

FACULTY OF AGRONOMY

Faculty of Agronomy that has celebrated 95th anniversary of its existence in 2014 has been welcoming international exchange students from Europe and beyond for a number of years.

We are part of the MENDELU campus which means incoming students can take courses from agronomy, forestry and wood-processing, business and economics, regional development and soft skills, all conveniently located in one place, close to the city centre on the line of buses, trams and trolleybuses.

As Agronomy teaches students in Czech:

- Agribusiness
- Food Technology
- General Agriculture
- Animal and Plant Breeding
- Waste Management
- Agroecology
- Molecular Biology and Biotechnology

to name at least a few on Bachelor, master and Ph.D. levels, we can offer over 60 courses taught in English that span a wide range of life science areas.

Upon a special agreement, students can write their thesis or its part under the supervision of our tutor and we also accept interns

The contact person for international students at the Faculty of Agronomy is:

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<https://www.facebook.com/zahranicnistudiaAF>

Courses taught in English at the Faculty of Agronomy

(the list may alter from time to time)

| Level | Name of a course | Semester Winter/ Summer | Number of ECTS credits |
|-------|---|-------------------------------|------------------------------|
| B | Agriculture Microbiology | W or S | 6 |
| B | Agroclimatology | W or S | 6 |
| B | Agrotourism | W | 4 |
| M | Alternative Energy Sources | S | 5 |
| B | Anatomy and Morphology of Plants | W or S | 5 |
| B | Anatomy and Physiology of Farm Animals | W or S | 7 |
| B | Animal Genetics | S | 6 |
| M | Applied Bioclimatology | W or S | 5 |
| B | Biochemistry | W | 8 |
| B | Cattle Husbandry | W or S | 7 |
| B | Dairy Technology | W or S | 6 |
| B | Environmental Protection (can taught in English and/or Italian!) | W | 5 |
| M | Farm Animal Husbandry | W | 6 |
| M | Fish Culture | W | 5 |
| M | Food Analysis | S | 8 |
| M | Food Engineering | S | 5 |
| M | Food Chemistry | W | 4 |
| B | General Phytopathology | W or S | 6 |
| B | General Plant Production | W or S | 5 |
| M | Grassland Management NEW!! | W | 5 |
| B | Herbology | W or S | 4 |
| M | Horse Husbandry | W | 5 |
| B | Hydrology and Hydraulics (in Spanish) NEW!!! | S | 6 |
| B | Chemistry | W | 8 |
| B | Inorganic and Analytical Chemistry | W | 6 |
| M | Insemination and Embryo Transfer | S | 8 |
| M | Landscape Ecology | W | 5 |
| M | Optimising of Diets with PC | S | 4 |
| M | Organic Agriculture | W or S | 5 |
| B | Organic Chemistry | W | 6 |
| M | Organic Systems of Animal Breeding | S | 6 |
| B | Physics I and II | W or S | 6 |
| M | Phytopathology and Entomology | W or S | 8 |
| B | Plant Anatomy and Physiology | W or S | 6 |
| M | Plant Breeding | W or S | 7 |

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|---|--|--------|---|
| B | Plant Physiology | W | 5 |
| M | Precision Agriculture | W or S | 5 |
| M | Principles of Fodder Production | W | 4 |
| M | Radioactive Waste | S | 5 |
| M | Radioecology | W | 5 |
| B | Reproduction of Farm Animals | W | 7 |
| M | Sheep and Goat Breeding | W or S | 4 |
| B | Soil Science | S | 6 |
| M | Special Phytopathology | W or S | 6 |
| M | Tropical and Subtropical Pastures NEW!! | S | 5 |
| B | Zoology | W or S | 6 |

You can also follow out facebook pages:
<https://www.facebook.com/zahranicnistudiaAF>
for up-to-date information.



Agricultural Microbiology

Content: The course acquaints students with basic problems regarding general as well as applied microbiology paying special attention to plant growing, farm animal husbandry and processing of plant and animal products. Discovery of the microbial world. Biochemistry of microbial cells, their functional anatomy, genetics and dynamics of growth. Microbial metabolism: enzymes, catabolic and biosynthetic processes. Microbial ecology: effect of abiotic factors, interactions between microorganisms and plants, microbial interactions with animals. Microorganisms and some novel pollution problems. Microorganisms in their natural habitats: air, water and soil microbiology. Role of microorganisms in biogeochemical cycling of carbon, nitrogen, phosphorus and sulphur focusing special attention on the agroecosystems. Soil fertility and soil sickness. Microflora of fodders and organic fertilizers. Microbial aspects of composting of plant and animal wastes . Useful properties of microbial preparations, enzymes and secondary metabolites in agricultural practice.

Language: English

Semester: W or S

Hours of lectures/seminars per week: 2/2

ECTS Credits: 6

Agroclimatology

Content: To educate students in methods of measurement and evaluation of the meteorological and agro-meteorological observations and also in methods of an agro-climatological evaluation of the environment including the agro-meteorological zonation. Students will be taught to apply acquired knowledge of the subject into growing technologies and will learn basic principles of utilization of crop growth simulation models.

