

**FACULTY OF
AGRICULTURAL AND
ENVIRONMENTAL
SCIENCES**

**COURSE CATALOGUE FOR
ERASMUS STUDENTS**

2008/2009

Dear Erasmus Student,

Welcome to the *Faculty of Agricultural and Environmental Sciences (FAES)* of Szent István University, one of the best agricultural educational institutions in Hungary.

We compiled this course catalogue of English-language subjects for your convenience. In here you will find information about all our currently taught courses, including an overview of the topics covered, the number of ECTS credits and the corresponding number of lectures per week, the instructors holding the lectures, and some additional info. If you want to know more about a particular course, you can contact the teacher through the given e-mail address. In case you are stuck, the *Erasmus Office* and the *FAES Educational Office* are always glad to help.

All courses are organized into *subject groups*. It is strongly advised to take courses from one particular subject group, and we also encourage to take all subjects from a given group.

We hope you will have a good time here at FAES, and you will remember the period spent here as an important milestone in your educational career.

Table of Available Subjects at the Faculty of Agricultural and Environmental Sciences

Neptun Code	Subject	Instructor(s)	ECTS Credits	Lectures per Week
Animal Husbandry				
SMKAE0001ER	Anatomy and Physiology of Fowls	László Bárdos	4	4
SMKAE0002ER	Animal Hygiene and Health	Zsuzsanna Kiss	3	3
SMKSJ0003ER	Beef Cattle Breeding	János Tózsér, Alfréd Kovács	4	4
SMKSJ0004ER	Dairy Farming	Alfréd Kovács	4	4
SMKAE0005ER	Experimental Methods in Animal Physiology	Annamária Kerti Csaba Szabó	4	4
SMKTK0006ER	Feed Toxicology	Miklós Mézes	4	4
SMKTK0007ER	Lipid Peroxidation and Biological Antioxidant Defences	Miklós Mézes	2	2
SMKSJ0008ER	Zoometeorology	Alfréd Kovács	3	3
Environmental Conservation				
SMKTG0009ER	Advanced Soil Science	Erika Michéli	4	4
SMKAL0010ER	Ecology	Péter Nagy	4	4
SMKTO0011ER	Environmental Education for Sustainability	Ákos Malatinszky	4	4
SMKTG0012ER	Environmental Soil Chemistry	Imre Czinkota	3	3
SMKKB0013ER	Instrumental Analysis of Pollutants and Nutrients	György Heltai	3	3
SMKTO0014ER	Land Degradation and Soil Protection	Csaba Centeri	3	3
SMKTO0015ER	Nature Conservation	Gábor Turcsányi, Csaba Centeri, Ákos Malatinszky, Eszter Falusi	4	4
SMKNZ0016ER	Principles of Crop Science	Márton Jolánkai	4	4
SMKNN0017ER	Protected, Medicinal and Poisonous Plants of Hungary	Károly Penksza, Tibor Szerdahelyi, Attila Engloner	3	3
Genetics and Biology				
SMKNG0018ER	Advanced Plant Breeding	Márta Novák-Hajós	3	3
SMKNG0019ER	Applied Plant Breeding	Márta Novák-Hajós	3	3
SMKNG0020ER	Experimental Genetic Analysis	Gábor Gyulai	4	4
SMKNG0021ER	Genetic Analysis	Gábor Gyulai	4	4
SMKNG0022ER	In Vitro Plant Breeding	Gábor Gyulai	4	4
SMKNG0023ER	Plant Biotechnology	Gábor Gyulai	4	4
SMKNV0024ER	Selected Topics in Plant Protection	József Kiss	3	3
Pond Fish Husbandry				
SMKHG0025ER	Breeding Technologies in Ponds	László Horváth	5	5
SMKHG0026ER	Environmental Protection and Fish Culture	Balázs Csorbai	4	4
SMKSK0027ER	Fish Ecology and Monitoring	Katalin Keresztessy	4	4
SMKHG0028ER	Fish Genetics	László Váradi	4	4
SMKHG0029ER	Fish Production in Ponds	László Horváth	5	5
SMKHG0030ER	Fish propagation and Fry Rearing	Tamás Szabó	4	4
SMKHG0031ER	Intensive Fish Culture	Béla Urbányi	4	4

Wildlife Management and Conservation in Hungary				
SMKVB0032ER	Basics of Forestry	Zoltán Somogyi	2	2
SMKVB0033ER	Biological Bases of Conservation Management	Tibor Standovár	4	4
SMKVB0034ER	International Communication	István Pál Kiss	4	4
SMKVB0035ER	Study Trips and Field Practices	Zsolt Bíró	5	5
SMKVB0036ER	Urban Wildlife Management	Miklós Heltai	4	4
SMKVB0037ER	Wildlife Biology	Sándor Csányi	2	2
SMKVB0038ER	Wildlife Biology and Management	Sándor Csányi	4	4
SMKTK0039ER	Wildlife Nutrition	Szilvia Orosz	4	4
SMKVB0040ER	Wildlife Research Methodology	László Szemethy	5	5

Animal Husbandry Subject Group

**Faculty of Agricultural and Environmental Sciences
Institute of Basics of Animal Sciences
Department of Animal Physiology and Health**

Course title: Anatomy and Physiology of Fowls

Neptun Code: SMKAE0001ER

ECTS Credit: 4 (spring semester only)

Lectures per Week: 4

Instructor: László BÁRDOS, professor

Further information: bardos.laszlo@mkk.szie.hu

Overview

Anatomy and physiology are the sciences that describe the normal structures and functions of animals and human beings too. The basic structures (anatomy) and functions (physiology) have a lot of similarities among different domestic animals, but birds have a special place because of the variety of differences. Therefore, special attention is given to the various bird-specific phenomena of anatomy and physiology. The course deals with both parts of the subject as complementary and equivalent units.

Topics of the course

1. Organisation of the avian body. The chemical - cellular - tissue - organ - organisms levels. Parts of the body and the integument.
2. Support and movement. The skeletal system (bones, articulations) and their metabolism. The muscular system and its metabolism.
3. Maintenance of birds. The structure and function of cardiovascular system. The blood. The respiratory system and its function. The morphology of digestive tract. Digestion and absorption and outline of metabolism. Urinary tract and function.
4. Control systems. The nervous system The special senses. Endocrine glands and hormones.
5. Continuity. The reproductive tracts (males and females). The female reproductive processes (egg formation, broodiness). The male reproductive function. Basic development, (hatching/incubation). Written exam. Review and discussion of exam.

**Faculty of Agricultural and Environmental Sciences
Institute of Basics of Animal Sciences
Department of Animal Physiology and Health**

Course title: Animal Hygiene and Health

Neptun Code: SMKAE0002ER

ECTS Credit: 3

Lectures per Week: 3

Instructor: Zsuzsanna KISS, associate professor

Further information: kiss.zsuzsanna@mkk.szie.hu

Overview

The subject deals with the study of domestic animal hygiene. We provide information on disease prevention, pathogenesis, host responses, immunology and epidemiology. Within this scheme, we deal with the fundamentals of the immune systems of animals. The subject intends to give special attention to new aspects of veterinary microbiology, arising from the intensification production systems.

Topics of the course

1. The animals and the environmental.
2. Adaptation to microclimatic factors.
3. The most important climatic factors: humidity-temperature-etc.
4. The quality of drink water.
5. The hygiene of feeding and pasturing.
6. The hygiene of feeding. Vitamins, macro- and microelements in food.
7. The danger of mycotoxins in food.
8. The fundamental of immune system in animals.
9. Infectious disease of domestic animals cause by bacteria, virus, fungi, parasites.
10. Zoonoses in agricultural surrounding.
11. Oral exam.

**Faculty of Agricultural and Environmental Sciences
Institute of Animal Husbandry
Department of Cattle and Sheep Breeding**

Course title: Beef Cattle Breeding

Neptun Code: SMKSJ0003ER

ECTS Credit: 4 (only spring semester)

Lectures per Week: 4

Instructors: János TÖZSÉR, professor, Alfréd KOVÁCS, associate professor

Further information: tozser.janos@mkk.szie.hu

Overview

The purpose of this course is to provide participants with a basic understanding of breeding and foddering and grazing methods of Hungarian beef cattle husbandry.

Further important purposes of this course are to gain a basic knowledge about the housing systems and new ethological results in beef herds.

