

Faculty of Forestry and Wood Technology

Academic year: 2017–2018

Courses in English

Course title	Code	Level of studies	Semester	Number of ECTS credits	Page	
1	Acoustics of Wood	ZAW	U, P	W, S	5	4
2	Applied Ecology of Game	AEOG	P	S	4	4
3	Applied Genetics	ZAG	U, P	W	5	4
4	Applied Mycology	FMEF	P	W	4	5
5	Basic Principles of Game Management	BPGMZGM	U	W	4	5
6	Biomechanics and Tree Stability	BATS	P	S	4	6
7	CAD/CAM Application in Woodworking Industry	ZCAM	U, P	W, S	4	6
8	Dendrology of European Forest Tree Species	ZDEFT	P	S	4	6
9	Ecophysiology of Woody Plants	ZEOW	P	S	4	7
10	Economics of Sustainable Resource Management	ESRM	P	S	4	7
11	Ecosystems of Tropics and Subtropics	ZETS	P	W	5	8
12	Engineering Drawing with CAD System Application	ZED	U, P	W,S	5	8
13	Ergonomics and Occupational Safety	ZEOS	P	S	4	8
14	European Environmental Geochemistry	EGEF	P	W	4	8
15	European Forest Economics and Policy	EFEP	P	S	6	9
16	Forest Access Roads	ZFAR	U	W, S	5	10
17	Forest Biometry and Modelling	BMEF	P	W	6	10
18	Forest Botany: Plants of Various Forest Ecosystems in Europe	ZFOB	P	S	4	11
19	Forest Ecology	FORECOL	P	W	6	11
20	Forest Ecosystems in Europe	FEEF	P	S	6	12
21	Forest Management and Marketing	FMAM	P	W	6	12
22	Forest Pathology and Protection	FOPA	P	S	6	13
23	Forest Planning	ZFP	P	W	6	13
24	Forest Technology	FORT	P	W	6	14
25	Furniture and Design	ZFD	U, P	W	5	14
26	Furniture and Interior Visualisations	ZFIV	U, P	W, S	5	14
27	Geobiocoenology	GEOBISZGEBI	P	S	4	15
28	Geographical Information Systems	GISEF	P	W	6	15

29	Global Forestry	GFR	U, P	W	3	15
3029	Introduction to Engineering Computing	ZIEC	U, P	W, S	5	16
3130	Landscape Ecology	ZLENC	P	S	4	16
3234	Landscape Planning and Regional Development	ZLPRD	U, P	S	4	17
3332	Landscape Recreationology	ZLREC	P	W	4	17
3433	Log Yards and Sawmilling	LYEF	P	W, S	4	18
3534	Logging and Transport of Timber in European Forests	LTTEF	P	W	6	18
3635	Mathematics	Z-MT	U	W,S	5	19
3736	Multifunctional Forestry	MULF	P	S	6	19
3837	Nature Conservation	ZNC	P	S	4	19
3938	Non-wood Forest Products	NWFP	U, P	S	4	20
4039	Pathology of Woody Plants, Diseases of Trees	ZPWPN	U	W	5	20
4140	Physical and Mechanical Properties of Wood	PMEF	P	W	4	21
4241	Plant Biology	PBEF	P	W	4	21
4342	Public Relations in Forestry	PREF	P	W	4	22
4443	Remote Sensing	Z-IRS	U, P	S	5	22
4544	Risks and Benefits of Genetic Modified Organisms	GMOA	U,P	W, S	5	23
4645	Silviculture	SILV	P	S	6	23
4746	Soil Biology	ZSOB	P	S	4	23
4847	Soil Science	SOSC	P	W	4	24
4948	Statistical Analysis in Ecology Using R	SAIEU	P	W	3	24
5049	Surveying and Land Records	ZSLR	U	S	5	254
5150	Urban Forestry	URF	P	W	4	25
5251	Utility Plants of Subtropics and Tropics	ZUPST	P	S	4	25
5352	Water Management and Water Quality Policy	WSS	U	W	5	26
5453	Wood Anatomy	WAEF	P	W	4	26
5554	Wood Modification	ZWM	P	W	4	26

Course title: Acoustics of Wood

Objectives and contents: Students will be introduced to acoustics with orientation to properties and uses of wood. The course covers the following topics: theory of acoustics, wave propagation in wood, dynamic and acoustic properties of different wood species, internal friction in wood, experimental methods for the acoustic characterization of wood, sound as a non-destructive tool for wood quality assessment, influence of aging and moisture on the acoustic properties of wood, methods for improving the acoustic properties of wood, acoustic emissions, room acoustics, acoustics of musical instruments, numerical methods in vibro-acoustics, acoustic aspects of using wood in architecture, sound reproducer systems and musical instruments.