Language: English

Semester: W or S

Hours of lectures/seminars per week: 2/2

ECTS Credits: 6

Agrotourism

Content: To provide information on tourism in country, on business possibilities and forms of application of higher education knowledge. Outstanding specialists are invited as guest lecturers. Seminars are pooled into blocks and students take part in trips to places of agrotourims in the Czech Republic and Austria. The course provides complex information on agroutourism which is necessary to start tourist business in farming. The course deals with legislation, service provision, management, forms of agricultural production and its economy. The stress is put on the role of agrotourism in protection of environment and development of Czech countryside.



Language: English

Semester: W

Hours of lectures/seminars per week: 2/1

ECTS Credits: 4

Alternative Energy Sources

Content: Main goal of the course is to give an overview and division of alternative energy sources. To provide overall knowledge of alternative energy sources utilization, describing advantages and disadvantages with close connection to the economic evaluation. The environmental, energy and economical links to alternative energy sources are discussed. Using solar energy in direct and indirect application is presented. Energy of water, wind, oceans and geothermal energy usage is discussed. Terms like heat pumps, co-generation and their application are explained. Important part of the course deals with energy of biomass, alternative fuels for internal combustion engines, such as biodiesel and hydrogen. Application in fuel cells is presented as well. Theoretical base of this course is in principal physics level, students are acquainted with basic methods of energy consumption calculations, concluding in the economic evaluation of the alternative energy source utilization and investment evaluation.

Language: English

Semester: S

Hours of lectures/seminars per week: 2/2

ECTS Credits: 5

Anatomy and Morphology of Plants

Content: The structure of vascular plants from the level of single cell to the level of whole organism. Cell wall and protoplast, membranes organelles, cytoskeleton. Division and growth of the cell, cell cycle. Plant tissues – classification according to cell wall and shape, and according to functions. Root, stem, leaf, flower, seed and fruit – functions and external and internal organization. Plant reproduction (sexual, apomixis, asexual). Life cycles.

Minimum of 3 students registered is necessary to open the course! Alternative Plant Anatomy and Morphology.

Language: English

Semester: W or S

Hours of lectures/seminars per week: 2/2

ECTS Credits: 5

Anatomy and Physiology of Farm Animals

Content: The aim is to obtain knowledge about the structure and function of organism that are important for the animal husbandry. The subject covers information about the structure of organism (cell, tissue, organ systems) and how they work (function of body fluids, circulation, respiration, digestion, resorption, metabolism, respiration, thermoregulation, reproduction, lactation, neuroendocrine control).

Language: English

Semester: W or S

Hours of lectures/seminars per week: 2/3

ECTS Credits: 7

Animal Genetics

Content: Students should learn about genetics of farm animals, understand principles of genetic variability and master genetic mechanism on molecular and cellular levels as well as on levels of individuals and populations. They also should be able to interpret this knowledge and use it actively in their breeding work. Application of genetics in breeding of farm animals. Genotypic and genetic structure of populations, changes in frequencies of genes (selection, migration, mutation, effective size of a population, inbreeding). Characterisation of quantitative traits in a population, components of genotypic variance, environmental variance, correlations and interactions between genotype and environment. Genetic parameters of populations, their importance. Genetic aspects of estimation of breeding value, calculation of genetic parameters, non-linear and positional effects, heterosis and recombination effects, inbreeding depression. Genetics of health and resistance of farm animals to diseases. Genetics of cattle, pigs, horses, sheep and poultry - alternative traits, polymorphism of DNA and proteins, marker genes and QTL, genetic maps, genetics of production traits. Genetics and biodiversity, protection of gene reserves.

Language: English

Semester: S

Hours of lectures/seminars per week: 2/2

ECTS Credits: 6

Applied Bioclimatology

Content: In this course we apply system approach in order to analyze 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 the 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.

Language: English

Semester: W or S

Hours of lectures/seminars per week: 2/2

ECTS Credits: 5

Biochemistry

Content: The course of biochemistry deepens the knowledge about structure of living systems and their metabolism. It reveals structure of enzyme molecules, forms of their occurrence, their localization, mechanisms of their action and regulation. The course familiarizes students with classification and nomenclature of the enzymes and with estimation of their catalytic activity. The main attention is aimed at saccharine metabolism (glycolysis, pentose cycle, photosynthesis), of lipids (triacylglyceroles, fatty acids) and nitrogen containing molecules (aminoacids metabolism, ammonium detoxification, proteosynthesis, proteolysis). In addition, the course describes secondary metabolism and principles of biochemical regulation. Laboratory practise acquaint students with sampling and preparing of biological samples and with main biochemical methods (enzyme kinetics, gel electrophoresis, immunochemical methods, electrochemistry, liquid chromatography).

Language: English

Semester: W

Hours of lectures/seminars per week: 2/4

ECTS Credits: 8

Cattle Husbandry

Content: To introduce main aspects of production management and non-production functions of cattle. The aim of the course is to introduce cattle as a significant part of the agricultural system and a food producer. The main production traits, such as fertility, milk and meat production and factors affecting them are described. Students are given an overview of the most important cattle breeds, especially those kept in the Czech Republic. The system of breeding measures taken to secure the breeding progress in cattle herds and population is presented. Management of all categories of cattle, i.e. cows, calves, heifers and beef is discussed. The ecological, production, economic and ethological aspects of systems of rearing and breeding of cattle in both dairy and beef herds are emphasized.

Language: English

Semester: W or S

Hours of lectures/seminars per week: 2/3

ECTS Credits: 7

Dairy Technology

Content: Dairy technology describes the technology, physics, chemistry 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 lectures and laboratory exercises.