Topics of the course

1. Glossary of beef cattle breeding terms.
2. Evaluation of beef breeds in practice.
3. Management facilities in small, middle and large scale farms.
4. Methods of performance records, part I: reproduction of female and male.
5. Methods of performance records, part II: evaluation of growth rate and efficiency of gain.
6. Methods of performance records, part III: live animal evaluation (judgement of conformation, judgement of BCS, judgement of conformation by video image analysis).
7. Methods of performance records, part IV: beef carcass evaluation.
8. Animal models: IBOVAL, BREEDPLAN.
9. Use of forage and grazing systems by beef cow herds.
10. Animal housing for beef cattle.

**Faculty of Agricultural and Environmental Sciences
Institute of Animal Husbandry
Department of Cattle and Sheep Breeding**

Course title: Dairy Farming

Neptun Code: SMKSJ0004ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: ALFRÉD Kovács, ASSOCIATE PROFESSOR

Further information: kovacs.alfred@mkk.szie.hu

Overview

This course is designed to familiarise participants with the knowledge and skills necessary for modern dairy (cow, ewe and goat) farming and to improve the efficiency of milk production and milk quality. It includes lectures, laboratory work and farm visits.

Topics of the course

1. Mammary glands.
2. Physiology of milk production.
3. Energy requirements of milk production.
4. Udder types and milkability.
5. Practice of hand and machine milking.
6. Yield and composition of bovine, ovine and caprine milk.
7. Somatic cells in bovine, ovine and caprine milk.
8. Factors affecting milk production and milk quality.
9. Mastitis prevention.
10. Cooling and storage of farm milk.
11. Raw milk quality standards.
12. Milk defects.
13. Quality assurance of farm milk production.
14. Quality control of milk samples.
15. Farm visits (audits).

**Faculty of Agricultural and Environmental Sciences
Institute of Basics of Animal Sciences
Department of Animal Physiology and Health**

Course title: *Experimental Methods in Animal Physiology*

Neptun Code: SMKAE0005ER

ECTS Credit: 4

Lectures per Week: 4

Instructors: Annamária Kerti, associate research scientist, Csaba Szabó assistant professor

Further information: kerti.annamaria@mkk.szie.hu

Overview

The aim of the subject is to intensify the theoretical knowledge of animal physiology for agricultural students. There are also some experiments with veterinarian aspects for the students who have a deeper interest in preparation for that field. All demonstrations are done with full regard for the ethical principles and rules of animal experimentation.

Topics of the course

1. Blood circulation.
2. The determination of blood plasma volume, using Evans-blue in the rabbit/sheep. The study of the peripheral circulation in the frog/rat (Laewen-Trendelenburg preparation).
3. Muscle/Nerve Physiology. The electrophysiological phenomenon of the cell- membrane, investigated in vitro (the function of n. ischiadicus and m. gastrocnemius).
4. Protein metabolism. The protein digestion of the stomach, demonstrated in the rat.
5. Carbohydrate metabolism. In vitro production of rumen gases of the cattle.
6. Modern methods for monitoring of the energy metabolism.
7. Written exam.

**Faculty of Agricultural and Environmental Sciences
Institute of Basics of Animal Sciences
Department of Nutrition Science**

Course title: Feed Toxicology

Neptun Code: SMKTK0006ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: Miklós MÉZES professor

Further information: mezes.miklos@mkk.szie.hu

Overview

The topics of the course provide a general introduction to toxicology, particularly feed toxicology. Feed contains potentially hazardous inorganic and organic materials, which have an effect on the production and health status of animals. The course gives a short overview of the general symptoms of toxicoses and also considers preventive therapy.

Topics of the course

1. Terminology of toxicology, basic principles of xenobiotic metabolism.
2. Amino acid toxicoses (Phe, Tyr, Trp, Met, Cys, His, Gly).
3. Rancidity of fats and lipid peroxide toxicoses.
4. Vitamin toxicoses.
5. Metal toxicoses I. - heavy metal toxicoses.
6. Metal toxicoses II. - toxicoses of other metals.
7. Nitrate, nitrite toxicoses.
8. Other toxic materials in feedstuff (glucosides, alkaloids, anti-nutritive factors).
9. Toxicoses caused by herbicides and pesticides.
10. Chemotherapeutics toxicoses.
11. Mycotoxicoses - a general overview.
12. Some important mycotoxins and their effects on animal production.
13. Methods of mycotoxin decontamination.
14. Methods of analysis of mycotoxins.
15. Feedstuff quality control system.

**Faculty of Agricultural and Environmental Sciences
Institute of Basics of Animal Sciences
Department of Nutrition Science**

Course title: Lipid Peroxidation and Biological Antioxidant Defences

Neptun Code: SMKTK0007ER

ECTS Credit: 2

Lectures per Week: 2

Instructor: Miklós MÉZES professor

Further information: mezes.miklos@mkk.szie.hu

Overview

The topics of the course provide a general introduction to the free radical chemistry of biological systems and the effects of oxygen-free radicals at the organism level. The second part of the course deals with biological antioxidant defence systems and the causes and consequences of their disturbance. The course also gives a short overview of the general symptoms of lipid peroxide-induced toxicosis; and also, of preventive therapy.

Topics of the course

1. Terminology of oxygen-free radicals.
2. Free radical generation during normal and abnormal physiological processes.
3. Mechanism of lipid peroxidation.
4. Methods of measurement of lipid peroxidation products.
5. Effect of free radicals on biological membranes.
6. Effect of free radicals at the cellular level - apoptosis vs. necrosis.
7. Free-radical mediated diseases in animals (and man).
8. General overview of antioxidant defence mechanisms.
9. Non-enzymatic defence.
10. Enzymatic defence.
11. Natural antioxidants in feed.
12. Synthetic antioxidants.

**Faculty of Agricultural and Environmental Sciences
Institute of Animal Husbandry
Department of Cattle and Sheep Breeding**

Course title: Zoometeorology

Neptun Code: SMKSJ0008ER

ECTS Credit: 3

Lectures per Week: 3

Instructor: Alfréd KOVÁCS, associate professor

Further information: kovacs.alfred@mkk.szie.hu

Overview

The purpose of this course is to provide participants with a basic understanding of zoo-meteorology, including the general rules of thermo-regulation systems and the adaptation forms of domestic animals to extreme meteorological events. Further important purposes of this course are to gain basic knowledge about the main important meteorological parameters and their effects on living.

Topics of the course

1. Definition and classification of zoo-meteorology.
2. Main measuring methods of agro-meteorology in practice.
3. Animal physiology; Homeostasis, heat balance, thermo-regulation systems in domestic animals.
4. Adaptation forms of domestic animals to extreme meteorological events.
5. Specifications of sunlight on domestic animals.
6. Air temperature and humidity.
7. Quantities and distribution of precipitation forms.
8. Wind speed, turbulence, air flow patterns, ventilation, windbreaks and shelter belts.
9. Meteorological front effects on domestic animals.
10. Agro-meteorological statistics and models.
11. Meteorological observation in indoor and outdoor experiments.

Environmental Conservation Subject Group

Faculty of Agricultural and Environmental Sciences
Institute of Environmental Sciences
Department of Soil Sciences and Agricultural Chemistry

Course title: Advanced Soil Science

Neptun Code: SMKTG0009ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: Erika MICHELI, professor

Further information: micheli.erika@mkk.szie.hu

Overview

This course presupposes a basic knowledge of soil science. After an overview of the physical and chemical properties of soil, students will learn about soil-forming factors and processes. Different classification systems will be discussed. The study of major soils and their geographical distribution will be based on the FAO classification system. Field trips to study soils and landscapes are an integral part of the course.

Topics of the course

1. Functions of soils in our ecosystem; soils: interface of air, minerals, water and life.
2. Formation of soils; soil forming factors and processes (overview of classic and modern approaches).
3. Soil architecture and physical properties; comparison of Hungarian standards with US and European standards of physical properties; aggregation and its promotion in arable soils.
4. Soil, water and the hydrologic cycle; soil water energy concept.
5. Written exam; review and discussion of exam.
6. The practical significance of soil colloids.
7. Classification of soil acidity, buffering capacity of soils; liming.
8. Organisms and soil ecology.
9. Soil organic matter; the global carbon cycle.
10. Soil erosion and control, types of erosion; a world overview of soil degradation.
11. Soil classification; the structure and categories of US soil taxonomy; the FAO and Hungarian classification systems.
12. Correlation of Hungarian with international units.
13. Modern technologies for soil investigations.
14. Soils and the world's food supply; factors affecting the world's food supply; the world's land resources; problems and future opportunities.