Instructor: Ing. Jan Tippner, Ph.D., Dept. of Wood Science

Language: English

Semester: W or S

Duration: 1 semester

Time-table: lectures and practices –
40 hours, lab work - 30 hours

ECTS Credits: 5

Method of assessment: written examination

Prerequisite courses: -

Course title: Applied Ecology of Game

Objectives and contents: To deepen students' knowledge of environmental laws associated with the occurrence of game in ecosystems. Focus will be on understanding the ecological relationships between populations and between animals and their environment. An important part of the course will be study of competition for food resources, and sustainable balance between population of game and the environment.

Course contents:

1. Ecological interactions of game and their environment, focusing on the possibility of improving the sustainability of game management. The definition of environment and relationships in ecosystems will be discussed. 2. Possibilities of monitoring the environment, the concept of ecological stability in relation to the game management. 3. The most important implications of hunting for the environment, the definition of carrying capacity and the possibility of eliminating the negative impact caused by game. 4. Legislation on environmental protection related to the game management. 5. Population ecology of game, internal and external factors that affect it, the possibility for improving the welfare of game. 6. Fragmentation of the landscape and its potential effects for life of game. Possibilities of decreasing these effects and methods for their monitoring. 7. Anthropogenic landscape changes and their impact on game and its interaction with the environment. 8. Evaluation of environmental quality for game.

Instructor: doc. Ing. Jiří Kamler, Ph.D., Ing. Radim Plhal, Dept. of Forest Protection and Wildlife Management

Language: English

Semester: S

Duration: 1 semester
30 hours

Time-table: lectures, exercises and practices –

ECTS Credits: 4

Method of assessment: examination

Prerequisite courses: -

Course title: Applied Genetics

Objectives and contents: The aim of the course is to introduce possibilities of applied molecular genetics in forestry, and basics of molecular biology. The molecular genetics opens new possibilities and offers new tools usable for example in breeding, forest protection. We want to also discuss about popular topics like GMO (Genetically modified organism). During exercises we will also perform basic molecular-genetic approaches.

1. Applied genetics around us (Applications in medicine, breeding, criminalistics, and in phytopathology)
2. Introduction to laboratory work

3. Preparing of solutions and buffers for molecular experiments
4. Isolation of DNA, PCR (polymerase chain reaction), and quality and quantity control
5. Sequence databases
6. GMO - genetically modified organisms
7. Markers, restriction digestion
8. Sequencing
9. Fingerprinting and its usage in praxis

Instructor: Dr. Ing. Jaroslav Mráček, Dept. of Forest Bot., Dendrology and Geobiocoenology

Language: English

Semester: W

Duration: 1 semester

Time-table: lectures and practices – 40 hours, lab work - 20 hours

ECTS Credits: 5

Prerequisite courses: -

Method of assessment: written and oral exam

Course title: Applied Mycology

Objectives and contents: Definition of the fungi kingdom. A brief overview of the system of fungi, phylogenetic relations. Life cycle of fungi and fungus organisms. Sexual and asexual life forms. Ways of asexual reproduction of fungi. Application of methods of molecular biology in mycology. Physiology of nutrition and growth. Sources of carbon and nitrogen. Macroelements, microelements, vitamins in the nutrition of fungi. Ecology of fungi – fungi in forest ecosystems. Decomposition of wood mass by fungi. Cellulotic and ligninolytic enzymes. Use of enzymes in practice. Accumulation of heavy metals in fungi (mechanisms of storing, environmental applications). Fungi in symbioses. Lichenism. Mycorrhizal symbioses. Symbiosis with animals (ambrosia fungi, symbiosis with termites). Fungi in extreme conditions. Fungi in human nutrition. Nutritional substances in the fruiting body of fungi. Fungal intoxication. Growing fungi. Mushrooming and non-wood-producing forest functions. Protection of fungi.