1. Collection and reception of milk.
2. Heat treatment of milk, centrifugal separators and milk fat standardisation. Homogenisers.
3. Butter and dairy spreads. Buttermilk.
4. Cultured and starter manufacture. Cultured milk products - yoghurt, fermented milk beverages.
5. Introduction to cheese-making - tradition and basic knowledge, acid and sweet coagulation of protein, terminology for classification of cheese.
6. Cheese-making models - milk collection, milk treatment, standardisation, additives in cheesemilk (starter), 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.
7. Sort of cheese - fresh cheese, semi-hard cheese, hard cheese, surface mould-ripened cheese, blue cheese, pasta-filata cheese.



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8. Processed cheese. Whey processing. Lactose conversion.
9. Condensed milk - unsweetened condensed milk, sweetened condensed milk.
10. Milk powder - drying, production of milk powder, production of instant powder.
11. Recombined milk products - definitions, raw material handling. Casein.
12. Ice cream - categories of ice cream, the ice cream process.

Key words: milk, fermented milk products, cheese, yoghurt, cream, milk powder, condensed milk, ice cream, dairy technology

Language: English

Semester: W or S

Hours of lectures/seminars per week: 2/1

ECTS Credits: 6

Environmental Protection

Content: Key periods of human population development resulting in characteristics of present North – South relationships and development of environmental crisis with its social and economic aspects. The connection to ecology, landscape ecology and relevant natural, technical, economic and social sciences. Life supporting systems and their disturbances (hydrological cycle, biogeochemical cycles of C, O, H, N, S, P etc.).

The concept of sustainable development. Ecological, economic and social sustainability and their indicators. Wise use of renewable and non-renewable natural resources. Nature and landscape conservation, the concept of regional systems of ecological stability, ecological nets, EECONET. Agriculture – environment relationship, comparison of traditional and industrialised agricultural systems., „free trade“ agriculture versus sustainable agriculture. New trends of The Common Agricultural Policy in relation to nature and landscape conservation and to rural development. Principles of environmental legislation . A field trip to the Protected Landscape Area Moravian Karst is a part of the course.

Language: English and/or Italian

Semester: W

Hours of lectures/seminars per week: 2/2

ECTS Credits: 5

Farm Animal Husbandry

Content: To provide information on biological and technological background and management of most important farm animal breeds and production traits of cattle, pigs, poultry, sheep and goats. The course introduces technology used in animal production systems, external and internal factors affecting organism. Students learn terminology and etology, welfare and ethics of animal production issues are discussed as well as legislation concerning animal protection. Students gain elementary knowledge on variability of production traits, breeding and reproduction of farm animal species. Methods of evaluation of growth, meat, milk and egg production and reproduction are introduced. Students take part in field trips to various farms and enterprises where they are shown systems of technology used in cattle, pig, poultry and sheep farming.

Language: English

Semester: W

Hours of lectures/seminars per week: 2/2

ECTS Credits: 6

Fish Culture

Content: To acquire detailed knowledge about culture of individual fish species in connection with rational pond management including ecological and economical aspects of fishery. The course will start with review of historical evolution of fisheries with respect to its progress in the Czech Republic. Special attention is paid to the technology of carp production, including reproduction and culture. Within the framework of this course technologies and processes involved in culture of other commercial fish species, stock enhancement of running waters and the role of individual fish species in the market will be discussed. The last part of the course is devoted to pond fertilization and intensive fish culture, organized harvesting of the fish produced in the pond, fish transport and maintenance. Practical part of the course will focus on common activities in the field of fisheries management. Excursions and practical trainings in some selected fish farms will supplement the course.

Language: English

Semester: W

Hours of lectures/seminars per week: 2/2

ECTS Credits: 5

Food Analysis

Content: Basic principles of instrumental analytical chemistry, determination of major and minor components. Principles of instrumental analysis. Sampling and sample pre-treatment. Water and dry matter. Determination of major and minor inorganic components. Nitrogen containing substances (proteins, aminoacids, total nitrogen...). Lipids (basic parameters, fatty acids). Saccharides (mono-, di-, poly-). Organic acids. Aromatic substances. Tannins. Natural pigments and synthetic dyes. Vitamins. Contaminants in food (pesticides, toxic elements and substances, antibiotics, mycotoxins). Additives (antioxidants, preservative, flavours and colourands, emulsifiers, stabilizers). Practical courses are oriented on determination of basic parameters by classical and instrumental methods (HPLC, electroanalytical methods, UV-VIS spectrophotometry). Visit of LC, LC/MS, GC/MS, AAS and AES laboratories is also included.

Language: English

Semester: S

Hours of lectures/seminars per week: 2/4

ECTS Credits: 8

Food Engineering

Content: Food Engineering is a theoretical subject. The course objective is to acquaint the students with basic principles of food processing. The introductory lessons deal with material and energy balances, heat transfer and liquid transport. The topics of the individual lectures are: dosing, mixing and forming, mechanical separations (filtration, centrifugation, sedimentation), extraction, distillation, crystallisation, heat processing using steam and water (heat exchangers, blanching, pasteurisation, heat sterilisation, evaporation) and heat processing using hot air (dehydration, baking and roasting), chilling and freezing. Hygrothermal properties of food materials, incl. the effect of water activity on food and mechanism of drying (heat and mass transfer, EMC/ERH) are demonstrated using a special laboratory dryer. Technical calculations and utilisation of diagrams i-s (steam), log p-i (cooling agent) and psychrometric chart (Molliere diagram) are topics of seminars.

