rural utilization of the landscape, to introduce research methods of the landscape ecology and their applications in agricultural and design practice.

Course content:

1. **Formation of the landscape ecology as a trans-disciplinary science. (allowance 2/2)**
    a. Ecology as a complex formation (Geo-complex) and a system (Geo-system).
    b. Natural processes creating the landscape, landscape attributes, landscape as a self-controlling system.
2. **Spatial structure of the landscape and its changes. (allowance 2/2)**
    a. Hierarchy of the landscape units.
    b. Vertical and horizontal landscape structure.
3. **Landscape evolution. (allowance 2/2)**
    a. Landscape dynamic and rhythms.
    b. Landscape development in the Quaternary.
    c. Role of the man in the historical context.
    d. Landscape typology.
4. **Landscape and the man. (allowance 2/2)**
    a. Basic functions of the landscape in relation to the man.
    b. Complex landscape potential, landscape limits, CES + SES.
    c. Degradation and regenerative processes in the landscape.
    d. Landscape scenery. Land consolidation.

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5. **Landscape and nature protection. (allowance 2/2)**
    a. Law No. 114/1992 Coll.
    b. Natura 2000 - description.
    c. Biospheric reservation.
6. **Changes of the cultural landscape. (allowance 2/2)**
    a. Land use and land resources.
    b. Financial tools of landscape protection and formation.
    c. Landscape utilization, landscape planning.
7. **Landscape management. (allowance 2/2)**
    a. Ecologization of agriculture, alternative agricultural technologies.
    b. EIA - Environmental Impact Assessment.
    c. SEA - Strategic Environmental Assessment.
8. **Sustainable development of a countryside. (allowance 2/2)**
    a. Agrarian politic in rural landscape.
    b. Suburbanization.
    c. Brownfields - description.
    d. Landscape tourism.
9. **Landscape formation programs in the Czech Republic. (allowance 2/2)**
    a. Ecological stability of a landscape.
    b. Revitalization of river systems.
    c. Villages renewal.
10. **Information systems. (allowance 2/2)**
    a. Areas, databases, monitoring.
11. **Sustainable landscape utilization. (allowance 2/2)**
    a. Ecological catastrophes.
12. **European national programs, visions. (allowance 2/2)**
    a. European agro-environmental programs.

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15. Z-OAG Organic Agriculture

Course supervisor: Ing. Tamara Dryšlová Ph.D. (Department of Agrosystems and Bioclimatology)

Instructors: Ing. Tamara Dryšlová Ph.D., doc. Ing. Soňa Dušková Ph.D., doc. Ing. Stanislav Hejduk Ph.D., doc Mgr. Ing. Eva Hrudová Ph.D., doc. Ing. Tomáš Kopta Ph.D., doc. Ing. Vladimír Smutný Ph.D.

Semester: W

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 5

The number of students on course is limited – max. 20 students

Assessment methods: Oral exam: Final exam is defence of the project - 20min. presentation in Powerpoint and 5 min. discussion. Prerequisite for the exam is 90% attendance in the lectures

Aim of the course and learning outcomes:

To acquaint the listeners with the philosophy, goals and principles of organic agriculture, with deeper knowledge about the functions and connections in agroecosystems.To get acquainted with the history, development and current status of organic agriculture in the conditions of the Czech Republic and the EU.To acquaint students with the basic legal standards applicable to management in organic farming and with the principles of supervision and certification processes.To explain to students the main differences and specifics in running conventional and organic farming.

Course content:

16. Z-COR Organic Chemistry (CURRENTLY NOT AVAILABLE)

Course supervisor: doc. RNDr. Lukáš Richtera, Ph.D. (Department of Chemistry and Biochemistry)

Instructors: to be announced

Semester: W

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 6

Assessment methods: Oral exam: Final exam is defence of the project - 20min. presentation in Powerpoint and 5 min. discussion. Prerequisite for the exam is 90% attendance in the lectures

Aim of the course and learning outcomes:

Reviews the topics from general chemistry that will be important to your study of organic chemistry. You will learn how to name five different classes of organic compounds. This will give you a good understanding of the basic rules followed in naming compounds. The structures and physical properties of these compounds will be compared and contrasted, which makes learning about them a little easier than if each compound were presented separately.

Course content:

1. **Carbon Compounds and Chemical Bonds** (allowance 2/0)
    a. Representative Carbon Compounds
2. **Spectroscopic Methods** (allowance 2/0)
3. **Isomers, Stereochemistry-Chiral Molecules** (allowance 2/0)
    a. An Introduction to Organic Reactions: Acids and Bases
    b. Ionic Reactions-Nucleophilic Substitutions and Elimination
4. **Alkanes, Alkenes, Alkynes and Cycloalkanes-Conformations, Properties and** Reactions (allowance 2/0)
5. **Aromatic Compounds, Properties and Reactions** (allowance 2/0)
    a. Electrophilic Aromatic Substitution
6. **Reactions and Properties of Alkyl Halides, Amines** (allowance 2/0)
7. **Alcohols and Ethers** (allowance 2/0)
8. **Carbonyl Compounds, Aldehydes & Ketones** (allowance 2/0)
9. **Carboxylic Acids** (allowance 2/0)
10. **Carboxylic Acids and Their Derivatives** (allowance 2/0)
11. **Carbohydrates** (allowance 2/0)
12. **Polymers & Biopolymers** (allowance 2/0)
13. **Laboratories: Will be in three 8-hour blocks** (allowance 0/24)

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17. Z-FYENM Phytopathology and Entomology

Course supervisor: doc. Mgr. Ing. Eva Hrudová, Ph.D. (Department of Crop Science, Breeding and Plant Medicine)

Instructors: doc. Mgr. Ing. Eva Hrudová Ph.D., Ing. Mária Neoralová, prof. Ing. Radovan Pokorný Ph.D.

Semester: W or S

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 8

Assessment methods: Oral exam

Aim of the course and learning outcomes:

Causes of plant diseases and disorders, the most important plant diseases and pests and their control. Theory of plant disease origin, creation and development. Pathogenicity. Systems of the main groups of pathogens - viruses, phytoplasmas, bacteria, fungi. Symptomatology. Non-infectious diseases and disorders of plants. Host-parasite interaction. Genetic background of different types of host resistance. Chemical and nonchemical plant disease control. Most important diseases of the field and horticulture crops, their etiology, harmfulness and control. Most important groups of fungicides. Reason and mechanism of pesticide resistance. Disease forecast and its signalisation. Incidence and prevention of epidemics. Morphology, anatomy and physiology of insects, their reproduction and development. Insect systematics. Their importance. Relationship host - pest, principles of resistance, biochemical mechanisms of plant resistance against insects. Important pests of the field crops, vegetables and orchards: their systematics, description, bionomic, economic importance and methods of protection. Relationships between the incidence of individual insect pests a loss of yield and quality. Plant tolerance to phytophagous insects. Economic thresholds levels. Basic principles of chemical and biological control.

Course content:

1. Causes of plant diseases and disorders, the most important plant diseases and their control. (allowance 12/12)

a. Theory of plant disease origin, creation and development. Pathogenicity.
b. Systems of the main groups of pathogens - viruses, phytoplasmas, bacteria, fungi.
c. Symptomatology.
d. Non-infectious diseases and disorders of plants.
e. Host-parasite interaction. Genetic background of different types of host resistance.
f. Chemical and nonchemical plant disease control.
g. Most important diseases of the field and horticulture crops, their etiology, harmfulness and control.
h. Most important groups of fungicides. Reason and mechanism of pesticide resistance.
i. Disease forecast and its signalisation. Incidence and prevention of epidemics.