Instructor: doc. RNDr. Michal Tomšovský, Ph.D., Dept. of Forest Protection and Wildlife Management

Language: English

Semester: W

Duration: 1 semester

Time-table: lectures, exercises and practices – 30 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: examination

Course title: Basic Principles of Game Management

Objectives and contents: To provide students with information on the history and with current knowledge and skills in game management. Interpretation of this knowledge and its specific use in the European context.

Main topics:

1. Importance of hunting and game management and its perspectives in different phases of human history.
2. Game management legislation, organization and governance in the Czech Republic and in the world.
3. Biological fundamentals of gamekeeping.
4. Influence of the external environment on game.
5. Management of game populations, selective hunting.
6. Economics of game management.
7. Methods, equipment and guns used for hunting.
8. Influence of human activity on game.
9. Care for game.
10. Assessing the age of live and killed game.

Instructor: doc. Ing. Jiří Kamler, Ph.D., Ing. Radim Plhal, Dept. of Forest Protection and Wildlife Management

Language: English

Semester: W

Duration: 1 semester
49 hours

Time-table: lectures, exercises and practices –

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: examination

Course title: Biomechanics and Tree Stability

Objectives and contents: Mechanical disturbances are an important factor affecting forests and wood production. The course will enable students to understand the basic relationships between the mechanical influences of the environment (wind, snow, extreme habitat) and the stability of trees and forest stands. The course will deal with the basic parameters of a tree that define its stability and parameters of the environment determining the strength of disturbance. The influence of abiotic factors of the environment will be discussed in terms of the stability of both individual trees and the entire stand. The student will obtain basic competencies in identifying individual important factors of the environment and in proposing a protection plan for an individual tree as well as for a stand against abiotic effects. The breadth of knowledge will be extended with information concerning urban forestry and arboriculture, in which ability to determine the stability of a tree is one of the basic requirements.

Discussed topics:

Definition of basic terms; strategy of a tree in terms of mechanics; properties of wood and their interpretation in relation to the mechanical stability of a tree; optimisation of the structure of wood; adaptational growth; geometry of the trunk and roots; stress load, its sources; distribution of tension; calculation of arising tension, load analysis; assessment of the probability of failure.

Instructor: Ing. Luděk Praus, Ph.D., doc. Dr. Ing. Petr Horáček, Dept. of Wood Science

Language: English

Semester: S

Duration: 1 semester

Time-table: lectures, exercises and practices –
30 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: examination

Course title: CAD/CAM Application in Woodworking Industry

Objectives and contents: Introduction to CAD systems. Import of a CAD data file into a CAM environment where CNC production of a designed object is being prepared. The CAM environment requires technological data input which must correspond with both cutting tool materials as well as workpiece materials. These properties must be included into workpiece program processing. The path of a selected cutting tool is determined by the curves or surfaces intended for processing. Process simulation is usually a part of the process preparation. A program for processing of the workpiece on the CNC machine for final production is then the output of the CAD/CAM application. CAD/CAM systems are applied both at the design and production levels.

Instructor: ???., Dept. of Furniture, Design and Habitation

Language: English

Semester: W or S

Duration: 1 semester

Time-table: lectures and practices –
40 hours, lab work - 20 hours

ECTS Credits: 5

Prerequisite courses: -

Method of assessment: test on PC

Course title: Dendrology of European Forest Tree Species

Objectives and contents: The course encompasses the morphology, taxonomy, chorology and ecology of trees with primary focus on trees important for European forestry, on the species most often introduced and with a possible perspective for forest management and landscape formation. In terms of shrubs, the course focuses especially on species prominent in European stands. The course provides a systematic overview and distribution of trees in various geographic areas of the globe: vegetation belts, zonality, altitudinal vegetation zones with a focus on European forest regions. Forest regions: North European region of coniferous forest, East and North-East European deciduous-coniferous forest (mixed forest), Central European oak-beech forest region, West European (Atlantic) deciduous forest region, coniferous mixed forest region of the Alps, South European deciduous mixed forest region, Mediterranean sclerophyllous forest region. The course also covers chorology of trees, territory, ecology of trees, mutual relationships of trees within the community, variability of a species

(cultivars) and utilization of trees in forest management and landscape formation. An integral part of the course is the practical identification of trees according to macroscopic attributes, i.e. leaved shoots, buds, fruits (cones), seeds, bark and wood.