Language: English

Semester: S

Hours of lectures/seminars per week: 2/2

ECTS Credits: 5

Food Chemistry

Content: Basic principles of food chemistry and biochemistry. Major and minor food components. Organic chemistry and biochemistry of food and agricultural materials. Basic substances and their properties. Chemical reactions in food chemistry. Major and minor inorganic components. Water and dry matter. Nitrogen containing substances (proteins, aminoacids, total nitrogen...). Lipids (basic parameters, fatty acids). Saccharides (mono-, di-, poly-). Organic acids. Aromatic substances. Tannins. Natural pigments and synthetic dyes. Vitamins. Contaminants in food (pesticides, toxic elements and substances, antibiotics, mycotoxins). Additives (antioxidants, preservative, flavours and colourands, emulsifiers, stabilizers)..

Language: English

Semester: W

Hours of lectures/seminars per week: 3/0

ECTS Credits: 4

General Phytopathology

Content: 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.).

Language: English

Semester: W or S

Hours of lectures/seminars per week: 2/2

ECTS Credits: 6

General Plant Production

Content: Vegetation and production factors, site characteristics, partition of the CR territory into production regions, crop production zoning, agrobiological characteristics of major field crops and their incorporation into crop rotations, soil tillage and stand establishment, weed control, systemic approach in arable farming, and crop production history. Students obtain deeper knowledge about plant production, its practical running and special management on farms (agricultural enterprises) and are acquainted with agronomic principles of sustainable arable farming. The subject provides groundwork for subsequent specialized subjects.

Language: English

Semester: W or S

Hours of lectures/seminars per week: 2/2

ECTS Credits: 5

Grassland Management

Content: Grassland in Europe and the world, knowledge of disciplines to combine the issue of crop and livestock production. Graduates will gain knowledge of the treatment, restoration of grasslands and their maintenance, they will learn of grazing cattle, sheep, goats and horses. Graduates able to give advice on pasture management and working on farms with grazing livestock.

Language: English

Semester: W

Hours of lectures/seminars per week: 2/2

ECTS credits: 5

Herbology

Content: Characteristics of weed groups, their harmfulness, usefulness, propagation, dissemination. Current problems of weed infestation. Relationships between the most common crops and weeds. Weed management - prevention and direct control treatments. Herbicides – characteristics and possibilities of their use. Agronomic and economic effectiveness of individual weed management treatments and their impacts on the environment. Weed control under different farming practices (conventional, integrated, ecological, precision). Students obtain deeper knowledge about biological properties of field weeds, their economical importance, occurrence, possibilities and methods for weed control, and its impacts on the environment.

Language: English

Semester: W or S

Hours of lectures/seminars per week: 2/1

ECTS Credits: 4

Horse Husbandry

Content: To gain knowledge on horse husbandry and breeding of required types of horse. The course is focussed on development of horse husbandry, elements of creation of production types and breeds of horse, changes and present trends in use of horses. Students are introduced to principles of horse breed identification; particulars of horse anatomy evaluation; the description of the most significant horse breeds and their production traits; horse husbandry in the Czech Republic; principles, forms and methods of horse breeding; technology of rearing and breeding, grazing system; handling and training of horse performance evaluation; methods of selection and economy of horse husbandry. Students take part in two day-long trips focused on horse husbandry in the Czech Republic and selection of horses according to their performance. Two practical field trips allow students to take part in horse type evaluation, mechanics and irregularities of movement, description of horse.

Language: English

Semester: W

Hours of lectures/seminars per week: 2/2

ECTS Credits: 5

Hydrology and Hydraulics (in Spanish)

Content:

1. Introducción a la Hidrología (Procesos y depósitos en el ciclo hidrológico; Importancia del agua en la Tierra: regulación de la distribución de energía y de los seres vivos. Ecohidrología)
2. Lluvia, nieve, rocío y evaporación: el agua en la atmósfera (Rasgos principales de la atmósfera; Procesos de condensación y evaporación del agua en la atmósfera; Formación de rocío, lluvia y nieve; Interceptación de la lluvia por la vegetación; Lluvia media de la cuenca; La reserva de agua en la nieve)
3. Distribución temporal y espacial en Hidrología (Probabilidad en Hidrología; Variabilidad espacial en Hidrología)
4. Infiltración y generación de escorrentía: el agua en el suelo (Comportamiento hidrológico del suelo; Generación del exceso de lluvia; Redistribución y evaporación del agua en el suelo)
5. Circulación subterránea del agua (Flujo del agua en acuíferos; Descarga de acuíferos: interacción con ríos y lagos; Recarga de acuíferos)
6. Escorrentía superficial (Caracterización hidrológica de la cuenca; Respuesta hidrológica de la cuenca: Hidrograma unitario; Circulación del agua en la cuenca. Efectos de canales y embalses)
7. Recarga y descarga del suelo y análisis de cuencas: modelos hidrológicos (Modelos de recarga. Balances de agua; Modelos de circulación de flujos en la cuenca)
8. Hidráulica (Fórmula de Chézy; Ecuación de continuidad; Principio de Bernoulli)

Teacher: Ing. Petra Oppeltová, Ph.D.