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2. The most important pests of garden and field plant and their control. (allowance 12/12)

a. Morphology, anatomy and physiology of insects, their reproduction and development.
b. Insect systematics. Their importance.
c. Relationship host - pest, principles of resistance, biochemical mechanisms of plant resistance against insects.
d. Important pests of the field crops, vegetables and orchards: their systematics, description, bionomic, economic importance and methods of protection.
e. Relationships between the incidence of individual insect pests a loss of yield and quality.
f. Plant tolerance to phytophagous insects.
g. Economic thresholds levels.
h. Basic principles of chemical and biological control.

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18. Z-SLR Plant Breeding

Course supervisor: doc. Dr. Ing. Pavlína Smutná (Department of Crop Science, Breeding and Plant Medicine)

Instructors: doc. Dr. Ing. Pavlína Smutná, Ing. Nikola Frantová

Semester: W

Mode of delivery and timetable classes: 2/3 (2 hours of lectures per week/3 hours of seminars per week)

ECTS Credits: 7

Assessment methods: The credit is granted for the active work and submitted protocols from practicum. The exam is written and oral.

Aim of the course and learning outcomes:

Students will understand the basic principles of plant breeding and cultivar development of common crops with respect to their biological differences and the way of reproduction. The current advances in plant breeding including the use of molecular genetics and biotechnology will be also discussed.

Course content:

1. Introduction to plant breeding, historical perspectives, and importance for plant production (allowance 2/1)

Genetic diversity and its importance for breeding, conservation and utilisation of plant genetic resources (allowance 2/1)

2. Enhancement of genetic variability, parental germplasm, induced mutagenesis (allowance 2/0)

3. Intraspecific and interspecific hybridisation, pollen incompatibility, polyploidy (allowance 2/2)

4. Selection for monogenic and polygenic traits, phenotypic and genotypic selection, molecular markers (allowance 2/1)

5. Application of pedigree, bulk and single seed descent methods in early generations, double haploid lines, backcrossing (allowance 2/1)

6. Breeding of pure-line cultivars (allowance 2/3)

7. Breeding of F1 generation hybrids, inbreeding, heterosis effect (allowance 2/3)

8. Breeding of open-pollinated and synthetic cultivars (allowance 2/0)

9. Breeding of clonally propagated species (allowance 2/0)

10. Breeding for resistance to pathogens and abiotic stresses (allowance 2/0)

11. Genetic engineering techniques, genetically modified crops (allowance 2/6)

12. Varietal testing, registration and recommendation (allowance 2/0)

13. Quality control system for plant propagating material, field inspection, seed testing and certification, marketing (allowance 2/2)

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19. Z-SFPAT Special Phytopathology

Course supervisor: Ing. Mária Neoralová (Department of Crop Science, Breeding and Plant Medicine)

Instructors: doc. Mgr. Ing. Eva Hrudová Ph.D., Ing. Mária Neoralová, prof. Ing. Radovan Pokorný Ph.D.

Semester: W or S

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 6

Assessment methods: Oral exam

Aim of the course and learning outcomes: The aim is give the overview of diseases of field crops, horticultural and greenhouse plants and the methods of their control.

Course content:

1. **Economically important pathogens of field crops and their control (allowance 12/16)**
    a. Diseases of cereals and maize
    b. Disease of legume plants and fodder crops
    c. Diseases of potatoes and sugar beet
    d. Diseases of rape, sunflower, poppy, hop, flax and medicinal plants
2. **Economically important diseases of horticultural plants (allowance 10/12)**
    a. Diseases of stone, pip, small fruits and vine
    b. Diseases of vegetables (tomatoes, pepper, cucumbers, Brasicaceae, carrot, onion etc.)
3. **Strategy of diseases control (allowance 6/0)**
    a. Integrated plant disease control
    b. Chemical control of plant disease

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20. Z-ZEMI Agriculture Microbiology

Course supervisor: Ing. Jaroslav Záhora, CSc. (Department of Agrochemistry, Soil Science, Microbiology and Plant Nutrition)

Instructors: Ing. Ivan Tůma Ph.D., Ing. Jaroslav Záhora, CSc.

Semester: W or S

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 6

Assessment methods: Course credit: (requirements -- equivalent presence in seminars, prepared protocol from each seminar, final seminary credit test -- minimum at least 60% corrects answers). Preparation of the final semester project. Credit is compulsory for final exam participation.

Examination: writing preparation and oral exam (duration of 30 minutes in total) consist of 4 questions from separate thematic fields. Precondition for passing the subject - to answer each of the questions at least with mark "E".

Aim of the course and learning outcomes:

Basic knowledge about history and evolution of microbiology. General knowledge of the Environmental Microbiology with emphasis on knowledge of basic characteristics of microorganisms. The importance of microbial activity for the stability of the different environmental components.

Course content:

1. Basic characteristics of microorganisms (allowance 6/8)

a. The structure of prokaryotic and eukaryotic microbial cells and their chemical composition
b. Growth, reproduction methods and types of metabolism of the microorganisms

2. The influence of abiotic and biotic factors on the activity of microorganisms (allowance 6/6)

a. Abiotic factors (temperature, water, oxygen, pH, pressure, radiation, oxidored potential)
b. Biotic factors (interactions between organisms, microorganisms and p lants, microorganisms and animals)
c. Anthropogenic factors

3. Microflora of basic components of the environment (allowance 6/6)

a. Microbiology of water and air
b. Soil microbiology
c. Microbiology of biofilms

4. The role of microorganisms in the cycles of carbon, nitrogen, phosphorus and sulphur in nature with special emphasis on agroecosystems (allowance 4/4)

5. Ecological and economic importance of microorganisms (allowance 6/4)

a. Symbiosis between plants and microorganisms (fixation of atmospheric nitrogen, mycorrhiza)
b. Decomposition of organic residues in soil and aquatic environments
c. Treatment and liquidation of waste, composting
d. Conversion and elimination of xenobiotic in the environment (pesticide residues, organic pollutants, heavy metals)
e. Microorganisms and organic agriculture

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21. Z-AGRT Agrotourism

Course supervisor: Ing. Vladimír Mikule, Ph.D. (Department of Animal Breeding)

Instructors: Ing. Vladimír Mikule, Ph.D.

Semester: W or S

Mode of delivery and timetable classes: 2/1 (2 hours of lectures per week/1 hours of seminars per week)

ECTS Credits: 4

Assessment methods: Exam – written test, 50 questions, minimum of successful rate 60%.

Aim of the course and learning outcomes:

Multidisciplinary subject which comprises social, cultural, economic and environmental aspects connected with sustainable rural development and Agrotourism as a part of rural tourism. Students will get information about all business connected with Agrotourism which they can use for their own business, consultancy, for work in local council etc.

Course content:

1. Tourism (allowance 8/4)

a. Rural tourism and its forms
b. Tourism and its forms, actual state of Rural Tourism in Czech Republic and abroad
c. Agrotourism

2. Business in Agrotourism (allowance 8/4)

a. Analysis of conditions for business
b. Legislation
c. Services, Accommodation, Catering

3. Plant and animal production as a part of Agrotourism (allowance 8/4)

a. Plant production as a part of Agrotourism
b. Animal production as a part of Agrotourism
c. Horses in Agrotourism

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22. Z-AFYZ Anatomy and Physiology of Farm Animals

Course supervisor: doc. Ing. Petr Sláma Ph.D. (Department of Morphology, Physiology and Genetics)

Instructors: doc. Ing. Petr Sláma Ph.D.