Course objective:

Identification of selected species of trees according to morphological features, knowledge of their scientific names, ability to assess trees as plant organisms in accordance with their biotic and abiotic environment and to assess trees with regard to the production of wood material, knowledge of the range and influence of the properties of individual species of trees for solutions of practical utilisation in forest management and landscape formation.

Instructor: doc. Ing. Luboš Úradníček, CSc., Dept. of Forest Bot., Dendrology and Geobiocoenology

Language: English

Semester: S

Duration: 1 semester

Time-table: lectures, exercises and practices – 30 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: examination

Course title: Ecophysiology of Woody Plants

Objectives and contents: The objective of the course is to understand the behaviour of woody plants in the full range of external environmental factors including intentional and unintentional anthropogenic changes.

The course lectures cover: Architecture and growth of trees, shrubs and creepers. Phases of ontogenetic development of an individual tree, aging. Buds, shoot growth and types of shoots. Growth and development of leaves. Roots, root growth, rhizosphere of woody plants, types and extent of root systems. Management of growth of shoot and root systems. External and internal conditions for the growth of woody plants (utilization of materials and energies, assimilation, respiration, reserve substances and tissues, translocation, internal competition and division of photosynthates, growth regulators and growth management, external conditions for growth). Intake and distribution of radiation in the crown, effects (including stress) of radiation of various wavelengths, adaptation of trees to radiation climate, energy balance of leaves (photosynthesis, production of biomass and intake of radiation, light and the development of a plant, photoperiodicity). Temperature and physiological processes – influence of low and high temperatures, thermo-periodicity. Soil and the absorption system of plants, importance of mineral nutrients, effect of insufficient and imbalanced nutrition. Water stress – causes and effects of water stress, the function of water in woody plants, tolerance to drought. Aeration, compaction and salinisation of soil. Effect of air-pollution, concentration of carbon dioxide, effect of the wind. Trees in cities – response of woody plants to stress factors of the environment, silvicultural interventions and faulty interventions.

Instructor: Ing. Zuzana Špinlerová, Ph.D., Dept. of Forest Bot., Dendrology and Geobiocoenology

Language: English

Semester: S

Duration: 1 semester

Time-table: lectures – 30 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: examination

Course title: Economics of Sustainable Resource Management

Objectives and contents: This course covers the theory of natural resource economics, both in the context of the microeconomics of decision-making as well as its role in the larger economy and society. The focus will primarily be on the forest management and management of natural resources. How can we manage finite natural resources? What is the relationship between resources, trade and economic growth? This course will examine the conditions for market performance, market failure, elementary capital theory and application for investment decision-making in forest resources. It will also cover some topics that lie at the interface between resource and environmental economics. Attention will be paid to resource allocation issues which involve both market and non-market environmental values.

Instructor: Ing. Petra Hlaváčková, Ph.D., Dept. of Forest and Wood Products Economics and Policy

Language: English

Semester: S

Duration: 1 semester

Time-table: lectures and seminars

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: seminars, project work, written/oral examination

Course title: Ecosystems of Tropics and Subtropics

Objectives and contents: Basic information on forest communities in tropics and subtropics. Natural conditions of the forests, their distribution within particular countries. Forest regions in relation to vegetation zones and climate. Profiles through natural ecosystems. Species composition of forests. Morphology, taxonomy, chorology, ecology and present-day and indigenous way of use of the most important tree species of the particular forest regions.

Instructor: Ing. Petr Jelínek, Ph.D., Dept. of Forest Botany, Dendrology and Geobiocoenology

Language: English

Semester: W or S

Duration: 1 semester

Time-table: lectures and practices –
40 hours, lab work - 20 hours

ECTS Credits: 5

Prerequisite courses: -

Method of assessment: approved exercises, seminars, laboratory work, project work, written/oral examination

Course title: Engineering Drawing with CAD System Application

Objectives and contents: Essential knowledge of engineering drawing, basics of design including CAD application for 2D drawings, graphical elements – entities and their attributes, object creation and edition, control functions in CAD applications, dimensioning of drawing, notes and labels, analysis of created objects. Basics of 3D objects, transfer processes, display functions, solid modelling including Boolean operations with solid objects and finally 3D rendering and visualization of designed objects. Drawings are generated from 3D objects. Means of data export to various graphical environments. Essential and useful knowledge of design art in CAD systems to create and display various objects and/or assemblies not only in wood-working industry.