Department of Applied and Landscape Ecology

Language: Spanish

Semester: W or S

Hours of lectures/seminars per week: 2/2

ECTS Credits: 6

Chemistry

Content: 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 physics-chemical properties. Students should be trained in basic laboratory operations and proper using chemical nomenclature. Structure of atoms and molecules, origin and kinds of chemical bond. Basis of thermodynamic. Reaction kinetics. Interphase and chemical equilibria. Solutions, acidobasic, complexforming, redox and precipitation reaction. Elements and their compounds. Organic structures, structure of molecules (isomerism), organic reactions (electron-effects, mechanisms of a reactions). Chemistry of organic compounds. Hydrocarbons (carbon-carbon single, double and triple bounds), aromatic hydrocarbons. O-derivatives (alcohols, phenols, aldehydes, ketones, carboxylic acids, ethers, esters, hemiacetales). N-derivatives (amines, nitro-derivatives). S-derivatives. Heterocycles. Chemistry of natural compounds. Saccharides. Lipids. Peptides. Chemistry of macromolecules. Biochemistry: metabolic pathways (photosynthesis, biological oxidation).

Language: English

Semester: W

Hours of lectures/seminars per week: 3/3

ECTS Credits: 8

Inorganic and Analytical Chemistry

Content: Aim of study is to obtain knowledge about inorganic and analytical chemistry (particularly qualitative and quantitative analysis). Basic information about theory and application of instrumental analytical methods used in agriculture and relative fields is obtained. The course make the students acquaint with basic problems of inorganic and analytical chemistry. Inorganic part explains structure of atoms, origin and kinds of chemical bound, kinds of chemical reactions, periodic system, basic characteristics of selected elements and their compounds. Analytical part explains theoretical basis of qualitative and quantitative analysis, sample preparation for analysis, gravimetric and volumetric methods, instrumental - optical (polarimetry, refraktometry, photometry, atomic spectroscopy), electrochemical (potentiometry, conductimetry, polarography) and separation (extraction, gas and liquid chromatography, electromigration methods) methods. Students use theoretical knowledge of analytical methods in work in chemical laboratory (sample preparation, gravimetry, volumetry, photometry, potentiometry, conductimetry and separation methods).

Language: English

Semester: W

Hours of lectures/seminars per week: 2/2

ECTS Credits: 6

Insemination and Embryo Transfer

Content: To provide complex theoretical information and train practical skills used in insemination and other bio-technological methods in order to maximise reproduction potential of farm animals. The course develops theoretical knowledge gained in the course "Reproduction of Farm Animals" . It describes theory of biological, technical and legal background of successful insemination, embryo transfer and other kinds of bio-technological methods. In seminars students learn about examination and storage of insemination doses, about insemination of horses, cattle, pigs, sheep and poultry and they practise its performance on the University farm. Students are introduced to examination of female reproduction organs, diagnosis of pregnancy with the aid of ultrasound and a process of parturition. The embryo transfer is performed in practicals and students visit a centre of controlled reproduction where fertilization in vitro is performed. Students who successfully passed the examination receive Authorization to perform the above mentioned operations (according to the law No. 154/2000).

Language: English

Semester: S

Hours of lectures/seminars per week: 2/4

ECTS Credits: 8

Limited number of students, certificate for successful students

Landscape Ecology

Main goals: To define landscape as a phenomenon; to identify problems of landscape utilization and to create knowledge basement for students to be able individually propose a solution of these problems. There is an applied character of the subject emphasized; therefore a space is devoted to basic connections of landscape ecology to other research fields.

The lectures are divided into 12 thematic blocks. Knowledge is deepened and applied on specific case studies/examples by interactive teaching techniques during practices. Part of the practice might be an excursion focusing on evaluation methods of land use. Semestral assignment will be required.

1. Ecology in relation to landscape

- Landscape as a subject of the study, different approach and perception of the landscape, genesis of landscape ecology as a trans-disciplinary science.
- Landscape as a complex form (geocomplex) and system (geosystem), landscape units and components, landscape factors, natural landscaping processes, ecosystems and geosystems, landscape attributes as a self-regulation system, landscape homeostasis.

2. Space structure of landscape and its changes

- Vertical and horizontal structure of landscape, hierarchy of landscape units, individual and typological landscape signs, primary, secondary and tertiary landscape structure.
- Changes of landscape structures. Landscape evolution, its dynamic and rhythmic, landscape evolution in Quaternary, role of man in historical context.
- Landscape typology.

3. Landscape and human

- Basic function of landscape related to human, complex landscape potential, creation of cultural landscape, landscape load and its limits, natural and civilization disturbance.
- Changes of cultural landscape. Degrees of anthropogenic landscape changes, reversible and irreversible changes, character of disrupted and devastated landscapes, degradation a regeneration processes in landscape. Ecology of recovery, biotope reclamation in cultural landscape, natural renaturalization, directed succession.
- Landscape and environment protection. Extra protected areas.

4. Landscape diagnoses and prognosis

- Information sources about landscape areas, databases, GIS, landscape ecological monitoring, data interpretation and evaluation, identification of problems and conflicts of interest in landscape, risk estimation, EIA/SEA, methods of natural values appraisalment.
- Conceptions of recovery for landscape ecological stability. Conceptions of Act No. 114/1992 Coll, on the protection of nature and landscape (ÚSES), key words, methods, experiences / case studies, similar programs abroad, EECONET. Types and function of landscape greenery.
- Evaluation of landscape scenery. Principles and methods. Conservation and change in landscape structure development.
- Landscape planning – introduction.
- Landscape scenarios – introduction.