**Faculty of Agricultural and Environmental Sciences
Institute of Basics of Animal Sciences
Department of Zoology and Animal Ecology**

Course title: Ecology

Neptun Code: SMKAL0010ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: Péter István NAGY, assistant research scientist

Further information: nagy.peter@mkk.szie.hu

Overview

Introductory course aimed to give an overview on the numerous fields and aspects related to ecology, as a basis of environmental and nature conservation studies, as well as for decision making in agricultural and industrial systems. During the course an emphasis is given both to theoretical background and practical demonstrations, including various methods applied in ecology. Individual efforts in reading scientific articles are also required from students. A considerable proportion of the course is given as field trips aimed at collecting personal experiences and observations.

Topics of the course

1. Historical background, basic terms
2. Approaches and scales in ecology
3. Supraindividual organizations
4. Interactions of populations
5. Species richness, disturbances
6. Island biogeography
7. Diversity
8. Energy flow, nutrient cycles
9. Biological indicators, monitoring, toxicology
10. Case studies
11. Practicals with simple experiments and demonstrations on methodology
12. Field trip: in situ demonstrations and observations
13. Presentations from participants on individual topics
14. Exam

**Faculty of Agricultural and Environmental Sciences
Institute of Environmental and Landscape Management
Department of Nature Conservation and Landscape Ecology**

Course title: Environmental Education for Sustainability

Neptun Code: SMKTO0011ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: Ákos MALATINSZKY, assistant professor

Further information: malatinszky.akos@kti.szie.hu

Overview

The main goals of the course are to draw attention onto global ecological, environmental, social problems, aspects of sustainable development and educate on integrative approach and holistic view. Means of non-formal education. History and methods of environmental (as well as global) education, organizing camps, study trails, actions and visitor centres. Role and means of public participation and active citizenship are also covered.

Topics of the course

1. Introduction, principles.
2. Global ecological, environmental, social problems I.
3. Global ecological, environmental, social problems II., causes and effects of global problems
4. Local aspects of global processes, relationships between and state of the environment in urban and rural areas
5. Civic topics, active citizenship, legal basis, role and means of public participation
6. Basics and principles of sustainable development
7. Environmentally conscious consumption and lifestyle
8. Means, methods, tools of formal and non-formal education
9. Definitions, history, aims and tasks of environmental and global education
10. Organisation of study circles, competitions, exhibitions
11. Organisation of summer camps, field trips, forest schools, preparation of study trails
12. Environmental education programmes of non-governmental organisations and opportunities for fund-raising
13. Visitor centres of national parks, education centres of NGOs
14. Practical examples for communities living for sustainability: eco-villages
15. Written exam. Overview and discussion of exam.

**Faculty of Agricultural and Environmental Sciences
Institute of Environmental Sciences
Department of Soil Sciences and Agricultural Chemistry**

Course title: Environmental Soil Chemistry

Neptun Code: SMKTO0012ER

ECTS Credit: 3

Lectures per Week: 3

Instructor: Imre CZINKOTA, associate professor

Further information: czinkota.imre@mkk.szie.hu

Overview

In the first part of this course, the students will study or review chemical, physical-chemical, colloidal properties, reactions and equilibrates using soil chemistry. In the second and more applied part of the course, they will build and discuss basic soil chemical subjects and major sources of contamination. The study of chemical properties and contaminants will concentrate on investigating environmental aspects and consequences.

Topics of the course

1. Surface properties of inorganic soil materials.
2. Surface and colloid properties of soil's organic matter.
3. Absorption processes in soil, ion change, and molecular absorption.
4. Precipitation, dissolution and absorption processes of contaminants.
5. Effects of pH and redox potential on surface reactions.
6. Transport processes of contaminants in soil.
7. Major sources of soil contaminants.
8. Artificial or natural process? Acidification.
9. Plant nutrients or contaminants? The nitrate and phosphate problem.
10. Cumulative contaminants; heavy metals in the environment.
11. Degradation, leaching or cumulate? Pesticides and organic compounds in soils.
12. Investigation methods for inorganic contaminants.
13. Investigation methods for organic contaminants.
14. Exam.

**Faculty of Agricultural and Environmental Sciences
Institute of Environmental Sciences
Department of Chemistry and Biochemistry**

Course title: Instrumental Analysis of Pollutants and Nutrients

Neptun Code: SMKKB0013ER

ECTS Credit: 3

Lectures per Week: 3

Instructor: György HELTAI, professor

Further information: heltai.gyorgy@mkk.szie.hu

Overview

This course presupposes a basic knowledge of chemistry, biochemistry and soil science. It gives an overview of the aims of environmental analysis, sampling strategies, sample preparation and standardisation problems. The most important elements of analytical and molecular analytical principles and instrumentation are presented from the point of view of analytical merit and applicability. Special analytical questions concerning the correlation of human activity and biogeochemical cycles of soil/water/atmospheric systems are also discussed.

Topics of the course

1. Importance and role of chemical analysis in environmental and nutrition capacity studies; sampling, calibration, limit values; classification principles.
2. Element analytical methods I: atomic emission spectrometry; excitation sources (ICP, DCP, flame), application field.
3. Element analytical methods II: X-ray fluorescence spectrometry; mass spectrometry.
4. Element analytical methods III: atomic absorption spectrometry.
5. Element analytical methods IV: nuclear analytical methods: neutron activation analysis, β -spectroscopy, isotopic tracer methods.
6. Molecular and species analysis I: absorption spectroscopy: UV-VIS, IR, fluorescence and reflection methods; raman spectroscopy.
7. Molecular and species analysis II: NMR, organic mass spectrometry.
8. Separation methods and hyphenated techniques I: chromatography: GC, LC; basic principles techniques, detection methods.
9. Separation methods and hyphenated techniques II: coupling of element and molecule selective detectors with separation procedures; calibration problems.
10. Air and gas analysis; monitoring possibilities.
11. Soil analysis; nutrition or pollution.
12. Water and waste water analysis, monitoring of industrial emission.
13. Calibration, quality assurance, standardisation problems.
14. Conference on course evaluation; discussion of analytical project work .

**Faculty of Agricultural and Environmental Sciences
Institute of Environmental and Landscape Management
Department of Nature Conservation and Landscape Ecology**

Course title: Land Degradation and Soil Protection

Neptun Code: SMKTO0014ER

ECTS Credit: 3

Lectures per Week: 3

Instructor: Csaba CENTERI, associate professor

Further information: centeri.csaba@kti.szie.hu

Overview

The first part of the course provides a general introduction to the land degradation processes in the world, to the state and problems in connection with land degradation, processes and possible solutions for soil protection. The second part deals with practical knowledge. Methodology for in situ and laboratory measurements, soil loss and nutrient loss calculations, tolerable soil and nutrient loss calculations are practiced. The course gives practical knowledge that can be used in various part of environmental protection and in nature conservation as well.

Topics of the course

1. Is soil a renewable natural resource? The state of soil and soil science (pedology) in the World. Basic concepts of pedology and its protection. Problems and possible solutions. Interrelations of pedology, soil protection, nature conservation and environmental protection.
2. Soil degradation processes and their states in the World, in Europe and in Hungary.
3. Soil degradation processes and their states in Hungary.
4. Available datasets, maps and other resources for analysing soil protection.
5. Problems of salt affected soils: international and Hungarian overview.
6. Problems of low pH in the soils: international and Hungarian overview.
7. Problems caused by soil management. Written exam.
8. Discussion of written exam. Introduction to soil loss calculations, in situ and laboratory soil loss measurements.
9. Known and widely used soil erosion models, basic concepts.
10. The beginning: introducing the USLE model.
11. Practical lecture: How to use the USLE model? Calculations.
12. Practical lecture: What is the concept of soil erosion map legends? Calculations to mark the limit of sustainable land use, the allowable/tolerable amount of soil loss.
13. Introduction of the Hungarian Soil Protection and Monitoring System and published results.
14. Final written exam.

**Faculty of Agricultural and Environmental Sciences
Institute of Environmental and Landscape Management
Department of Nature Conservation and Landscape Ecology**

Course title: Nature Conservation

Neptun Code: SMKTO0015ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: Gábor TURCSÁNYI, professor, Csaba CENTERI, associate professor, Ákos MALATINSZKY, assistant professor, Eszter FALUSI, teacher assistant

Further information: turcsanyi.gabor@kti.szie.hu

Overview

The course gives a general overview about the history of nature conservation (in the world, in Europe and in Hungary) in general and about the history of the protected areas. Basic nature conservation and conservation biology issues are included during the course (e.g. aims, tasks and purposes of nature conservation, island biogeography, SLOSS etc.). International agreements, EU and Hungarian regulations are discussed for understanding of the policies. Finally a detailed description of the Hungarian nature conservation areas and related nature conservation issues are discussed.