Semester: W

Mode of delivery and timetable classes: 2/3 (2 hours of lectures per week/3 hours of seminars per week)

ECTS Credits: 7

Assessment methods:

Practical part - recognize 2 of 3 histological sections for the written part of the exam
Written part - 10 questions, 6 correct answers for the oral part of the exam
Oral part - 2 questions, both must be answered

Aim of the course and learning outcomes:

The aim is to obtain knowledge about the tissues and the carcass body structure, organ functions and the physiological basis of farm animals production features.

Course content:

1. Characteristics of food components of animal origin, animal tissues - morphological and functional characteristics (allowance 0/8)
2. Function of body fluids, immune system (allowance 4/4)
3. Skeletal system, muscular groups of cattle and pigs (allowance 0/4)
4. Anatomy and function of digestive and respiratory system, metabolism (allowance 6/6)
5. Vitamins and microelements function (allowance 4/0)
6. Anatomy and function of the mammary gland, male and female reproductive organs (allowance 6/4)
7. Thermoregulation, excretion, anatomy and function of skin and its derivatives (allowance 2/2)
8. Neurohumoral regulation, adaptation, stress (allowance 6/2)
9. Anatomy of birds and fish (allowance 0/4)
10. Test (allowance 0/4)

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23. Z-AFYR Plant Anatomy and Physiology

Course supervisor: Mgr. Martin Jiroušek, Ph.D. (Department of Plant Biology)

Instructors: Mgr. Martin Jiroušek Ph.D., Ing. Kamila Širůčková Lónová Ph.D.

Semester: S

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 6

Assessment methods: Attendance in the classroom (2 excused absences are tolerated). Oral exam at the end of the semester, where the questions are based on both, the theoretical knowledge and the practical skills related to the microscopic preparation and description of plant anatomy directly on preparates.

Aim of the course and learning outcomes: The structure of vascular plants from the level of single cell to the level of whole organism will be presented. Anatomical descriptions and physiological functions of plant organelles, cells, tissues and organs will be described with focus on important species for agricultural use. The skills in plant objects preparation for microscopic observation, light microscopy will be attained in the practical training.

Course content:

1. Plant Cell (allowance 2/2)

a. Introduction, fundamental botanical terminology
b. Cell Nucleus, DNA, Cell division
c. Cell Wall, Biological membranes

2. Plant Cell Organelles (allowance 2/2)

a. Plastids
b. Vacuole
c. Other Cell Organelles
d. Plant Cell Physiology

3. Plant Tissues (allowance 2/2)

a. Parenchyma
b. Collenchyma
c. Sclerenchyma
d. Prosenchyma
e. Aerenchyma

4. Function of Plant Tissues (allowance 2/2)

a. Meristematic and Somatic Tissues
b. Ground Tissues (Chlorenchyma, Mechanical Tissues, Storage Parenchyma, Glandulous Parenchyma)

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5. Conducting Tissues (allowance 2/2)

a. Xylem
b. Phloem
c. Vascular Bundles

6. Dermal Tissues (allowance 2/2)

a. Epidermis
b. Guard Cells
c. Trichomes

7. Photosynthesis and Respiration (allowance 2/2)

a. Photosynthesis
b. Respiration

8. Vegetative Plant Organs (allowance 2/2)

a. Leaf Anatomy
b. Stem Anatomy
c. Root Anatomy

9. Secondary Structure of Plant Organs (allowance 2/2)

a. Cork Cambium, Periderm, Bark, Lenticels
b. Vascular Cambium, Secondary Xylem and Phloem, Medullary Rays
c. Secondary Anatomical Structure of the Stem
d. Secondary Anatomical Structure of the Root

10. Generative Plant Organs (allowance 2/2)

a. Flowers, Inflorescences
b. Stamen, Pollen Grain, Pistil, Egg, Pollination

11. Life Cycle (allowance 2/2)

a. Double Fertilisation in Flowering Plants
b. Seed, Fruit, Seed Germination
c. Life Cycle of Angiosperms
d. Life Cycle of Gymnosperms
e. Life Cycle of Sporogenous Plants

12. Plants and the Environment (allowance 2/2)

a. Adaptations of Plants on Stress Factors
b. Secondary Metabolites
c. Phytohormones

24. Z-BBT Beer and Beverage Technology

Course supervisor: doc. Ing. Tomáš Gregor Ph.D. (Department of Food Technology)

Instructors: doc. Ing. Tomáš Gregor Ph.D., Ing. Jana Zemanová

Semester: W

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 6

Assessment methods: Completion by written and oral exam

The number of students on course is limited – max. 30 students

Aim of the course and learning outcomes: The course deals with raw materials processing and beverage production. The aim is to acquaint students with the production of beverages, especially beer and non-alcoholic beverages, including the production of syrups. Students should understand the relationship between the chemical composition and the physical, biochemical and microbiological properties of the raw material, which determine the quality and health of the final product. They will try to prepare their own products based on technology and recipe, including quality assurance.

Note: Teaching will take place also in the brewery pilot plant in the building M and in the classroom M02.02 according to the teacher´s instructions.

25. Z-DT Dairy Technology (CURRENTLY NOT AVAILABLE)

Course supervisor: Ing. Jana Zemanová Ph.D. (Department of Food Technology FA)

Instructors: doc. Ing. Morislav Jůzl Ph.D., Ing. Růžena Majkričová, doc. Mgr. Milena Matejovičová Ph.D., Ing. Jan Slováček, Ing. Veronika Švehlová Ph.D., Ing. Jana Zemanová Ph.D.

Semester: W

Mode of delivery and timetable classes: 2/1 (2 hours of lectures per week/1 hours of seminars per week)

ECTS Credits: 6

Assessment methods:

Credit: mandatory attendance at seminars, mandatory preparation, submission and oral presentation of the seminar work (max. 10 min.). Examination: mandatory written, written examination - 10 questions including practices and lectures (10-9.5 points - A, 9.25 to 8.5 points - B, from 8.25 to 7.5 points - C, 7.25 to 6.5 points - D, 6.25-6 points - E, 6 or less points - F).

Aim of the course and learning outcomes: Dairy technology describes the technology, physics, chemistry and microbiology of pasteurised and long-life milk, cream, butter, cheese, condensed milk, milk powder, yoghurt and other fermented milk beverages, ice cream and other dairy products. This subject is segmented at lectures and laboratory exercises.

Course content:

1. Collection and reception of milk. (allowance 2/1)

2. Heat treatment of milk, centrifugation and milk fat standardization. (allowance 2/1)

3. Butter and dairy spreads. Buttermilk. (allowance 2/1)

4. Cultured milk products - yoghurt, fermented milk beverages. (allowance 2/1)

5. Introduction to cheese making - tradition and basic knowledge, acid and sweet coagulation of protein, terminology for classification of cheese. (allowance 2/1)

6. Cheese making models - milk collection, milk treatment, standardization, additives in cheese milk, curd production, renneting, cutting the coagulum, final removal of whey and principles of curd handling, final treatment of curd - pressing, salting, ripening and storage of cheese. (allowance 2/1)

7. Sorts of cheese - fresh cheese, semi-hard cheese, hard cheese, surface mould-ripened cheese, blue cheese, pasta-filata cheese. (allowance 2/1)

8. Processed cheese. Whey processing. (allowance 2/1)

9. Condensed milk - unsweetened condensed milk, sweetened condensed milk. (allowance 2/1)

10. Milk powder - drying, production of milk powder, production of instant powder. (allowance 2/1)

11. Recombined milk products - definitions, raw material handling. Casein. (allowance 2/1)

12. Ice cream - categories of ice cream, the ice cream process. (allowance 2/1)

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26. Z-FYZ Physics

Course supervisor: RNDr. Tomáš Ondro, Ph.D. (Department of Technology and Automobile Transport)

Instructors: RNDr. Tomáš Ondro, Ph.D.