5. Landscape and space planning

- Evolution of space planning – historical point of view.
- Landscape versus land planning. Definitions and interpretation of basic terminology.
- Land planning – legislation, theoretical basis and practical application.

6. Landscape planning

- Landscape planning methods. Methods, content and standards of a landscape plan. Preventive landscape protection.
- Strategic, regional and community planning.
- Complex land reallocation as a tool of space planning. New organization of soil fund and road net, land blocking, liquidation of dispersed green, landscape unification, changes of landscape character. Anti-erosion control measures, positive a negative impacts of landscape reclamation. Problems of chemicalization in agriculture.
- Countryside renewal

7. Agricultural landscape

- Agro-ecosystem -- basic determination
- Ecologization in agriculture. Ecologization trends in recent agriculture, alternative agricultural technology, sustainable agriculture and forestry. Double role of a farmer in landscape. Agro-environmental programs.
- Sustainable farming in landscape -- vision of sustainable landscape farming within national and international connectivity.

8. Landscape and countryside

- Determination of rural areas -- criteria, situation in Czech Republic and in the world.
- Indicators typical for rural areas -- estate and tendency
- Sustainable development of rural landscape (Cork declaration). Agrarian politic and its reflection in rural landscape.
- Politic of regional development.

9. Urban landscape

- Problems of urban environment. Suburbanization.
- City versus countryside. Descriptive and exact comparison.
- Brownfields. Definition. Cause of BF initiation. Types of BF. BF regeneration.

10. Landscape creation programs in CZ. European funding

- Function and assurance of landscape creation programs, experiences, successes and problems of its realization. Landscape cultivation program, revitalization of river systems, rural (village) renewal program.
- Coordination of land creation programs and documents. Interlacing of urbanistic and landscape structures, role of complex land reclamations. Problems of farming in areas with specific management.
- Structural EU funds, Norwegian funds etc.

11. Landscape politic. European convention about landscape.

12. Landscape and tourism

- Impacts of tourism on landscape. Role of local autonomy in tourism.

- Desirable form of tourism. Certification of services in tourism.
- Geo-parks.

Language: English

Semester: S

Hours of lectures/seminars per week: 2/2

ECTS Credits: 5

Optimising of Diets with PC

Content: The aim of course is to introduce principles and pre-conditions of model creation, optimisation and simulation models for feed mixtures, feed diets and production of feeds. Students practical use Software for optimising of feed production for farm (small, average or big). The aim of course is to introduce principles and pre-conditions of model creation, phases of model creation, aiming and selection of instruments, optimisation, structural and simulation models. Individual variant solution analysis, sensitive analysis, parameterisation, selection of optimal variant for implementation in process of optimising diets and feedstuffs base. Optimising diets for cattle, pigs, horse and poultry. Software: Excel, Mixit II, NRC (1998, 2001), Degussa AminoDat and AminoCow, KDS, OKD, OKS, Agrokonzulta Žamberk, Solomix, e.t.c.

Language: English

Semester: S

Hours of lectures/seminars per week: 0/4

ECTS Credits: 4

Organic Agriculture

Content: The aim of the course is to acquaint students with philosophy, objectives and principles of organic agriculture, broader theoretical knowledge of functions and relationships in agroecosystems (relations to landscape, soil, water and biodiversity); to acquaint with history, development and current position of organic agriculture under conditions of the Czech Republic and European Union. Acquaint students with basic legal standards valid for farming in organic agriculture; to elucidate principles of supervision and certification processes. To explain differences and specificities between conventional and organic farming, i.e. principles of plant production with emphasis on crop rotations and differences in plant nutrition, importance and main principles of farm animal breeding in relation to nutrient balance in the organic farming system, plant protection strategy in relation to approved processes and weed management. Students will be acquainted with productivity of organic agriculture and economic aspects of organic farming enterprises. Principles of bio-food production and problems of bio-food market will be explained. The aim is to teach students the principles of sustainable soil management according to rules of organic agriculture applied in the EU and CR, and to acquaint them with the practice in organic agriculture so that they can elaborate a business plan for an organic farm, apply for registration as a person carrying business in organic agriculture, function as a head of an organic farm as well as other activities ensuring organic farming system (e.g. in relation to the use of supporting tools for organic farming practice) including bioproduction realization.

Language: English

Semester: W or S

Hours of lectures/seminars per week: 2/2

ECTS Credits: 5

Organic Chemistry

Content: Aim of study is to obtain knowledge about chemistry of 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. Students should be trained in basic laboratory operations and proper using chemical nomenclature. Organic structures, structure of molecules (isomerism), organic reactions (electron-effects, mechanisms of a reactions). Chemistry of organic compounds. Hydrocarbons (carbon-carbon single, double and triple bounds), aromatic hydrocarbons. O-derivatives (alcohols, phenols, aldehydes, ketones, carboxylic acids, ethers, esters, hemiacetales). N-derivatives (amines, nitro-derivatives). S-derivatives. Heterocycles. Chemistry of natural compounds. Saccharides. Lipids. Peptides. Chemistry of macromolecules, biopolymers and synthetic polymers.