Topics of the course

1. The history of nature conservation (first steps, policies, first nature conservation areas). History of establishing nature conservation areas in the world.
2. International overview about the protected areas: specialties of the separate continents.
3. Basics of nature conservation: who, how and why? In situ and ex situ conservation. Nature conservation management practices?
4. Conservation biology – an overview of the concepts.
5. What do we protect? Geological, hydrological, botanical, zoological and cultural values, protected landscapes. International agreements, EU and Hungarian regulations and policies.
6. Pannonian specialties (endemic and relict of the Carpathian Basin)
7. Written exam from lessons 1-6.
8. Nature conservation areas of Hungary I. (Hortobágy and Kiskunság National Park Directorates).
9. Nature conservation areas of Hungary II. (Bükk and Aggtelek National Park Directorates).
10. Nature conservation areas of Hungary III. (Fertő-Hanság and Körös-Maros National Park Directorates).
11. Nature conservation areas of Hungary IV. (Duna-Ipoly and Duna-Dráva National Park Directorates).
12. Nature conservation areas of Hungary V. (Órség and Balaton-felvidék National Park Directorates)
13. Some examples of landscape protection districts and other protected areas (ex lege protected values).
14. Written exam from lessons 8-13.

**Faculty of Agricultural and Environmental Sciences
Institute of Crop Production**

Course title: Principles of Crop Science

Neptun Code: SMKNZ0016ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: Márton JOLÁNKAI, professor

Further information: jolankai.marton@mkk.szie.hu

Overview

The primary object of this course is to develop an understanding of how to handle theoretical and practical questions concerning the production of field crops. The subject-matter is twofold: one giving appropriate information, beginning with plant physiology and genetics, environmental aspects of production, soil and land use as well as techniques and technologies related to specific crops. The other will use all these levels of knowledge for discussion focusing on crop utility, yield quantity and quality. Agronomy students with a reliable educational background in biology may benefit from this course.

Topics of the course

1. The life of plants; the life cycle, morphology, root system, organs of vegetation.
2. The environment; ecology, crop management and soil conservation, air, water and soil pollution, erosion and deflation and their control, crop rotation.
3. The soil; the origin and formation of soils, organic and mineral soil components, living organisms, elements for plant food, plant and soil relations.
4. Plant nutrition; biochemical composition of plants, nutrient demand, phenophases of plant growth and development, deficiencies, nutrient uptake, water inhibition, irrigation, manure and fertilisers, the N cycle.
5. Plant protection; epidemics of diseases, weeds and pests and their control, complex means of plant protection, effects of chemical impacts, variety specific susceptibility, biological control, spraying techniques, ULV pesticides, pesticide residues. Grain crops; a short description of the main crops (wheat, maize, barley, rye etc), soil and climatic requirements, elements of production techniques from sowing to harvest, transport and storage, economic importance.
6. Cash crops; a short description of the main crops, soil and climatic requirements, elements of production techniques from sowing to harvest, transport and storage, the food industries, by-products.
7. Seed production; a definition of seed, legal framework of variety testing, registration, inspection of seed production.
8. Milling and baking quality; grain structure (protective layers, endosperm, germ), milling process, types of flour, bran, quality parameters.

**Faculty of Agricultural and Environmental Sciences
Department of Botany and Ecophysiology**

Course title: Protected, Medicinal and Poisonous Plants of Hungary

Neptun Code: SMKNN0017ER

ECTS Credit: 3

Lectures per Week: 3

Instructors: Károly PENKSZA, associate professor, Tibor SZERDAHELYI, assistant professor, Attila ENGLONER, department engineer

Further information: szerdahelyi.tibor@mkk.szie.hu

Overview

The students are required to have a basic knowledge of plant taxonomy. Students will be given a chance to learn some essential terms related to vegetation and flora. They study the relationships between such areas as habitats, stands and associations and also the connection between degradation processes and environmental protection. The course aims to enlarge the skills of species identification. A field trip to study the special dolomite vegetation close to Budapest is included. Slides, herbarium specimens, botanical garden and field trips are part of the course, as well.

Topics of the course

1. National parks, protected areas, conservation areas in Hungary. Protection and degradation.
2. Flora and vegetation in Hungary and in Central Europe. Flora elements of Hungary, vertical zones in Europe.
3. Relic and endemic plants. Protected and strictly protected species. 'Red book of the endangered Plants'.
4. Medicinal, poisonous and protected plants of the Ranunculaceae family.
5. Rare and medicinal plants of Umbelliferae and Cruciferae.
6. Medicinal and protected plants in the families of the Lamiaceae and the Scrophulariaceae.
7. Poisonous and medicinal plants in the Solanaceae family.
8. Protected plants in the families of Linaceae and Boraginaceae.
9. Rare plant of loess, steppe and sand vegetation. The Caryophyllaceae family.
10. Bogs and moors. Rare and medicinal plants of the Gentianaceae family.
11. Rare and medicinal plants of the Asteraceae family.
12. Rare grasses, irises and lilies. Protected orchids.
13. Poisonous, medicinal and protected species in our botanical garden. Field- work. Field trip to study the rare and medicinal plants of the dolomite vegetation.

Genetics and Biology Subject Group

Faculty of Agricultural and Environmental Sciences
Department of Genetics and Plant Breeding

Course title: *Advanced Plant Breeding*

Neptun Code: SMKNG0018ER

ECTS Credit: 3

Lectures per Week: 3

Instructor: Márta NOVÁK-HAJÓS, associate professor

Further information: hajosne.novak@mkk.szie.hu

Overview

The course is based on basic knowledge in plant breeding. The first seven lectures briefly summarise the goals of plant breeding, the traditional and new methods to create genetic variability, the most important breeding methods of self- and cross-pollinated crops. We dedicate lectures to quality breeding, biotic and abiotic stress resistance. Finally the advantages and disadvantages of transgenic plants are discussed.

Topics of the course

1. What is plant breeding? Objectives, goals and importance of plant breeding. Reproduction in crop plants.
2. The importance of genetic variability in plant breeding. Traditional and new methods to create genetic variability.
3. Mutation breeding. Kinds of mutations. Induction of mutation. Results of mutation breeding. Polyploidy in plant breeding. The autopolyploids. The allopolyploids. Producing haploids. Uses of haploids.
4. Principles of selection in self-pollinated crops. Pedigree, SSD, Bulk and Backcross methods.
5. Breeding methods with cross-pollinated crops. Principles of selection in cross-pollinated crops. The recurrent selection principle and types.
6. Inbreeding and heterosis. Hybrid varieties. Synthetics.
7. Breeding for higher yield. Yield potential. Improvement of yield components in wheat. Improvement of photosynthetic efficiency in corn.
8. Quality breeding Breeding for higher oil, protein and sugar content.
9. Breeding for disease resistance. Principal problems in breeding for resistance to parasites. Inheritance of resistance. Gene-for-gene interaction. Conventional sources of resistance. Genetic manipulation. Insect resistance.
10. Breeding for abiotic stresses. Drought tolerance and its assessment. Indirect selection or drought tolerance. Winter hardiness. 13-14. Transgenic plants. Production of transgenic plants. Types of transgenic plants. Transgenic plants of agronomic importance. Risks of production genetically manipulated plants.

**Faculty of Agricultural and Environmental Sciences
Department of Genetics and Plant Breeding**

Course title: Applied Plant Breeding

Neptun Code: SMKNG0019ER

ECTS Credit: 3

Lectures per Week: 3

Instructor: Márta NOVÁK-HAJÓS, associate professor

Further information: hajosne.novak@mkk.szie.hu

Overview

The discipline deals with some of the most frequently applied traditional and new techniques to create and detect genetic variability in breeding materials. The course overviews the whole range of molecular markers and their application in measurements of genetic similarity, individual and variety identification. Finally principles in the conducting and evaluation of field trials are also discussed.

Topics of the course

1. Reproduction in crop plants.
2. How to do EMS treatment?
3. Application of plant cell and tissue culture in plant breeding.
4. Genetics of plant isozymes. Isozymes in plant breeding.
5. Methods of separating native enzymes. Principle of gel electrophoresis.
6. Storage proteins gliadins and zeins. Separation of storage proteins.
7. DNA markers. Principles of DNA isolation. The RFLP technique. Evaluation of RFLP pattern.
8. PCR-based techniques (tecMAAP, VNTR, SSR, AFLP). Evaluation of RAPD data. Calculation of Dice similarity values. Construction of dendrogram using TREECON software program.
9. Conducting field trials. Principles in plot experimentation. Experimental designs.
10. Statistical evaluation on field trials.
11. Written exam.