Semester: W or S

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 6

Assessment methods: Credit, Examination. Credit is obtained after success in written tests, 60% of total mark.

Aim of the course and learning outcomes: After finishing of the course students will be able to orientate in basic problems of classical Newtonian mechanics. They will be able to statistically process the results from physical measurements, mathematically work out basic exercises from kinematics and dynamics, and will understand the terms like the coordinate vector, velocity vector, acceleration vector, power, work, energy.

Course content:

1. Basic physical terms (allowance 2/2)

a. Basic physical terms
b. SI units
c. unit conversions

2. Mathematical introduction (allowance 2/2)

a. summation of vectors
b. dot and cross product
c. derivations and integrals

3. Measurement in physics (allowance 2/2)

a. statistical data processing
b. quadratic deviation
c. error propagation
d. Gaussian function

4. Mass point kinematics (allowance 2/2)

a. position vector
b. velocity vector
c. acceleration vector
d. tangential and normal acceleration

5. Circle movement (allowance 2/2)

a. angular velocity
b. angular acceleration
c. relationship between translational motion and circle motion

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6. Dynamics of the massive point (allowance 2/2)

a. The first Newton law
b. The second Newton law
c. The third Newton law
d. Principle of superposition

7. Forces in physics (allowance 2/2)

a. gravitational force
b. frictional force
c. force acting on the body on the spring
d. the Lorentz force

8. Conservation laws (allowance 2/2)

a. energy conservation law
b. momentum conservation law
c. angular momentum conservation law
d. conservative and non-conservative forces

9. Momentum and energy (allowance 2/2)

a. momentum
b. mechanical energy
c. work
d. power
e. efficiency

10. Harmonic oscillator (allowance 2/2)

a. periodic motion
b. kinetic and potential harmonic oscillator energy

11. System of the particles (allowance 2/2)

a. centre of mass
b. elastic collisions
c. inelastic collisions

12. Dynamics of rotational motion (allowance 2/2)

a. moment of inertia
b. angular momentum
c. moment of force
d. Steiner's theorem

13. Gravitational field (allowance 2/2)

a. Kepler's laws
b. Newton's gravity law
c. gravitational potential energy

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14. Liquid mechanics (allowance 2/2)

a. Pressure
b. Bernoulli equation

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27. Z-FYR Plant Physiology

Course supervisor: Ing. Jozef Balla, Ph.D. (Department of Plant Biology)

Instructors: Ing. Jozef Balla, Ph.D.

Semester: W

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 5

Assessment methods: exam

Aim of the course and learning outcomes: Basic knowledge about physiological processes in plants - photosynthesis and respiration, water balance, mineral nutrition, transport of solutes in relation with plant growth and development.

Course content:

1. Absorption and transport systems: transpiration and water flow, mineral uptake and transport and floem transport. (allowance 6/6)

2. Photosynthesis: developing a general equation for photosynthesis, converting light energy to chemical energy and photorespiration. (allowance 6/6)

3. Respiration: the reactions of respiration and effects of environmental factors on respiration (allowance 6/6)

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28. Z-PRZE Precision Agriculture

Course supervisor: Ing. Karel Klem, Ph.D. (Department of Agrosystems and Bioclimatology)

Instructors: Ing. Karel Klem, Ph.D., prof. Ing. Jan Křen, Csc.

Semester: S

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 5

Assessment methods: none

Aim of the course and learning outcomes:
To teach students to effectively use modern technologies to solve problems of spatial heterogeneity of land and temporal dynamics of production processes in the cultivation of field crops in crop production systems. To acquaint them with the latest knowledge in the field of precision agriculture and the possibilities of increasing the economic efficiency of cultivation measures, including reducing their negative impact on the environment.

The course mainly covers newly emerging aspects of precision agriculture:
- Methods of evaluation of spatial heterogeneity (remote sensing, vegetation sensors, yield monitoring, soil sampling, soil sensors).
- Decision making systems for precision agriculture
- General principles of Global Navigation Satellite Systems (GNSS), error sources, examples of operating systems (GPS, GLONASS, Comapass, Galieo)
- Possibilities of using the geographic information system (GIS) in the cultivation of field crops.
- Methods of evaluation and importance of time dynamics of production processes, use of models of growth and development of field crops.
- Statistical methods and interpolation techniques for precision agriculture.
- Delineation and application of management zones.
- Processing and interpretation of results obtained by imaging, sampling and monitoring, creation of application maps.
- Variable cultivation measures (VRT – Variable Rate Technologies) to optimize abiotic factors (nutrition, irrigation) and biotic factors (weeds, diseases, pests).
- Controlled Traffic Farming (CTF) systems, principles, examples, benefits for soil and economy of crop production
- Assessment of economic and environmental benefits of precision farming methods.
- Factors influencing the implementation of precision agriculture methods in practice, possibilities and perspectives of further development.
- Examples of the application of precision agriculture technologies in agricultural practice.
- Use of precision agriculture technologies for plant phenotyping

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29. Z-REHZ Reproduction of Farm Animals

Course supervisor: Ing. Zuzana Rečková Ph.D. (Department of Animal Breeding)

Instructors: Ing. Zuzana Rečková Ph.D.

Language: English

Semester: W

Mode of delivery and timetable classes: 2/3 (2 hours of lectures per week/3 hours of seminars per week)

ECTS Credits: 7

The number of students on course is limited – max. 7 students

Assessment methods: For Credit you have to receive minimal 80 % participation on exercising. Practical examination (for students trying to obtain a certificate of professional qualification pursuant provisions of the Act n° 130/2006 Sb.). Written test (35 % of the total mark) and oral (35% of the total mark) examination.

Aim of the course and learning outcomes: Furnish summary of domestic animals reproduction and by this effectively operate and affect animals reproduction.

Subject result from principles of theoretic branches and show to students influence of external and internal ambient into reproduction level, and general reasons of male and female reproduction interference. Student obtain theoretic and partly practical knowledge of sperm taking of bulls, boars, stallions, rams, bucks, dogs and others, sperm manipulation and preservation in laboratory conditions. Students are given to understand to insemination, diagnostic of gravidity, process of cows, sows, mares, sheep, goats and dog's pregnancy, and problems connected with parturition and puerperium process. The subject also showed up piece of knowledge in the field of induction and synchronisation of heats, fertilization process, preservation and transfer of embryos and using of the other biotechnics.