Instructor: ???, Dept. of Furniture, Design and Habitation

Language: English

Semester: W or S

Duration: 1 semester

Time-table: lectures and practices –
40 hours, lab work - 20 hours

ECTS Credits: 5

Prerequisite courses: -

Method of assessment: test on PC

Course title: Ergonomics and Occupational Safety

Objectives and contents: Ergonomic system of man in the course of work. Methods and findings of anthropology and biomechanics. Physiology of work and work hygiene. Occupational diseases and first aid in case of occupational injuries. Occupational safety and health protection. Machines and principles of their use. Industrial design, work aesthetics. Efficiency and work evaluation, remuneration. Work sociology and psychology. Basic ergonomic characteristic of forest workplaces, application of ergonomic findings.

Instructor: RNDr. Vladimír Šedivý, CSc., Dept. of Forest and Forest Products Technology

Language: English

Semester: S

Duration: 1 semester

Time-table: lectures and practices –
30 hours, lab work - 15 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: written and oral examination

Course title: European Environmental Geochemistry

Objectives and contents: The basic plan for the course is divided into 4 main thematic areas:

1. Composition of the Earth

- Geochemistry of the Earth's crust, model of the Earth, brief overview of historical geology

- Plate tectonics, volcanicity, earthquakes and their influence on people

- Weathering, creation of soil, soil – erosion – degradation – food policy
- 2. Atmosphere
 - Composition and stratification, sources of substances in the atmosphere and their transport
 - Anthropogenic influences – climate change (greenhouse gases, ozone hole) – development scenarios
 - Types of anthropogenic pollution (sources and causes)
- 3. Hydrosphere
 - Composition of oceans, large hydrologic cycle, types of pollution, possibilities for utilization
 - Freshwater reservoirs, hydrologic cycle, types of pollution, sources of drinking water
- 4. Man on the Earth
 - Outline of development of human civilization and its interaction with environment
 - Exploitation of mineral resources, technological processes and influences on the environment
 - Non-renewable energy sources (coal, natural gas, oil), main energy strategies
 - Nuclear energy, alternative sources of energy, possibilities and limits
 - Global climate changes, viewpoints and opinions from various perspectives
 - EIA, policy solutions (Rio de Janeiro, Kyoto Protocol)

Instructor: doc. Mgr. Aleš Bajer, Ph.D., Dept. of Geology and Soil Sciences

Language: English

Semester: W

Duration: 1 semester

Time-table: lectures, exercises and practices – 30 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: examination

Course title: European Forest Economics and Policy

Objectives and contents:

1. Definition of Forest Policy and Forest Economics. Political definition of Europe and the European Union countries. Description of European Union – importance, foundation and history, structure, institutions, law of the EU, environmental law of the EU. Importance of natural conditions for Forest policy and Economics and Policy making. Basic description of forestry in the Europe. Historical development of forest economics and policy. Definition of Forestry as a career and main forest products.
2. Review of the Common Agricultural Policy of EU. Forest policy of the European Union. Main themes and objectives of forest policy in EU. EU targets on renewable energy sources. EU FLEGT Action Plan and EU Timber Regulation. EU Biodiversity Strategy. EU 2020 Energy Strategy. Communication on “innovative and sustainable forest-based industries”. Green Paper on forest protection and information. International forest-related processes (UNFF, REDD+, LULUCF).
3. A new EU Forest Strategy: for forests and the forest-based sector.
4. Important institutions in EU forestry. Key conferences on EU forestry. Criteria and indicators of sustainable forest management. FAO and Forest Policy. International Forestry organizations (governmental and nongovernmental). Forest Europe.
5. Informational instruments. Advisory Services. Forest Reports. Public Relations in Forestry. Forest Reports from UN.
6. Economics Instruments. Self-regulation of the market economy. State compensation and subsidies.
7. Forest Management Inventory and Forest Management Planning. Need of Forest Management Planning for owners. Land-use planning and Regional Forest Management Plans.
8. Important trends in forest legislation. Position of forestry in state economy. National Forest Programmers (NFP) and main principles.
9. Ownership structure of forest estates of EU countries. Representation of forest owners and influence of government. State forests management institutions. Forest stakeholders: owners, workers and employees, and the general population.
10. Certification of forest estates. PEFC. FSC. C-o-C certification. Legal Source.
11. Forest Function as a part of ecosystems services. Forest products (wood and no-wood forest products). Natural resource evaluation.
12. Sustainable development processes. Sustainable development principles. Climate changes and European forests. System of protected areas in EU (Natura 2000), IUCN. Environmental agreements and protection of the forest ecosystems. International conventions and action plans.
13. Timber supply and demand. Pricing of forest products and trends in timber prices. Forest valuation. EU Timber regulation. Carbon Forestry.
14. Basic principles of macroeconomics. Macroeconomic impacts of environmental policies. Global and local environmental assessments. Positive externalities. Negative externalities. Basic