Language: English

Semester: W

Hours of lectures/seminars per week: 2/2

ECTS Credits: 6

Organic Systems of Animal Breeding

Content: The aim of the course is to inform students about problems associated with organic breeding of farm animals, animal welfare and ethics. Students will learn about systems of organic animal production as operated in accordance with the EU regulations and with possibilities of their application under conditions of the Czech Republic. The most important topics are as follows: organic breeding of individual species of farm animals, animal welfare, ethology of farm animals, elimination of negative environmental effects of animal production, marketing of organic products and economic aspects of organic animal production.

Language: English

Semester: W or S

Hours of lectures/seminars per week: 2/2

ECTS Credits: 6

Physics I, II

Content: Acquisition of basic physical standards and knowledge, required for following study. Ability of individual analyzing of technical problems and practical application of physical laws. Subject is divided into six main following parts: Mechanics, Hydromechanics, Thermodynamics, Electricity, Magnetism and Basic modern Physics. Practical demonstration of measurement of physical and technical values is a part of laboratory practice. Results of the measurements must be technically and statistically processed in a special protocol which includes graphical interpretation. The oral examination is focused on logical interrelationship and continuity of various physical values and formulas and their relation to technical use.

Students will be asked to sit a math test before enrolling in the course to ascertain if they can understand the physics on level that is being taught! Physics II comes after Physics I or after passing an exam from Physics I.

Language: English

Semester: W or S

Hours of lectures/seminars per week: 2/2, 2/2

ECTS Credits: 6

Phytopathology and Entomology

Content: 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. Noninfectious 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, bionomie, economic importance and methods of protection. Relationships between the incidence of individual insect pests a losses of yield and quality. Plant tolerance to phytophagous insects. Economic thresholds levels. Basic principles of chemical and biological control.

Language: English

Semester: W or S

Hours of lectures/seminars per week: 3/3

ECTS Credits: 8

Plant Anatomy and Physiology

Content: The structure of vascular plants from the level of single cell to the level of whole organism and physiological functions of these structures. Structure of plant cell, main parts of plant cell, cell wall, protoplast, nuclear and cell division, basic types of plant cells. Respiration. Plant tissues, general characteristic and basic types of tissues. Organs – root and stem – primary and secondary internal structure, external structure, branching, metamorphosis. Transport of water and solutions. Mineral nutrition. Leaf – types, internal and external structure, metamorphosis. Photosynthesis. Transpiration. Flower – receptacle, calyx, corolla, perianth, stamen, pollen, pistil, ovule, embryonal sac. Plant reproduction – pollination, double fertilisation. Inflorescence – basic types. Phytohormones. Plant integrity. Seed – structure, embryo – structure. Fruit – structure, classification of fruit types. Seed germination. Plant movements.

Language: English

Semester: W or S

Hours of lectures/seminars per week: 2/2

ECTS Credits: 6

Plant Breeding

Content: The objective of the subject is explanation of the significance of genetic diversity in plants, description of genetic improvement of plants and application of genetic potential of new varieties by certified seeds in practice.

Language: English

Semester: W or S

Hours of lectures/seminars per week: 2/3

ECTS Credits: 7

Plant Physiology

Content: The understanding of the basic metabolic, growth and development functions of plant body parts and their mutual coordination. Principles of the most important metabolic processes like transport of substances, nutrition, respiration, photosynthesis, movement, growth and development, stress reactions and environmental adaptation. In practical courses, the chosen experiments illustrate principles concerned with the most general aspects of plant physiology and show basic methods of determination problems. The topics are stress metabolic and growth function which influences specificity of plant parts important for economy.

Language: English

Semester: W

Hours of lectures/seminars per week: 2/2

ECTS Credits: 5

Precision Agriculture

Content: Use of spatial heterogeneity of fields - possibilities of measurements and diagnostics. Synchronization of growth and development processes with dynamics of soil processes - measurements and diagnostics. Equipment for sensing the stand and soil status, different application of fertilizers and pesticides, and soil tillage. Transmission of data from a machine to the place where data are evaluated (application maps, yield maps). Work with software and high-tech for precision farming (GPS, GIS). Agronomic utilization of results obtained using methods for precision farming, interpretation of results, estimation of economic effects. Students are acquainted with modern technologies and mechanization for crop growing in arable farming systems, possibilities of their use for increasing economic effectiveness, and decreasing adverse environmental impacts.

Language: English

Semester: W or S

Hours of lectures/seminars per week: 2/2

ECTS Credits: 5

Principles of Fodder Production

Content: The objective of this course is to obtain basic information about yield formation and commercial characteristics of important perennial and annual fodder crops grown on arable land and on permanent grassland (meadows and pastures) as well as about their production and non-production functions.

Language: English

Semester: W

Hours of lectures/seminars per week: 1/1

ECTS Credits: 4

Radioactive Waste

Content: To acquaint the students with original, actual and potential sources of contamination of radioactive waste and with their effects in agriculture, the food industry and forestry, with the system of monitoring radio-contamination in the waste, with standards (legislation) and the handling of biological waste contaminated with radio-nuclides. The student will apply this information in the protection of agricultural, food and forest production against radioactive waste, including procedures necessary to handle contaminated agricultural products. The content of lectures is the character of radioactive waste: types, sources and biogenic migration of radio-nuclides, effects on organisms, detection methods; protection and international cooperation in the protection of waste against sources of radioactive radiation in agricultural and forest production. In the practical workshops (incl. video-programmes, discussions and excursion to an radio-monitoring works) the students will learn the properties and detection of radioactive radiation, analysis of radioactive contaminated waste and protection of the waste against sources of ionizing radiation.