Course content:

1. External and internal ambient into reproduction level, and general reasons of male and female reproduction interference (allowance 4/6)

2. The Insemination of the farm animals (allowance 6/12)

3. Oestrus and gravidity detection (allowance 4/9)

4. Gravidity and parturition (allowance 4/6)

5. Process of the puerperium (allowance 2/6)

6. Biotechnics and biotechnology of the reproduction (allowance 8/3)

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30. Z-CHOK Sheep and Goat Breeding

Course supervisor: prof. Dr. Ing. Jan Kuchtík (Department of Animal Breeding FA)

Instructors: prof. Dr. Ing. Jan Kuchtík

Semester: W

Mode of delivery and timetable classes: 1/2 (1 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 4

Assessment methods: final examination

Aim of the course and learning outcomes: To provide complex theoretical and practical information of goat and sheep breeding in large, small scale, organic and convective farms.

Course content:

1. History, actual situation and future of both breeding. (allowance 2/1)

2. Feeding, management and housing. (allowance 8/4)

3. Main diseases and parasites. (allowance 2/1)

4. Meat, milk and wool production. (allowance 10/5)

5. Marketing and economy of breeding. (allowance 2/1)

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31. Z-RADEK Radioecology

Course supervisor: Mgr. Jan Novák, Ph.D (Department of Molecular Biology and Radiobiology)

Instructors: Mgr. Jan Novák, Ph.D, prof. RNDr. Michael Pöschl, CSc.

Semester: W

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 5

Assessment methods: Credit + Examination To receive a basic credit (30 % of the total mark) is required: Participation in all practical exercises, and completing and defending the exercise protocols. The exam will be in oral form.

Aim of the course and learning outcomes: To acquaint the students with original, topical and potential sources of radioactive contamination of the environment; behaviour and fate of radionuclides in the environment - radionuclide transport processes - biogenic migration of radionuclides; specific effects of ionising radiation on organisms; protection of soil, crops and farm animals against adverse effects of the pollutants. The student will master information applicable in the protection of all components of the environment against radionuclides (sources of ionising radiation) and how to apply the phenomenon of radioactivity in human activities with a focus on agriculture, food production and forestry.

Course content:

1. Content of lectures (allowance 28/0)

a. **Fundamentals of atomic theory, radioactivity, radionuclides and radioactive decay**
b. **Detection method and radioactivity analysis**
c. **Sources of ionising radiation and radionuclides in the environment**
d. **Biogenic transport processes of natural and man-made radionuclides**
e. **Effects of ionising radiation on organisms, and dosimetry**
f. **Application of radionuclides and ionising radiation in agriculture, food production and research**
g. **Regulations and radiation safety - radioactivity and international co-ordination in the area of protection of agriculture, food production and forestry against radioactive pollutants**

2. Practical exercises (allowance 0/28)

a. **Students will be informed about, and will be able to examine or to practise, the properties and detection of radionuclides, analysis and the handling of radioactive-contaminated samples.**

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32. Z-ZOOL Zoology

Course supervisor: Mgr. Jan Šipoš Ph.D. (Department of Zoology, Fisheries, Hydrobiology and Aqicalture)

Instructors: Mgr. Jan Šipoš Ph.D.

Semester: W or S

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 6

Assessment methods: Requirements: Compulsory participation in exercises; the course is completed by a practical exam on a computer in the form of statistical analysis of zoological data in the program R. The duration of the exam will be 60 minutes, to successfully pass the exam it will be necessary to achieve at least 60% of points.

Aim of the course and learning outcomes: This course will provide to students: 1) Necessary basics information for work in statistical interface R; 2) Necessary theoretical basis for the application of generalized linear models; 3) Knowledge enabling assessment of model quality and its correct interpretation. Students will gain practical knowledge in the field of modern procedures in the processing of zoological data and will be able to choose the right procedure for statistical analysis.

Course content:

1. General introduction to work with statistical software R (allowance 6/0)

a. Program installation and explaining the graphical interface
b. Explanation of programming language syntax

2. Problematic of general linear models and generalized linear models (allowance 2/0)

a. Model structure (linear predictor, link function, error distribution)
b. Estimation methods (Least squares, Maximum likelihood)

3. Introduction to exploratory data analysis (allowance 4/0)

a. Problematic of model validation
b. Problematic of model interpretation
c. Data visualization

4. Problematic of model complexity (allowance 1/6)

a. Overfitting
b. Collinearity

5. Theory of GLM models with Poisson error distribution (allowance 2/0)

a. Model structure
b. Model validation

6. Problematic of under and overdispersion in GLM models. (allowance 1/0)

a. Dispersion statistic
b. Dispersion parameter

7. Problematic of GLM models with negative binomial error distribution (allowance 1/8)

a. Model structure
b. Model validation

8. Problematic of GLM models with binomial error distribution (allowance 2/0)

a. Model structure
b. Model validation

9. Problematic of GLM models with Gamma error distribution (allowance 4/6)

a. Model structure
b. Model validation

10. Solution of residual heteroscedasticity and collinearity for GLM models (allowance 5/6)

a. Generalized Least squares
b. Covariance structure

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33. Z-CAL-P Analytical Chemistry (CURRENTLY NOT AVAILABLE)

Course supervisor: Ing. Lukáš Nejdl, Ph.D. (Department of Chemistry and Biochemistry FA)

Instructors: to be announced

Semester: W or S

Mode of delivery and timetable classes: 2/0 (2 hours of lectures per week/0 hours of seminars per week)

ECTS Credits: 4

Assessment methods: Oral presentation of seminar work

Aim of the course and learning outcomes: After completion of a course student will have expert knowledge about methods of analytical chemistry. Student will be able to understand and explain principles of these methods and to use baselines for statistical analyses. Student will be able to make valid decision about analytical strategies and special procedures for the analyses of foodstuffs, water, biotic samples, and objects of everyday use, from sampling procedures up to the evaluation of the results in relation to both Czech and European legislation.

Theoretical lectures will be supplemented by examples of real analysis and show of equipments in laboratory.

Course content:

1. Analytical process, analytical procedure, performance characteristics Chemical analysis (allowance 4/0)

a. Qualitative chemical reactions, screening
b. Sensitivity, Selectivity, Group, Selective and specific reactions
c. Use of Qualitative an. in everyday life

2. Chemical analysis/ quantitative (allowance 4/0)

a. Gravimetry, direct, indirect
b. Volumetry, standard substances, equivalence point, indicators

3. Optical methods (allowance 6/0)

a. Refractometry, Interferometry, Polarimetry,
b. Spectrophotometry, Fluorimetry
c. Atomic absorption spectrometry
d. Atomic emission spectrometry
e. Infrared spectrometry, Raman spectroscopy

4. Electrochemical methods (allowance 4/0)

a. Conductometry
b. Electrogravimetry
c. Coulometry
d. Polarography and Voltametry
e. Potenciometry

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5. Chromatography (allowance 4/0)

a. Thin layer chromatography
b. Gas chromatography
c. Liquid chromatography

6. Electromigration methods (allowance 2/0)

a. Electrophoresis
b. Izotachophoresis
c. soelectric focusing
d. Electrochromatography

7. Nuclear magnetic resonance spectrometry (allowance 2/0)

8. Mass spectrometry (allowance 4/0)

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34. Z-ENET Environmental Ethics

Please note well, that if there are more than 10 students interested in this course, the priority in the enrollment is given to those enrolled at the Faculty of AgriSciences (MENDELU), even if the course was previously approved in the (O)LA.