terms of business economics. Capital structure of a forest enterprise. Profit, revenue, forest benefits. Principles of forest taxation. Subsidies, subvention and grants in forestry. Economic damage from environmental degradation. Economic aspects of negative impacts on the environment. Methods of quantification of economic damage from environmental degradation. Environmental degradation and economic instruments. Economic instruments of environmental policy.

15. Basic data and forestry description of European countries. Description of its forest based sector and wood industry.

Instructor: Ing. Kateřina Holušová, Ph.D. et Ph.D., Dept. of Forest and Wood Products Economics and Policy

Language: English

Semester: S

Duration: 1 semester

Time-table: lectures, exercises and practices – 56 hours

ECTS Credits: 6

Prerequisite courses: -

Method of assessment: project work, written and oral examination

Course title: Forest Access Roads

Objectives and contents: The objective is to teach the students the practical works needed for planning, design, construction and maintenance of forest road network aimed at private owners of small woodlots.

Content: the long term view, factors affecting road planning and location, surveying in road systems, harvesting road layout, project documentation of the forest roads.

Materials and machines: soils, crushed stone and culverting materials.

Design and construction: road construction, formation, curves and gradients, culverts, bridges, quarrying, road surfacing, geotextiles.

Maintenance: causes of wear and tear, maintenance maps, maintenance of formation, maintenance of the road surface, maintenance of drainage.

Special situation involving protecting fish habitat, recommendations for wetland forest roads, dealing with beavers.

Instructor: doc. Ing. Petr Hruža, Ph.D., Dept. of Landscape Management

Language: English

Semester: W or S

Duration: 1 semester

Time-table: lectures and practices – 40 hours, lab work - 20 hours

ECTS Credits: 5

Prerequisite courses: -

Method of assessment: written and oral examination

Course title: Forest Biometry and Modelling

Objectives and contents:

1. Introduction to open source statistical and modelling language R.
2. Graphical methods of exploratory data analysis.
3. Biometrical and statistical analysis of measured quantities with R.
4. Estimation of parameters of non-normal data.
5. Linear and non-linear regression models.
6. Parameterization and calibration of models with R.

Instructor: doc. Ing. Karel Drápela, CSc., Dept. of Forest Management and Applied Geoinformatics

Language: English

Semester: W

Duration: 1 semester

Time-table: lectures, exercises and practices – 56 hours

ECTS Credits: 6

Prerequisite courses: -

Method of assessment: personal project

Course title: Forest Botany: Plants of Various Forest Ecosystems in Europe

Objectives and contents: The objective of the course is to obtain an overview of the classification system of vascular plants, including the importance of individual groups within ecosystems. The practical instruction focuses on ca 280 indicator species of vascular plants and knowledge of ecological requirements of the most important plants.

Lectures:

1. Introduction, ecologic aspects – soils and climates of Europe, history of vegetation development in Europe.
 2. Phylogenetic system of non-vascular and especially vascular plants
 3. Bryophytes and ferns with a focus on indicator species
 4. Gymnosperms
 5. Angiosperms, characteristics of the most important angiosperm families
 6. Indicator ferns, bryophytes, lichens and spermatophytes:
 - a/ arctic vegetation
 - b/ boreal vegetation
 - c/ Atlantic vegetation
 - d/ Central European vegetation
 - e/ Mediterranean vegetation
 - f/ Pannonian vegetation
 - g/ Alpine plant communities
 - h/ Fresh-water communities
 - i/ Coastal plant communities, floodplain forest communities
 7. Principles of classifying vegetation, protection of plant communities
- Practices:** Practical demonstration of most important indicator plants