**Faculty of Agricultural and Environmental Sciences
Department of Genetics and Plant Breeding**

Course title: *Experimental Genetic Analysis*

Neptun Code: SMKNG0020ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: Gábor GYULAI, associate professor

Further information: gyulai.gabor@mkk.szie.hu

Overview

Experimental genetic analysis gives introduction to plant molecular analyses including genomic DNA isolation and analysis, organelle specific PCR-based techniques such as RAPD, SSR, ISSR, ALF, AFLP, cpDNA, mtDNA, archaeo-genetical DNA, fragment purification and sequencing.

Topics of the course

1. Plant DNA isolation techniques
2. Solutions, equipments, micropipettes, molecular weight markers
3. Quantitative and qualitative analysis of plant DNA analyzed by Nano-Drop
4. Gel electrophoresis, EtBr-stained Agarose gel, (PAGE),
5. Polyacrilamide (PAGE) analysis by automatic laser fluorometre (ALF)
6. Random amplified polymorphism (RAPD) of genomic DNA
7. Microsatellites (SSR) in the genome
8. Organelle specific probes, microsatellites in the organelles (mt, cp)
9. Fragment purification form agarose gel, reamplification and cloning
10. DNA fragment recovery from archaeological samples (watermelon, millet)
11. DNA sequencing, BLAST analysis
12. Molecular detection of mutations, indels and SNPs
13. Molecular detection of somatic cell variation (*Populus nigra*)
14. Molecular detection of intra and inter specific genome variability (*Zea mays*)
15. Exam

Literature

B. Lewin: Genes VII.

Articles

- Gyulai G et al. (2005) AFLP analysis and improved phytoextraction capacity of transgenic *gshI*-poplar clones (*Populus canescens* L.) in vitro. *Z. Naturforschung* 60c:300-306.
- Lágler R, Gyulai G et al. (2005) Morphological and molecular analysis of common millet (*P. miliaceum*) cultivars compared to an aDNA sample from the 15th century (Hungary). *Euphytica* (in press EUPH420R1).
- Szabó Z, Gyulai G et al. (2005) Genetic variation of melon (*C. melo*) compared to an extinct landrace from the Middle Ages (Hungary) I. rDNA, SSR and SNP analysis of 47 cultivars. *Euphytica* (i press, EUPJ418R1).

**Faculty of Agricultural and Environmental Sciences
Department of Genetics and Plant Breeding**

Course title: Genetic Analysis

Neptun Code: SMKNG0021ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: Gábor GYULAI, associate professor

Further information: gyulai.gabor@mkk.szie.hu

Overview

Genetic analysis is an integrating subject. It is logic applied to living systems. In other words it is the mathematics of biology. During the course we examine the integrated view of classical molecular genetics, and the essence of genetic thinking. Organised around the basic laws of genetics, we discuss the issues raised by the laws of Mendel, crossing over, gene mapping, the genetic analysis of the code, gene function and ontogenesis. We place special emphasis on outlining the biological machinery (at the level of organism, cells and molecules).

Topics of the course

1. The horizons of genetic analysis: transmission genetics, molecular genetics, gene cloning and reverse genetics.
2. Random gamete analysis using Mendel's laws: estimation of the number of genes from phenotypic variability; polymery; genome fusion; free recombination; uncovering genetic pathways with complemented and epistasis analysis.
3. Random gamete analysis and recombination: the ideal crossing over and recombination; the logic of crossing over, gene mapping functions, linkage analysis, LOD analysis.
4. Tetrad analysis: full (regular) tetrad analysis; full tetrad partial analysis; half tetrad analysis.
5. Gene conversion: the relationship of recombination, crossing over, tetrad analysis and gene mapping: gene conversion, the breakdown of ideal crossing over, the contrast of ideal and real crossing over; anomalies in gene mapping.
6. The real crossing over: the Holiday junction and its properties; enzymes of recombination; models of crossing over; the reliability of gene maps.
7. Illegitimate, site specific and transposition recombination analysis: genetic and physical markers; gene tagging; application of linkage logic.
8. Genetic and physical mapping: the realism of genetic map; the correlation of genetic and physical maps; minute mapping, proportional mapping; combination of genetic and physical mapping; combination of cytological and genetic mapping; DNA markers and genetic mapping; genome programs.
9. Analysis of cis and trans parts of genes: mapping and qualification of mutant alleles; complementation, over expression; database analyses; complementation mapping.
10. Genetic analysis of the code, frameshift algebra.
11. Genetic analysis of functions: genetic dissection; genetic pathways, cascades: straight, diverging, converging, networks; complementation, complemented inheritance and genetic pathways; analysis of substrate conversion pathways with epistasis and cross feeding; analysis of signal transduction pathways with recessive and dominant epistases; gain of function, loss of function combination analysis.
12. Analyses based on temperature sensitive (ts) alleles: ts mutation and protein structure; temperature shift analysis with ts mutants; thermo sensitive period (tsp), duration of gene expression.
13. Analysis of gene regulation: positive and negative regulation: transcription, translation and polar mutations, reporter gene systems; DNA looping, co-operative regulation; analysis of DNA-protein interaction (loss of contact).

14. Analysis with genetic mosaics: male, female (gynander) analysis; transplantation analysis, focus of gene function, mitotic recombination; compartment identification, the direction of signal transduction; blastoderm fate map.
15. Analysis of complex protein, protein-DNA structures: inter allelic complementation; suppressor and enhancer mutations; α - Ω complementation, phage display.
16. Mutation analysis: the molecular nature of mutations; mutagen, carcinogen tests (Ames, Smart, Mosaic, SCE, Induct); environmental, health, medical diagnostic importance; balancer chromosomes, mutator genes, repair, site directed mutagenesis.
17. Some natural genetic systems: lambda phage, E. coli, B. subtilis, Neurospora crassa, yeast, Caenorhabditis elegans, Drosophila melanogaster, mouse; the importance of heterozygotes in genetic analysis.
18. Analysis in transgenic systems: knock out mutants; dominant (overexpression); allele, exon exchange; directed gene introduction.

**Faculty of Agricultural and Environmental Sciences
Department of Genetics and Plant Breeding**

Course title: In Vitro Plant Breeding

Neptun Code: SMKNG0022ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: Gábor GYULAI, associate professor

Further information: gyulai.gabor@mkk.szie.hu

Overview

In vitro Plant Breeding enables to increase the knowledge in areas of cell and tissue culture, mode of effects of plant hormones, in vitro nutrition, sexual plant reproduction, haploid induction, protoplast selection and fusion, cybrid isolation and mutant selection.

Topics of the course

1. In vitro techniques in plant breeding, historical overview
2. Artificial soils - aseptic nutrition media
3. Macro and mezo elements in plant nutrition
4. Microelements in Plant nutrition
5. Mode of action of plant growth regulators (PGRs): Auxins
6. Mode of action of plant growth regulators (PGRs): Cytokinins
7. Mode of action of plant growth regulators (PGRs): GAs, ABA, ethylene
8. Micropropagation in vitro, virus elimination, ELISA
9. Plant development from somatic cells, somaclones
10. Plant development from protoplasts, protoclones
11. Plant cell fusion, cybrids
12. Organelle genetics in vitro
13. Haploids in in vitro plant breeding
14. Triploids in in vitro plant breeding
15. Exam

Literature

Reiner F, YPS Bajaj (1988) Plant cell, tissue and organ culture. Naros

Articles

Gyulai G et al. (2003) Somaclone breeding of reed canarygrass (*Phalaris arundinacea* L). Grass and Forage Sciences 58:210-215.

Gyulai G e al. (2000) Doubled haploid development and PCR-analysis of F1 hybrid derived DH-R2 paprika (*Capsicum annuum* L.) lines. J Plant Physiol 156:168-174.

Gyulai G et al. (1995) A selective auxin and cytokinin bioassay based on root and shoot formation in vitro. J Plant Physiol 145: 379-382.

Gyulai G et al. (1992) Callus initiation and plant regeneration from inflorescence primordia of the intergeneric hybrid *Agropyron repens* (L.) Beauv. x *Bromus inermis* Leyss. cv. nanus on a modified nutritive medium. Plant Cell Rep 11: 266-269.

**Faculty of Agricultural and Environmental Sciences
Department of Genetics and Plant Breeding**

Course title: Plant Biotechnology

Neptun Code: SMKNG0023ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: Gábor GYULAI, associate professor

Further information: gyulai.gabor@mkk.szie.hu

Overview

The course Plant Biotechnology comprises all the main fields of Plant Cell-, Tissue-, and Organ culture of both sexual and asexual explant origin; protoplast-, and protoplast fusion cultures, mutant isolation; gene transformation techniques, electroporation-, and fusion. Lectures and lab experiments are included.