Course supervisor: prof. Dr. Ing. Milada Šťastná. (Department of Applied and Landscape Ecology FA)

Instructors: prof. Dr. Ing. Milada Šťastná., Ing. Martina Urbancová

Semester: W or S

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 5

Assessment methods: At the end of the subject, students take an oral exam testing them on the theoretical knowledge (50%) and practical /applied

Aim of the course and learning outcomes: An analytical preview of contemporary environmentalistic discourse, mainly in philosohy/ethics; identification of philo-sophical/ethical aspects in environmental problems; ethical solutions of environmental problems.

Course content:

1. Introduction (lectures: 2, seminars: 2)

a. Terminology and overview.
b. The ideals of human excellence and preserving the natural environment.
c. Global environment and international inequality.

2. The rights of animals. (lectures: 2, seminars: 2)

a. Moral value of reasonable beings. Kant's view of animals.
b. Utilitarian defense of freedom of animals. The case of radical egalitarianism in the issue of animal rights.
c. Critique of Regan's theory. Zoo – controversy, arguments

3. The value of nature. (lectures: 2, seminars: 2)

a. Naturalization values: organisms and species. Comments on Holmes Rolstonovu view.
b. Nature. Superficiality and depth, impact of environmental movement. Ecosophy. The core of ecology. Ecology – a new philosophy now?
c. Criticism of anti-anthropocentric ethics. Social ecology versus deep ecology.
d. Radical environmental protection and wildlife: a critique of the developing countries.

4. Environmental Ethics. (lectures: 2, seminars: 2)

a. Biodiversity: the key to saving life on Earth. Why species matter?
b. Respect for life. Biocentric egalitarianism.
c. Ecocentric ethics: the ethics of the country. Statutory rights of natural objects.

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5. Population and consumption. (lectures: 2, seminars: 2)

a. A special moment in history: the problem of overpopulation and excessive consumption. The tragedy of ”com-mon”.
b. Unequal struggle against the population. Ethics rescue.
c. Population and food: a critique of ethics rescue.

6. Pollution: land, air, water. (lectures: 2, seminars: 2)

a. The question of moral failure.
b. Use of resources versus pollution.
c. It’s ”Silent Spring” for us?

7. Ethics of food. (lectures: 2, seminars: 2)

a. Hunger, duties, and ecology: what do we owe the people starving? World food resources: damage caused by livestock farmers.
b. Vegetarianism. Genetically modified foods.
c. The industrialization of the food chain at the time of climate chaos.

8. Climate change and energy policy. (lectures: 2, seminars: 2)

a. Understanding the causes of global climate change. The role of livestock in the field of air pollution and climate change.
b. Ethics and global climate change. Refusing industry. Hidden interests of global climate justice movement. Sustainability and technological solutions in climate policy issues. Questions of appropriate technologies in the axles damaged environment.
c. War and climate change – environmental impacts of war.

9. Race, class, gender: environmental justice, and justice ecofeminism natives. (lectures: 2, seminars: 2)

a. Overcoming racism in environmental decision making. Environmental racism.
b. Deception of the Third World: Myths about catching up with developments. Environmental risks, rights and the failure of liberal democracy: some possible remedies. Questions relations: the original struggle for land and life.
c. Indigenous knowledge and technology, creation of environmental law in the 21 century. World democracy. The power and promise of ecological feminism. Earth Charter: from ethics to international legal instruments.

10. The greening of spirituality. (lectures: 2, seminars: 2)

a. Genesis 1 to 3 Jewish tradition and the environment. Judeo-Christian approach to nature.
b. Islamic environmental ethics, law and society. Hindu view. The Buddhist attitude towards nature.
c. Pagan Environmentalism: principles of unity.

11. The new” green” capitalist order: the economics and sustainability. (lectures: 2, seminars: 2)

a. Sustainable Development: Myths and global economic reality.
b. Political versus economic issues. The challenges of the future.
c. Ecosabotage and civil disobedience.

12. Globalization. (lectures: 2, seminars: 2)

a. Environmental limits of globalization

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35. Z-FOD Principles of Fodder Production

Course supervisor: doc. Stanislav Hejduk, Ph.D. (Department of Animal Nutrition and Forage Production FA)

Instructors: doc. Stanislav Hejduk, Ph.D.

Semester: W

Mode of delivery and timetable classes: 1/1 (1 hours of lectures per week/1 hours of seminars per week)

ECTS Credits: 4

Assessment methods: Oral exam + seminar work

Aim of the course and learning outcomes: Students should familiarize themselves with fundaments of annual and perennial forage crop production from arable land in temperate zones. The subject is focused on forage legumes and grasses cultivation and their importance for an agroecosystem.

Course content:

1. Introduction, division of forages, definitions, submission of seminar work topic

2. History and importance of forages

3. Importance of grasslands and their ecological services

4. Perennial Forage Legumes

5. Perennial Forage grasses

6. Annual Forages

7. Forage quality

8. Harvest and preservation of forages

9. Excursion

10. Presentation of seminar thesis

11. Final test (allowance 1/0)

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36. Z-OCHZP Environmental Protection

Please note well, that if there are more than 10 students interested in this course, the priority in the enrollment is given to those enrolled at the Faculty of AgriSciences (MENDELU), even if the course was previously approved in the (O)LA.

Course supervisor: prof. Dr. Ing. Milada Šťastná (Department of Applied and Landscape Ecology)

Instructors: prof. Dr. Ing. Milada Šťastná

Semester: S

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 5

Assessment methods:

Aim of the course and learning outcomes:

1. Definitions of basic terms (Environmental Protection, Ecology, Landscape Ecology, Environmentalists, etc.)

2. Historical milestones; population demand and attitude towards Environment, strategical trends

3. Concept of sustainable development; sustainability indicators (economical, ecological and social), Ecological footprint

4. Natural Biochemical Cycles (carbon, nitrogen, phosphate), functions and human disruption

5. Water cycle; water utilization; irrigation

6. Climatic change (basic facts, scenarios, impacts)

7. Soil degradation (contamination, erosion, conservation)

8. Traditional versus Sustainable agriculture (Permaculture, Bio products etc.)

9. Environmental Legislation

10. Excursion

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37. Z-INET Insemination and Embryo Transfer

Course supervisor: Ing. Zuzana Rečková, Ph.D. (Department of Animal Breeding)

Instructors: Ing. Martin Hošek, Ph.D., prof. Ing. Ladislav Máchal DrSc., Ing. Zuzana Rečková, Ph.D.

Semester: S

Mode of delivery and timetable classes: 2/4 (2 hours of lectures per week/4 hours of seminars per week)

ECTS Credits: 8

The number of students on course is limited – max. 10 students

Assessment methods: For Credit you have to receive minimal 80 % participation on exercising. The course is completed by an exam.

Aim of the course and learning outcomes: The course is based on the basics of theoretical disciplines and introduces students the effects of the internal and external environment on the reproduction and the main causes of low level of males and female's fertility. The student acquires theoretical and partly practical knowledge during ejaculate collection, its examination, processing and conservation in laboratory conditions. He gets acquainted with insemination, diagnosis of heat and pregnancy in cows, sows, mares, sheep and goats. In obstetrics, students are explained the issues related to the management of parturition, postpartum care and the puerperium process.

Course content:

1. Legislation in biotechnics and biotechnologies of reproduction (allowance 12/24)

2. Cryopreservation and work with liquid nitrogen, hygienic preconditions of AI and embryotransfer (allowance 4/4)

3. Artificial insemination in cattle, sheep and goats (allowance 2/4)

4. Biotechnologies in reproduction (allowance 2/8)

5. Embryotransfer, IVF and the other biotechnics and biotechnology in reproduction (allowance 4/8)

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38. Z-RUDT Rural Development

Course supervisor: doc. RNDr. Antonín Vaishar, CSc. (Department of Applied and Landscape Ecology)

Instructors: doc. RNDr. Antonín Vaishar, CSc.