Language: English

Semester: S

Hours of lectures/seminars per week: 2/2

ECTS Credits: 5

Radioecology

Content: The course acquaints the students with actual and potential sources of radioactive material, contamination of the environment, specific effects of ionizing radiation on organisms, biogenic migration of radionuclides and protection of soil, crop plants and farm animals from the negative effects of the pollutants. This knowledge can be used in environmental protection against radionuclides (sources of ionizing radiation) and in application of the nuclear phenomenon in human activities focused on agriculture, food processing and forest management.

Language: English

Semester: W

Hours of lectures/seminars per week: 2/2

ECTS Credits: 5

Reproduction of Farm Animals

Content: To provide complex theoretical knowledge on reproduction in major farm animal species and to gain practical skills in management of reproduction process. The course develops students' preliminary theoretical knowledge. It provides theoretical and partly practical knowledge of examination, processing and preservation of ejaculate in laboratory. Insemination, pregnancy diagnosis and the course of pregnancy in cows, sows, mares, sheep, goats and bitches is described. Insemination, pregnancy diagnoses and the course of gravidity in cows, sows, mares, sheep, goats and bitches are described. Students learn about the process of parturition, post-parturition care of females and a period of puerperium. Terms such as induced heat, synchronization of heat, conception, embryo preservation and transfer and use of other biotechnologies are explained. It describes theory of biological, technical and legal background of successful insemination, embryo transfer and other kinds of bio- technological methods.

Language: English

Semester: W

Hours of lectures/seminars per week: 2/3

ECTS Credits: 7

Sheep and Goat Breeding

Content: To provide complex theoretical and practical information on goat and sheep breeding in both large and small scale farms. Students are given overall knowledge on sheep and goat husbandry which includes: actual situation, trends and prospects of sheep and goat breeding in the Czech Republic and Europe; home and foreign goat and sheep breeds and their importance in selection and hybridization programmes; meat, milk and wool production in sheep; milk, meat and to some extent wool production in goats; technique and technology in production systems of all age categories of sheep and goats with respect to welfare of animals; economy of goat and sheep farming.



Language: English

Semester: W or S

Hours of lectures/seminars per week: 1/2

ECTS Credits: 4

Soil Science

Content: The aim of this course is to educate students as how to look at soil as an individual natural formation, created by regular developments, compounds of mineral and organic particles. Soil forms a living environment for microbes, site for plants and regulator of material cycle. Students should be aware that soil is a dynamic and still developing system. The course introduces students to soil as an essential element of food chain and currently as an environment for growing plants. It is its importance as a water storage and its ability to clean water. It shows soil as an environment which affects the life of microbes regarding its physical and biological properties. Organic soil matter is explained as the store of carbon, nitrogen and other macro-elements. Their accessibility for plants is affected by microbiological mineralization and immobilization. Students will be introduced to the role of soil in ecosystem stability, its influence on flow and balance of substances and energy, its buffer role at withholding, degradation and loosening dangerous elements. Students will too be introduced to soil taxonomy.

Language: English

Semester: S

Hours of lectures/seminars per week: 2/2

ECTS Credits: 6

Special Phytopathology

Content: The most important environmental factors that cause plant diseases: temperature, moisture, precipitations air and soil pollution, nutritional deficiencies in plants. Most important diseases caused by viruses, phytoplasmas, fungi, bacteria. Origin, biology and ecology of pathogens. Diseases of field crops (cereals, sugar beet, potatoes, sunflower, pulse crop, oil seed rape, fodder crops etc.). Disease of horticultural plants (apple trees, pear trees, stone fruits, different berry fruits, main special vegetables). Methods and measures of integrated control (biological, chemical, resistant cultivars, crop rotation, and others).

Language: English

Semester: W or S

Hours of lectures/seminars per week: 2/2

ECTS Credits: 6

Tropical and Subtropical Pastures

Content: Students will gain knowledge of cattle and small ruminants grazing in the tropics and subtropics. Discussed will be issue of tropical grasses and legumes, their cultivation, utilization and quality of forage. Knowledge about forages and feed will be supplemented by systems of animal breeding on the farms using pastures. Will be discussed also the issue of the influence of the tropical environment and nutrition on the physiological functions of animals. The knowledge and skills will increase the competence graduates for agricultural consultancy in the tropics and subtropics and increase the competence for management of farms with grazing systems of cattle and small ruminants in the tropics and subtropics.

Teacher: doc. Ing. Jiří Skládanka, Ph.D.

Language: English

Semester: S

Hours of lectures/seminars per week: 2/2

ECTS Credits: 5

Zoology

Content: To acquire the theoretical basic knowledge of zoology for other specialised agricultural disciplines and practical information of direct application. The student obtains a review of general zoology (cytology, histology, organology, ontogeny and phylogeny), zoogeography, domestication, ecology and ethology. An essential part of lectures is devoted to the systematics zoology with a special regard to taxa important in agricultural practise (Protozoans, Plathelminths, Nematelminths, Annelids, Molluscs, Arthropods and Vertebrates). The attention is paid to species of both negative (agricultural and store pests, parasites, vectors) and positive practical importance (edaphic animals and domesticants). The practical courses are focused in identification of animal species, in their life cycles and ecology.

Language: English

Semester: W or S

Hours of lectures/seminars per week: 2/2

ECTS Credits: 6