Topics of the course

1. History of the Plant Biotechnology.
2. Plant tissue culture laboratories. Chemicals, equipment.
3. Tissue culture media, major-, mezo-, minor element, plant growth regulators, carbon-sources.
4. Aseptic condition. Explants of monocot and dicot plants. Incubation techniques.
5. Plant regeneration in tissue culture. Morphogenesis (organogenesis, embryogenesis), alternative ways of plant development.
6. Meristem culture, mericlone technique, virus-elimination. Callus induction, somaclone selection, somaclonal variation, somaclone breeding.
7. Mutant isolation in vitro.
8. Protoplast isolation, protoclone selection, cell fusion, partial hybrids, cybrid selection.
9. Metabolic engineering, sugary mutants, amylose-free culticars, all-amylopectin plants of maize and potato.
10. Genetic analysis of plants regenerated from tissue culture (cytogenetics, PCR- based analyses).
11. Gene transformation techniques I.
12. Gene transformation techniques II.
13. Genetic analysis of GM (genetically modified) plants.
14. GMO as an ethical problem.
15. Written exam. Overview and survey of the course.

**Faculty of Agricultural and Environmental Sciences
Institute of Plant Protection**

Course title: Selected Topics in Plant Protection

Neptun Code: SMKNV0024ER

ECTS Credit: 3

Lectures per Week: 3

Instructor: József KISS, professor

Further information: jozsef.kiss@mkk.szie.hu

Overview

The course is based on a general knowledge of plant protection, including agricultural entomology, plant pathology, weed science and management, as well as integrated control of pests and diseases. Following an introductory lesson of each main subject, the students will learn about pests, pathogens and weeds of particular interest in Central-Europe. Their biology, ecology and control are also discussed. As for the latter, new approaches of preventing and/or limiting pests, disease and weed establishment in various crop systems will be emphasised. The lessons as well as laboratory and field practices, will provide the students with up-to-date information on the discipline.

Topics of the course

1. Fungal pathogens' variability and ecology.
2. Plant diseases of particular importance on field crops: cereals, sunflower, sugar beet, plant diseases of particular importance on horticultural crops: pome and stone fruits.
3. Taxonomy and ecology of microbial antagonists as biocontrol agents.
4. News about the mode of action of pesticides and their fate in environment.
5. Reduced sensitivity to pesticides, a theoretical and practical point.
6. Host plant species of *Diuraphis noxia* and population dynamics of this pest.
7. Morphology and biology of Eryophids on pome and stone fruits.
8. The taxonomy and role of spiders in cereal crops related to environmentally safe control.
9. Spiders in nature.
10. Accumulation and break-down of herbicides in agricultural soils.
11. Environmentally safe weed management in historical vineyards of Hungary.
12. Western Corn Rootworm (*Diabrotica virgifera virgifera*): a new pest of corn in Europe.
13. IPM of field crops: recent development in Hungary. (J. Kiss).

Pond Fish Husbandry Subject Group

Faculty of Agricultural and Environmental Sciences
Institute of Environmental and Landscape Management
Department of Fish Culture

Course title: Breeding Technologies in Ponds

Neptun Code: SMKHG0025ER

ECTS Credit: 5

Lectures per Week: 5

Instructor: László HORVÁTH, professor

Further information: horvath.laszlo@mkk.szie.hu

Overview

Pond preparation: tasks and works in autumn and spring. Flooding of ponds. Nutrient supply of water-fertilization of fish ponds. Stocking of fish ponds. Feeding of fish. Oxygen supplements. Test fishing, checking the weight uptake of fish. Summer or relecting fishing. Final fishing in autumn, yield collection. Wintering of fish.

Literature

Woynárovich, E. and Horváth, L., 1980. The artificial propagation of warm-water fin fishes - a manual for extension. FAO Fish. Tech. Paper, 201 pp

L. Horváth, G. Tamás, CH. Seagrave: Carp and pond fish culture Blackwell Science 2002

**Faculty of Agricultural and Environmental Sciences
Institute of Environmental and Landscape Management
Department of Fish Culture**

Course title: Environmental Protection and Fish Culture

Neptun Code: SMKHG0026ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: Balázs CSORBAI, department engineer

Further information: csorbai.balazs@mkk.szie.hu

Overview

Wetlands, which are strictly protected in EU, often get connected with the fish culture in artificial fish ponds and in natural lakes and rivers. This subject will introduce the EU and Hungarian law and any regulation of fish culture to the students who can learn the possible conflicts of environmental protection and fish culture and their solutions.

Topics of the course

1. Wetlands: importance, status in Europe.
2. The most important wetlands in Hungary
3. Protected species in fish-ponds I.
4. Protected species in fish-ponds II.
5. Natural fish habitats and their problems I.
6. Natural fish habitats and their problems II.
7. Water Framework Directive.
8. Programs for restoration of natural state of European rivers (Rhine salmon 2000, Viza 2020)
9. Renaturalisation of rivers, brooks, streams
10. The problems of marine habitats
11. Reed and its importance in pond fish culture and biodiversity
12. Sport fishing waters: special problems
13. Ecotourism
14. Consultation

Literature

Arthur Kirchhofer 1996. Conservation of Endangered Freshwater Fish in Europe Kiddle books 1-341 pages.

L. Horváth, G. Tamás, CH. Seagrave: Carp and pond Fish culture Blackwell Science 2002

The water Framework Directive: 2000/60/EC

**Faculty of Agricultural and Environmental Sciences
Institute of Animal Husbandry
Department of Animal Breeding, Piggery, Poultry and Hobby Animal Rearing**

Course title: Fish Ecology and Monitoring

Neptun Code: SMKSK0027ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: Katalin KERESZTESSY, research scientist

Further information: kereztesy.katalin@mkk.szie.hu

Overview

This class examines Hungarian fish fauna and the ecological needs and population of fish species. Hungarian, protected and threatened fish species are regarded as important indicators of the health of aquatic ecosystems: thus, their status must be monitored regularly. In the future, more faunistic changes are expected, due to new water regulation projects. It is very important not only to protect fish, but to be aware of their ecological needs and ensure their entire habitat.

Topics of the course

1. Planning investigations. Categories of water bodies (streams and lakes),
2. Environmental factors and measuring methods,
3. Limiting factors (oxygen, speed, temperature, etc.),
4. Fish fauna of Hungary,
5. Distribution of fish species,
6. Morphometric character of fishes,
7. Reproductive strategy (reproductive guilds),
8. Life-history strategies of fishes,
9. Sampling (passive and active capture methods),
10. Examination of fish populations (markings, length and weight, biomass),
11. Age determination of fish (examination of scales, otoliths, spines and fin rays),
12. Growth pattern and backcalculation (Bertalanffy-method),
13. Fish communities of rivers, streams and canals and lakes,
14. Threatened and protected fish species of Hungary,
15. Conservation of threatened and protected fishes,
16. Practical and written exam.

Literature

Holcik, J. 1989. Freshwater Fishes of Europe. Vol. 1. AULA Verlag, Wiesbaden.

Kereztesy, K. 1996. Threatened freshwater fish in Hungary. Conservation of Endangered Freshwater Fish in Europe (ed. A. Kirchhofer, D. Hefti) /Advances in Life Sciences/ Birkhauser, Basel, Boston, Berlin, pp. 73-77.

**Faculty of Agricultural and Environmental Sciences
Institute of Environmental and Landscape Management
Department of Fish Culture**

Course title: Fish Genetics

Neptun Code: SMKHG0028ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: László VÁRADI, associate professor

Further information: varadi.laszlo@mkk.szie.hu

Overview

The subject of Fish Genetics deals with fish meat production and ornamental fish breeding from genetic point of view. It comprises the inheritance of qualitative and quantitative traits, the hereditary basics of selection and crossings and the influence of environment on the appearance of individual traits.