Semester: S

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 4

Assessment methods: The subject will be finished by a seminar work and an oral examination.

Aim of the course and learning outcomes: The subject is focused on basic aspects of rural development in both developed and developing countries. It contents fundaments of regional development theory, characteristics and differentiation of the countryside in regional frames, consequences of contemporary urbanization and migration processes in different parts of the World for the rural development, impacts of the first and second demographic transition on the rural development, an overview of problems of rural communities, rural families and gender aspects, a view to rural constructions and rural planning and possible politics of rural development.

1. Regional Development - a Theory (allowance 4/0)

a. Regional Development: The Concept, Definitions, Relations to the Regional Politics and Strategic Planning
b. Theories of Localization, Concept of a Region, Regional Management and Methods

2. Countryside: The Concept and Differentiation (allowance 4/4)

a. Definition of the Countryside, its Characteristics and main Problems
b. Differentiation of the Countryside in National and International Scale

3. Urbanization and Migration Processes (allowance 6/6)

a. Urbanization and the Countryside. Relations to the Technological, Social and Demographical Development
b. Rural-to-Urban and Urban-to-Rural Migration Processes
c. Special Problems of the Contemporary Rural Development

4. Problems of Rural Communities (allowance 4/6)

a. Rural Community and its Development. Problems of Economic, Social and Environmental Sustainability.
b. Rural Family, Rural School, Rural Administration

5. Rural Planning and Politics of the Rural Development (allowance 6/8)

a. Strategic Rural Planning, Master Plans, Land Consolidation, Smart Village
b. Politics of Rural Development on the European level, Agriculture and/or the Countryside?
c. Rural Accessibility and Transport Systems

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39. Z-PED Soil Science

Course supervisor: doc. RNDr. Lubica Pospíšilová, Csc. (Department of Agrochemistry, Soil Science, Microbiology and Plant Nutrition)

Instructors: doc. RNDr. Lubica Pospíšilová, Csc.

Semester: S

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 6

Assessment methods: Oral and written exam.

Aim of the course and learning outcomes: Introduction students to soil properties, genesis, soil classification, land evaluation and land resources of Czech Republic. The student became knowing with role of soil in stability of ecosystems and influence about flow and balance materials and energy.

Course content:

1. Soil Mineralogy (allowance 1/0)

a. Primary Minerals
b. Secondary Minerals

2. Soil Physics (allowance 9/6)

a. Particle Size Distribution
b. Particle Density, Bulk Density and Porosity
c. Soil Water Content
d. Soil Water Energy
e. Saturated Flow
f. Soil Structure

3. Soil Chemistry (allowance 6/5)

a. The Chemical Composition of Soils
b. The Soil Solution
c. Soil Colloidal Behaviour
d. Ion Exchange Phenomena
e. Soil pH and pH Buffering

4. Soil Organic Matter (allowance 2/1)

5. Pedology (allowance 2/6)

a. Pedogenic Processes
b. The World Reference Base for Soil Resources

40. Z-WCPW Water contamination and protection of water sources

Course supervisor: Ing. Petra Oppeltová, Ph.D. (Deparment of Applied and Landscape Ecology)

Instructors: Ing. Petra Oppeltová, Ph.D., Ing. Ondřej Ulrich

Semester: S

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 5

The number of students on course is limited – max. 20 students

Assessment methods: none

Aim of the course and learning outcomes: The students will gain knowledge in the field of water contamination and protection of surface and groundwater source, problems of protection zones of water sources, nitrate vulnerable zones, as well as about the issue of matters of state administration in water management. After completing the course, the students will be able to make laboratory analysis of the water sample and spectrophotometry establish the value of basic chemical and physical water quality indicators and to orientate in Europe water legislation.

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41. Z-OSAB Organic Systems of Animal Breeding

Course supervisor: Ing. Zdeněk Hadaš Ph.D. (Department of Animal Breeding)

Instructors: Ing. Zdeněk Hadaš Ph.D.

Semester: S

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 6

Assessment methods: Evaluation of participation in seminars (min. 80 %), evaluation of participation in field exercises (100 %), submission and defence of a seminar work.

The course is finished with written and oral exam. Written exam takes about 45 minutes and two questions students elaborate on topics. Oral exam takes about 30 minutes. In both parts, students must demonstrate knowledge of at least 60 %.

Aim of the course and learning outcomes: Acquisition of theoretical and practical knowledge from ecological agriculture development in CR and worldwide, exploitation of the most appropriate breeds of individual animal species specified by Ecological Agriculture Law, registered breeding systems, welfare procedure and veterinary prevention principles, bio-material production and its processing and marketing under the terms of ecological breeding system. Subject will provide skills in field of ecological breeding management and marketing.

Course content:

1. Students will acquire compact perspective of ecological breeding systems based on EU requirements and possibilities of application in CR (allowance 28/28)

a. Students will familiarize with ecological breeding of individual animal species, welfare, animal behaviour, elimination of negative impact of breeding on environment, marketing basics and economical aspects of eco-farm breeding.

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42. Z-AGKLI Agroclimatology

Course supervisor: Ing. Milan Fischer Ph.D. (Department of Agrosystems and Bioclimatology)

Instructors: Ing. Juliana Arbelaez Gaviria, Ing. Lenka Bartošová Ph.D., Mgr. Monika Bláhová, Ing. Milan Fischer Ph.D., prof. Ing. Zdeněk Žalud Ph.D.

Semester: S

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 6

Assessment methods: Oral exam

Aim of the course and learning outcomes: To educate students in methods of measurement and in evaluation of the meteorological and biometeorological observations. To master the procedures of meteorological data analysis and their proper utilization in terrain. To manage methods of the agrometeorological prognoses, climatological and agroclimatological zonation.

Course content:

1. **Meteorological observations and measurements** (allowance 2/2)
   a. History of agrometeorology, climatology and bioclimatology
   b. World meteorological organization, Czech Hydrometeorological Institute, classification of meteorological stations
   c. Satellite observations, the possibility of using remote sensing for landscape description
   d. Weather radar, upper air measurements

2. Atmosphere (allowance 2/2)

   a. Stratification and atmospheric composition
   b. Ozone layer

3. Radiation and energy balance of active surface (allowance 4/4)

   a. radiation, distribution, biological significance
   b. radiation balance
   c. energy balance
   d. climate change in relation to landscape ecosystem services

4. Temperature and plants (allowance 4/4)

   a. Temperature - physical basis
   b. Atmosphere temperature gradients
   c. Soil temperature
   d. Temperature sums
   e. Temperature and plants growth and development

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5. The water cycle, the importance of water in the landscape (allowance 4/4)

a. air moisture
b. real, reference and potential evapotranspiration
c. clouds, cloudiness
d. precipitation and water significance for plants

6. Synoptic meteorology (allowance 4/4)

a. air pressure and wind, circulation of the atmosphere
b. air mass, cyclogenesis, weather forecast

7. Climatology and phenology (allowance 4/4)

a. climate factors and categories
b. world and European climate
c. climate of the Czech Republic
d. climatological and phenological studies

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43. Z-RADO Radioactive Waste

Course supervisor: Mgr. Jan Novák Ph.D. (Department of Molecular Biology and Radiobiology)

Instructors: Mgr. Jan Novák Ph.D.