Instructor: Ing. Hana Habrová, Ph.D., Ing. Tomáš Koutecký, doc. Ing. Radomír Řepka, Ph.D., Dept. of Forest Botany, Dendrology and Geobiocoenology

Language: English

Semester: S

Duration: 1 semester

Time-table: lectures, exercises and practices –
30 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: examination

Course title: Forest Ecology

Objectives and contents: The general objective of the course is to acquire knowledge of the processes and dependencies in the functioning of forest ecosystems. The importance, classification, development and current trends in ecology. Patterns of the impacts of ecological factors and responses of organisms. Structure and functioning of ecosystems – functional components, food web, flow of energy, primary and secondary production, decomposition, biochemical cycles, human influence. Population ecology – growth, spread, changes in size, cyclical outbreaks, island biogeography theory, competition, population strategy. Dynamics of ecosystems – succession and its ecological relations, stability, stress, regeneration, ecological network.

The specific objective of the course is to subsequently obtain an overview of current knowledge concerning main life processes of forest trees which condition their growth, resistance to pathogens, and ability to successfully survive and reproduce under adverse and changing environmental conditions. To ascertain causal relationships between the structure and function for main systems of trees and to interpret these theoretically and practically in terms of operating architecture, vitality and functional stability of objects under normal and extreme environmental conditions.

Contents of the course:

1. Introduction to Forest Ecology
2. Analyses of Changes in Forest Structure and Function at Multiple Time and Space Scales
3. Primary production
4. Water cycle in forest ecosystems
5. Biogeochemical cycles of nutrients
6. Biotic interactions and biodiversity
7. Ecological stability and ecosystem interaction
8. The Role of Forests in Global Ecology
9. Field excursion

Instructor: doc. Ing. Luboš Purchart, Ph.D., prof. Ing. Jiří Kulhavý, CSc., Ing. Ladislav Menšík, Ph.D.,
Dept. of Forest Ecology

Language: English

Semester: W

Duration: 1 semester **Time-table:** lectures, exercises and practices –
56 hours

ECTS Credits: 6 **Prerequisite courses:** -

Method of assessment: examination

Course title: Forest Ecosystems in Europe

Objectives and contents: The objective of the course is to become familiar with types of forest ecosystems within biomes of Mediterranean, temperate and boreal climatic zones existing on the European continent, including the main vegetation species determining the ecosystems and, last but not least, certain animal species typical of the given ecosystems.

On the basis of extensive photographic materials, students will be taught about the majority of zonal and azonal forest ecosystems in Europe. Attention will be given to the altitudinal zones in individual European mountain ranges, including the altitude and nature of the upper border of the forest. Special attention will be devoted to the specifics of ecosystems on individual islands and groups of islands with regard to endemism and biogeography.

The practices will provide information on the most important species of plants and animals in the individual types of ecosystems discussed by means of publications, slides and herbarium items. The individual practices will follow up the ecosystems presented in lectures.

The last two practices will be designated for collecting materials to prepare a seminar paper. Each of the students will select, or will be given, one of the ecosystems discussed (in a certain geographically determined variant), prepare its description in the form of a seminar paper with a focus on a concrete taxa of plants and animals that are typical of the given ecosystem.

Instructor: doc. Ing. Luboš Úradníček, CSc., Dept. of Forest Botany, Dendrology and Geobiocoenology

Language: English

Semester: S

Duration: 1 semester **Time-table:** lectures, exercises and practices –
56 hours

ECTS Credits: 6 **Prerequisite courses:** for non European students
Dendrology of European Forest Tree Species

Method of assessment: examination

Course title: Forest Management and Marketing

Objectives and contents:

1. Management. Holistic management. Functions of management.
2. Organizational structures. Business process management.
3. Individual management. Group management. Organizational management. Leadership.
4. Operational research.
5. Personnel management. Interpersonal communication.
6. Project management. Feasibility study.
7. Project valuation. Risk management. Project management software.
8. Quality management system. Environmental management system. Occupational health and safety management system.
9. EUROSTAT. Forestry statistics. Information systems.
10. Strategic marketing. Marketing mix. Marketing objectives.
11. Marketing Situation Analysis. BCG Model. GE model.
12. Pricing strategies. Balanced scorecard.
13. EU and global wood product markets, production specialization, aspects of globalization
14. Public Relations. Human Relations. Media relations.