Topics of the course

1. Evolution, domestication and genetic development of fish
2. Etology and behavior genetics in the fish cultures (wild and domesticated species)
3. Sex determination of fish
4. Inheritance of qualitative characters
5. Quantitative characters and their inheritances
6. Genetic manipulations - importances, utilities, methods in fish culture
7. Transgenic fish and chimeras
8. Sex reversal methods and their utilities
9. Population Genetics
10. Natural and artificial selections
11. The effects and utilities of inbreeding in fish breeding
12. Natural and artificial hibridizations among fish species
13. Genetic basic of fish breeding
14. Maintance of important fish species and landraces

Literature

T. Gjedrem: Genetics in aquaculture I-III. Elseviere

Dunham R. A. Aquaculture and fisheries biotechnology Hardcover 2003

Beaum A.R. Biotechnology and Genetics in Fisheries an aquaculture 2003

**Faculty of Agricultural and Environmental Sciences
Institute of Environmental and Landscape Management
Department of Fish Culture**

Course title: Fish Production in Ponds

Neptun Code: SMKHG0029ER

ECTS Credit: 5

Lectures per Week: 5

Instructor: László HORVÁTH, professor

Further information: horvath.laszlo@mkk.szie.hu

Overview

Basic terms of fishery. Historical review. Fish in the ecosystem, circulation of energy in aquatic environment, basic types of food chains. Basic information of biology and production in fish ponds. Living organisms in ponds. Fish breeding in earth ponds. Pond types: production and wintering ponds. Production pond types: ponds on land areas (ponds with round dams) and ponds on hilly areas (with dams blocking valleys). Typical features of Middle-European carp breeding in ponds. Pond cultures: full range and segment range production. Two- and three-year-long production. Annual cycle of carp breeding: differences between age groups (nursing of fingerlings and second-year-olds, production of market fish).

Topics of the course

1. Status of fishery among sciences. Aquaculture and fishery. Status of Hungarian fishery. Statistics.
2. Basic principles of the physico-chemical and biochemical processes in pond ecosystems.
3. Biology and ecology of aquatic organisms, namely phyto- and zooplanktons and cultured fish. Circulation of energy in aquatic environment, basic types of food chains.
4. Profiles of cultured fish species in Hungary.
5. The origin and domestication of common carp. The four principal phenotypes of common carp with different scales cover.
6. Characteristics of carp farming. Historical background of carp husbandry. European and Asian carp culture.
7. The development of Cyprinid farming in Europe. Current status.
8. The principles of carp farming: Ecological characteristics. Growth of carp in fish ponds.
9. Pond cultures: full range and segment range production. Two- and three-year-long production.
10. Basics of Pond Fertilization
11. Basics of Fish Nutrition
12. The farming cycle: Farm production. Planning and stocking of ponds.
13. The fish farm. Typical features of Middle-European carp breeding in ponds.

**Faculty of Agricultural and Environmental Sciences
Institute of Environmental and Landscape Management
Department of Fish Culture**

Course title: Fish Propagation and Fry Rearing

Neptun Code: SMKHG0030ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: Tamás SZABÓ, research scientist

Further information: szabo.tamas@mkk.szie.hu

Overview

A number of fish species that have great economic significance do not reproduce spontaneously in captivity. Hormone-induced spawning is the only reliable method to induce reproduction in these fishes. Propagation techniques of traditional aquaculture species such as common carp, grass carp, silver carp, big head carp, tench, wells, pike and pike-perch will be described.

Size of cultured fish fry. Plankton types and sizes: rotifers, copepods and cladocerans. Ponds for fry culture. Pond preparation. Pond fertilization. Timing of fry stocking. Tank culture. Artificial feeds. Fish species covered: common carp, herbivorous cyprinids, European catfish, northern pike and pike-perch. Tank culture of African catfish and sterlet fry will be described.

Topics of the course

1. History of Fish Propagation
2. Propagation Methods
3. Introduction to Hormone-Induced Spawning of Fish
4. Capturing, Handling, Transporting and Holding Brood Fish
5. Determining Sexual Maturity of Broodstock for Induced Spawning of Fish
6. Hormone Preparation, Dosage Calculation and Injection Techniques
7. Techniques for Taking and Fertilizing the Spwan of Fish
8. Induced Breeding of Common Carp
9. Induced Breeding of Chinese Carps and Tench
10. Advanced Fry Rearing for Cyprinids
11. Breeding Techniques and Methods of Larval Rearing for Salmonids
12. Breeding Techniques and Methods of Larval Rearing for the Catfish
13. Breeding Techniques and Methods of Larval Rearing for Sturgeons
14. Consultation

Literature

Woynárovich, E. and Horváth, L., 1980. The artificial propagation of warm-water fin fishes - a manual for extension. FAO Fish. Tech. Paper, 201 pp.

L. Horváth, G. Tamás, CH. Seagrave: Carp and pond Fish culture Blackwell Science 2002

V. G. Jhingran, R. S. V. Pullan: A hatchery Manual for the the common, chinese and indian major carps. Manila 1985

**Faculty of Agricultural and Environmental Sciences
Institute of Environmental and Landscape Management
Department of Fish Culture**

Course title: Intensive Fish Culture

Neptun Code: SMKHG0031ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: Béla URBÁNYI, research scientist

Further information: urbanyi.bela@mkk.szie.hu

Overview

Definition and introduction of intensive, semi-intensive and superintensive fish breeding methods as well as description of their role in world aquaculture. Presentation of technical devices and kits used in intensive technologies, basics of designing and executing intensive systems. Description of the most important fish species reared in intensive systems (trout, salmon, ayu, sturgeon, African catfish, tilapia, eel, etc.) and their environmental requirements.

Literature

J. Shepherd, N. Bromage: Intensive fish farming Blackwell scientific Publications Oxford 1988

L. Horváth, G. Tamás, CH. Seagrave: Carp and pond Fish culture Blackwell Science 2002

Wildlife Management and Conservation in Hungary

Subject Group

Faculty of Agricultural and Environmental Sciences
Institute for Wildlife Conservation

Course title: Basics of Forestry

Neptun Code: SMKVB0032ER

ECTS Credit: 2

Lectures per Week: 2

Instructor: Zoltán SOMOGYI, assistant professor

Further information: somogyi.zoltan@mkk.szie.hu

Overview

The course presupposes a basic knowledge of Botany, Animal Science, and Soil Science, according to the Hungarian classification system. Students will learn the factors influencing the development of tree species.

Topics of the course

Elements in silviculture. Abiotic factors influencing tree occurrence I. Topography, climate., II. Water forms and herbaceous species., III. Soil types and natural vegetation. Tree species of afforestation., IV. Soil types and natural vegetation. Tree species of afforestation., Biotic factors influencing tree occurrence. Ability for association., Conflicts between silviculture and game management. The possible solutions., Natural renewal and artificial afforestation., Comparative description of oak species., Comparative description of pine species., Beech and hornbeam., Black-locust., Willow, alder and poplar., Frequent fungi and insect damages in oak and pine stands.

**Faculty of Agricultural and Environmental Sciences
Institute for Wildlife Conservation**

Course title: Biological Bases of Conservation Management

Neptun Code: SMKVB0033ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: Tibor STANDOVÁR, associate professor

Further information: standy@ludens.elte.hu

Overview

The course introduces students the biological bases of successful biodiversity conservation in general. In addition to clarifying the special features of conservation biology and the concept of biodiversity, important causes of biodiversity crisis will be explored by discussing the effects of major factors. Then, based on the knowledge gained from pure biological disciplines (population biology, genetics, ecology etc.) students will get acquainted with major practical tools for successful conservation management, and with principles of necessary researches that need to support these management activities.

Topics of the course

What is conservation biology? Biodiversity: concept, definition, measurement and global distribution. Valuing biodiversity: ecological economics, ethical considerations. Extinction and vulnerability to extinction. Habitat destruction, fragmentation, degradation and overexploitation of populations. The problem of invasive non-indigenous species. Problems of small populations, applied population biology. Establishing new populations and ex situ conservation. Designing and establishing protected areas. Managing protected areas. The role of not protected areas in biodiversity conservation. Habitat restoration and ecosystem management. Economic and legal tools for biodiversity conservation at the local and national levels. Nature conservation initiative in the European Union. International agreements to protect species and habitats.

**Faculty of Agricultural and Environmental Sciences
Institute for Wildlife Conservation**

Course title: International Communication

Neptun Code: SMKVB0034ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: István Pál KISS, professor

Further information: ikisspal@bkf.hu

Overview

The course helps students to communicate and negotiate in foreign cultures and countries. They become familiar with the basics of communication. The students will understand the key factors of negotiation and will be able to build successful negotiation strategies and to select the appropriate negotiation strategy and style. They learn the different phases of negotiation process and to recognise and ward off negotiation tricks. By the completion of the course the participants will have a basic comprehension of the special aspects of intercultural communications. They will also get practical guidelines to communicate and negotiate in few selected cultures and countries.

Topics of the course

Models of communication. Verbal and non-verbal communication. Interpersonal communication. Active listening. Key factors of the negotiation strategy (Power-Time-Information). Negotiation goal and the BATNA (Best Alternative to Negotiated Agreement). Negotiation strategies. Negotiation styles. Negotiation process. Negotiation tricks. Models of culture. Dimensions of culture. Communication and context. Stereotype. Guidelines of communication and negotiation in specific cultures and countries.