Semester: S

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 5

Assessment methods: Test + credit + examination

Aim of the course and learning outcomes: To acquaint the students with original, topical and potential sources of radioactive contamination of waste and their effect in the area of agriculture, food industry and forestry; with the system of waste monitoring to detect radio-contamination; with standards (legislation) and methods of handling radionuclide-contaminated biological waste. The student will master information applicable in the protection of agricultural, food and forest production against radioactive waste, including methods of handling contaminated agricultural products.

Course content:

1. Content of lectures (allowance 28/0)

a. Radioactivity and ionizing radiation in the environment
b. Characterisation of radioactive waste, and radioactive waste management
c. Effects of radioactive waste on organisms
d. Detection methods and radiation protection in the radioactive waste management
e. International co-ordination in the protection of agricultural and forest production again sources of ionizing radiation and the radioactive waste

2. Practical exercises (allowance 0/28)

a. In practical exercises (including video programmes, and guided discussions), students will be informed about the properties of ionizing radiation and will practise detection, analysis of radioactive-contaminated waste, and protection of agricultural products against sources of ionizing radiation and radioactive waste.

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44. Z-FE Food Engineering

Course supervisor: Ing. Josef Los Ph.D. (Department of Agricultural, Food and Environmental Engineering)

Instructors: Ing. Tomáš Koutný, Ph.D., Ing. Josef Los Ph.D.

Semester: S

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 5

Assessment methods: Examination in oral and written form

Aim of the course and learning outcomes: The course objective is to acquaint the students with basic principles of food processing.

Course content:

1. Introduction (allowance 2/2)

a. State of a System
b. Enthalpy, Entropy
c. Balances

2. Fluid Flow in Food Processing (allowance 4/4)

a. Properties of Liquids, Newtonian and Non-Newtonian Liquids
b. Handling systems for Newtonian Liquids (The Continuity Equation, Reynolds Number, Bernoulli Equation, Ventouri Tube)
c. Liquid Transport System
d. Pumps, Pump Characteristic Diagram
e. Ways of separation, mixing, fluidisation

3. Heat Transfer in Food Processing (allowance 6/6)

a. Thermal Properties of Foods
b. Heat Transfer (Conduction, Convection, Radiation)
c. Heat Exchangers
d. Microwave Heating

4. Refrigeration (allowance 4/4)

a. Compressor Cooling System
b. Pressure -- Enthalpy Chart
c. Heat Pumps

5. Evaporation (allowance 2/2)

a. Boiling Point
b. Evaporators

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6. Psychrometries (allowance 4/6)

a. Psychrometries
b. Properties of Dry Air
c. Psychrometric Chart

7. Dehydration (allowance 6/4)

a. Properties of Wet Foods
b. Water Activity
c. Heat and Mass Transfer
d. Drying Kinetics

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45. Z-CAP Food Analysis

Course supervisor: Ing. Vedran Milosavljević, Ph.D. (Department of Chemistry and Biochemistry)

Instructors: Ing. Vedran Milosavljević, Ph.D.

Semester: S

Mode of delivery and timetable classes: 2/4 (2 hours of lectures per week/4 hours of seminars per week)

ECTS Credits: 8

Assessment methods: Exam

Aim of the course and learning outcomes:

i) demonstrate a sound theoretical knowledge of the basic principles of analytical chemistry.
   a. demonstrate a sound theoretical knowledge of the basic principles of analytical
   b. chemistry.

ii) demonstrate a sound theoretical knowledge of modern analytical methods applicable to the chemical analysis of food.
   a. demonstrate a sound theoretical knowledge of modern analytical methods applicable to the chemical analysis of food.

iii) demonstrate an ability to assess the most appropriate analytical procedure required
   a. for a particular food analysis problem.
   b. demonstrate an ability to assess the most approp

Course content:

1. Introduction to food analysis (allowance 2/0)

2. Food sampling and sample preparation, choosing proper analytical technique (allowance 2/0)

3. Chemical methods - gravimetry, titrimetry, screening methods (allowance 4/0)

4. Instrumental methods - Electrochemical methods (allowance 4/0)

5. Instrumental methods - Optical methods (allowance 4/0)

6. Instrumental methods - Chromatography (allowance 4/0)

7. Instrumental methods - Electrophoresis (allowance 4/0)

8. Laboratory exercises (allowance 0/48)

46. Z-RCHOV Fish Culture

Course supervisor: prof. Dr. Ing. Jan Mareš (Department of Zoology, Fisheries, Hydrobiology and Apiculture)

Instructors: Ing. Jan Grmela Ph.D., prof. Dr. Ing. Jan Mareš, Ing. Lucie Všetičková

Semester: S

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 5

Assessment methods: Oral examination

Aim of the course and learning outcomes: To acquire fundamental knowledge about fish biology, important fish species in the Czech Republic, basics of freshwater hydrochemistry hydrobiology and ecology, fish pond culture and technical aquaculture.

Course content:

1. Introduction to fish biology, basics of anatomy and physiology of fishes (allowance 10/6)

2. Sense organs, gas bladder, digestive system, circulatory system, excretory, osmoregulation and reproductive organs, reproductive cycles (allowance 10/6)

3. Fish systematics and nomenclature, important fish species in the Czech Republic (allowance 6/5)

4. Meristic and morphometric characters, anatomical dissection of fish, basic ichthyologic methods (allowance 0/5)

5. Basic of hydrochemistry, hydrobiology and ecology of water environment (allowance 8/12)

6. Fisheries in the Czech Republic - the past and the present (allowance 4/0)

7. Influence of the specific water pollution at the fish organism, management of running waters for angling (allowance 10/4)

8. Pond fish culture - carp and other market species, fish stock (allowance 4/6)

9. Trout culture, pelletized feeds, technical aquacultures (allowance 4/6)

10. Visitation of a typical Czech fish pond farm (allowance 0/8)

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47. Z-OPT2 Optimising of Diets with PC

Course supervisor: prof. Ing. Ladislav Zeman, CSc., dr.h.c (Department of Animal Nutrition and Forage Production)

Instructors: prof. Ing. Ladislav Zeman, CSc., dr.h.c

Semester: W

Mode of delivery and timetable classes: 2/2 (2 hours of lectures per week/2 hours of seminars per week)

ECTS Credits: 4

Assessment methods:

Aim of the course and learning outcomes:

Course Content:

1. Work with the Feed Database (allowance 3/3)

2. Optimization of feed base (allowance 3/3)

3. Practical calculation of nutrient cost estimation (allowance 2/2)

4. Calculation of nutrient requirements standards for different animal species and categories (Cattle, Horse, pigs, poultry (chicken, turkey) and the others (allowance 3/3)

5. Examination of knowledge focused on optimization of feed composition according to the following programs: AminoCow 3.0 Format, Spesware, Spartan, PC-dairy, NRC98, NRC89, (allowance 3/3)

6. Case study I (farms up to 1000 dairy cows, 10 horses, 500 sows) (allowance 4/4)

7. Optimization of feed rations according to programs (English version) "OKD" and "KDS", "OKS" (programs of Agrokonzulta Žamberk) (allowance 3/3)

8. Basic statistical methods in experimental work, database of results, summary characteristics, ANOVA interpretation, regression and correlation data analysis, linear statistical induction, simplex analysis and dual simplex analysis (allowance 3/3)