**Faculty of Agricultural and Environmental Sciences
Institute for Wildlife Conservation**

Course title: Study Trips and Field Practices

Neptun Code: SMKVB0035ER

ECTS Credit: 5

Lectures per Week: 5

Instructor: Zsolt BÍRÓ, associate professor

Further information: bsolti@ns.vvt.gau.hu

Overview

The course gives the opportunity to students to study the Hungarian system of game management and hunting at different sites in Hungary (2-3 trips to hunting reviers and conservation areas). They will be participating in field works of ongoing research projects (minimum 4 cases of more, depending on individual interest and willingness).

**Faculty of Agricultural and Environmental Sciences
Institute for Wildlife Conservation**

Course title: Urban Wildlife Management

Neptun Code: SMKVB0036ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: Miklós HELTAI, research scientist

Further information: heltai.miklos@vvt.gau.hu

Overview

Areas built-in and/or disturbed by people contain numerous habitats to wildlife species. These include not only parks and other green areas created by humans, but also roads, banks of railways, industrial areas, cemeteries, attics and sheds of abandoned buildings or dwelling-houses. These habitats provide living supports for numerous/many vertebrate and invertebrate species. Urban inhabitants almost never meet most of these species, and in turn get used to the presence of the others. It is a new phenomenon that more and more woodland species appear and settle down in inhabited areas. They may cause several problems and often significant property damage with their feeding habits and lifestyle. This course includes exploration, handling and managing possibilities of urban habitats, occurring species and the chances of protection and coexistence.

Topics of the course

Changing of construction of settlements; effects of changing agriculture and forest management on habitats. Changing composition flora and fauna, spread of generalist species. Adaptation to human environment. Settlements as wildlife habitats from the city center to the dump. Habitat management in urban areas: grasslands, woodlands, wetlands. Habitat management in public parks and private gardens. Wild animals in urban areas: pests, frightful, disinterested. Injuries in houses, gardens, public parks and others public areas. The possibilities methods of protection: eradication, exception, management. Urban wildlife management step by step: collection of data, determine of aim, intervention, control of results. Conflicts between humans and animals. The role of public relation and education. Examples from USA, Europe and Hungary. Urban wildlife management on the WEB. Field practice in the area of the university.

**Faculty of Agricultural and Environmental Sciences
Institute for Wildlife Conservation**

Course title: Wildlife Biology

Neptun Code: SMKVB0037ER

ECTS Credit: 2

Lectures per Week: 2

Instructor: Sándor CSÁNYI, professor

Further information: css@ns.vvt.gau.hu

Overview

The course presupposes a basic knowledge of ecology and vertebrate zoology. After positioning wildlife biology within the science of ecology, the essential theoretical areas are discussed. Students learn about the most important ecological concepts applied to wildlife conservation and management problems.

Topics of the course

Wildlife biology as a science: roots and concepts. The short history of the discipline. Differences of wildlife and game biology. The distribution and abundance of wildlife species. Basics concepts of population biology. Elementary models of population growth. Population dynamics and density-dependence. Modelling population processes. Population parameters and life tables. Effects of the environment. Environment and habitat. Characterising habitats. The concept of carrying capacity. The classification of the environmental factors. The concept of niche. Interactions among species. Intra-interspecific competition. Models of competition. Predator-prey and host-parasite interactions. Diversity of life. Examples for the importance of diversity in wildlife management. Behaviour and social interaction in wildlife populations. Genetics in wildlife research and management.

**Faculty of Agricultural and Environmental Sciences
Institute for Wildlife Conservation**

Course title: Wildlife Biology and Management

Neptun Code: SMKVB0038ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: Sándor CSÁNYI, professor

Further information: css@ns.vvt.gau.hu

Overview

The course presupposes a basic knowledge of ecology and vertebrate zoology. After an overview of ecological concepts essential to the understanding of renewable natural resource management students will learn about the basics of wildlife management. Existing legislation and the enactment of wildlife conservation and management will be discussed. Methods of hunting and game farming are also included.

Topics of the course

Wildlife biology as a part of ecology. Wildlife as a renewable natural resource. Values of wildlife. Wildlife-habitat relationships. The effect of the environment on the distribution and abundance of wild animals. The effects of the environment. Environment and habitat. The classification of the environmental factors. Carrying capacity and related concepts in wildlife ecology and management. Food and food habits. Factors influencing the food requirements of wild animals. Wildlife population dynamics and harvesting theory. The concept of niche. Interactions among species. Models of competition. Predator-prey and host-parasite interactions. Genetics in wildlife research and management. Wildlife conservation. National and international systems for the protection and conservation of the fauna. Wildlife management systems in Europe. The philosophy, history and legal framework of wildlife management. Methods and traditions of hunting and trapping, archery and falconry. The status and management of game species in Hungary. The status and management of game species in Hungary.

**Faculty of Agricultural and Environmental Sciences
Institute for Wildlife Conservation**

Course title: Wildlife Nutrition

Neptun Code: SMKTK0039ER

ECTS Credit: 4

Lectures per Week: 4

Instructor: Szilvia OROSZ, associate professor

Further information: orosz.szilvia@mkk.szie.hu

Overview

The course contains the basics of general information on animal nutrition and terminology used. Composition of feedstuffs. Biological role, importance and composition of proteins, fats and nitrogen-free extract, fibre, macroelements, trace elements and vitamins. Gastrointestinal anatomy, function, digestion, nutrient absorption, utilisation and requirements of wild species. Characterisation and use of forages in feeding. Practical aspects of feeding.

Topics of the course

Introduction. Terminology. Composition of feedstuffs: protein-, fat-, fiber-, ash- and nitrogen-free extract. Moisture content of feedstuffs. Water intake. Biological role, importance and composition of proteins, fats and nitrogen-free extract. Biological role, importance and composition of fibre: ruminants and monogastric animals. Energetical evaluation of feedstuffs. Biological role and importance of macroelements, trace elements and vitamins: water- and fat-soluble vitamins. Anti-nutritive factors. Gastrointestinal anatomy, function, digestion, nutrient absorption, utilisation and requirements of wild ruminants. Gastrointestinal anatomy, function, digestion, nutrient absorption, utilisation and requirements of wild monogastric animals: omnivorous and carnivorous mammals, hare, fowls. Regulation of voluntary feed intake: physiological, physical aspects and foraging strategies. Characterisation and use of forages in feeding. Characterisation and use of grains and by-products in feeding. Feeding ground management. Preservation of feedstuffs: silage/haylage and hay-making. Technology. Evaluation and quality of dried and fermented forages. Practical aspects of feeding of ruminants: roe deer, red deer, fallow deer and moufflon. Formulation of different rations for ruminants. Practical aspects of feeding of wild monogastric omnivorous mammals (wild boar) and game fowls (pheasant, duck). Formulation of different rations for monogastric games: wild boar and fowls.

**Faculty of Agricultural and Environmental Sciences
Institute for Wildlife Conservation**

Course title: Wildlife Research Methodology

Neptun Code: SMKVB0040ER

ECTS Credit: 5

Lectures per Week: 5

Instructor: László SZEMETHY, associate professor

Further information: szlaci@ns.vvt.gau.hu

Overview

The course introduces students into the basics of the most common methods of wildlife research in theory and practice. They become familiar with the process of scientific research and monitoring programs from planning to publication. The course involves the basics of sampling and the statistical analysis, as well as estimation of different population parameters. Students learn about the recognition of animal signs, capturing and marking techniques with special reference to radio telemetry, and the basics of using maps, GPS and GIS in practice. Lessons about diet analyses complete the course.

Topics of the course

The steps of scientific research and monitoring: problem, question, hypothesis, prediction, test and evaluation. Population estimation in the ecology. Data collection, sampling methods, estimation. Statistical definitions and tests. Classification of estimation methods. Complete counts. Capture-recapture: Lincoln-Petersen model. Change in ratio (CIR) method. Population indices. Calibration of indices. The plot sampling and the strip transect methods. Line transect method. Software for analyses. Questionnaires - benefits and disadvantages. Population dynamic parameters: age estimation (from teeth, bones, eye-lens), sex determination, estimation of reproduction (placental scars, corpora lutea) and indices of nutritional condition (kidney fat index, bone marrow fat). Recognition of animal signs and tracks. Capture methods of small and large animals. Types of traps and their use. Legislation of trapping. Wildlife marking techniques. Radio telemetry. Navigation in the field. Types of maps. GPS and GIS in the wildlife management. Aerial photographs, satellite images and vegetation mapping. Methods for diet analysis of herbivores and carnivores. Main aspects of publication and communication of results.