Instructor: Ing. Kateřina Holušová, Ph.D. et Ph.D., Dept. of Forest and Wood Products Economics and Policy

Language: English

Semester: W

Duration: 1 semester **Time-table:** lectures, exercises and practices –
56 hours

ECTS Credits: 6 **Prerequisite courses:** -

Method of assessment: written and oral examination

Course title: Forest Pathology and Protection

Objectives and contents:

1. Stress ecology and teoretical background of Forest Pathology.
 - a. Stress ecology, forest decline
 - b. Wildlife management and game damages
 - c. Injury o tress and forest stands
2. Pest and harmful organisms in forestry
 - a. Background to forest entomology
 - b. Pests and control in conipherous stands
 - c. Pests and control in broadleaved stands
 - d. Main pest and harmful organisms in European forests
3. Diseases of trees
 - a. Diseases of roots, stems, shoots and foliage
 - b. Main diseases of conipherous trees
 - c. Main diseases of broadleaved tress
 - d. Main diseases in forest in Europe
 - e. Alien, invasive a quarantine diseases and pests, Phytosanitary regulations

Instructor: prof. Dr. Ing. Libor Jankovský, doc. Ing. Petr Čermák, Ph.D., doc. Ing. Otakar Holuša, Ph.D., Dept.of Forest Protection and Wildlife Management

Language: English

Semester: S

Duration: 1 semester

Time-table: lectures, exercises and practices –
56 hours

ECTS Credits: 6

Prerequisite courses: -

Method of assessment: examination

Course title: Forest Planning

Objectives and contents:

1. Forest management – its main goal, contents and history
 - 1.1 Classic forest management plan (conventional)
 - 1.2 Planning based on statistic inventory and control methods.
2. Methods of description and segmentation of forest ecosystems.
 - 2.1 Construction of management sets and forest development types.
3. Methods of volume assessment of whole stands I.
 - 3.1 Angle sampling method
4. Methods of volume assessment of whole stands II.
 - 4.1 Unified volume curves method
5. Scales of forest management planning (frame and detailed planning)
 - 5.1 Method of forest stands assessment
6. Temporal and spatial arrangement of the forest
 - 6.1 Forest maps
7. Sampling inventory method
8. Control method
9. Planning of fellings
10. Local volume equations
11. Classic control method
12. Method of frequency curves
13. Diameter class shift method
14. Czech national forest inventory

Instructor: Ing. Michal Kneifl, Ph.D., Dept. of Forest Management and Applied Geoinformatics

Language: English

Semester: W

Duration: 1 semester

Time-table: lectures, exercises and practices –
56 hours

ECTS Credits: 6

Prerequisite courses: -

Method of assessment: Student has to pass the final exam. All staff presented and diskussed during lectures and exercises is necessary for the exam.

Course title: Forest Technology

Objectives and contents: Structure of the basic types of machines used in forest management in the Czech Republic and around the world, especially in the EU countries Characteristics of machines for: preparation of soil, sowing, planting care of forest cultures and agricultural products during vegetation, cultivation of stands, logging and transportation of wood, wood storage, irrigation and drainage of areas.

Basic tools, machines and machine systems for manual, semi-mechanised, mechanised and highly mechanised works used in the Czech Republic and in the countries of Eastern Europe and their comparison with the situation in Scandinavia, Western Europe, the Alpine countries and in the Mediterranean, depending on the natural and economic conditions and on the size of properties (from large scale, to small scale).

Requirements for forest machines with a view to their impacts on the forest and natural environment, economic efficiency, work safety and hygiene and methods of resolving these requirements in the past, present and near future, including the specifics of certain regions in Europe as well as examples from select other parts of the world.

Furthermore, students will learn the principles of caring for these technologies and select mathematic models and methods used in designing these technologies and production lines, including their practical use in solving specific problems.

Instructor: doc. Ing. Radomír Klvač, Ph.D., Dept. of Forest nad Forest Products Technology

Language: English

Semester: W

Duration: 1 semester

Time-table: lectures, exercises and practices –

56 hours

ECTS Credits: 6

Prerequisite courses: -

Method of assessment: examination

Course title: Furniture & Design

Objectives and contents: The aim of this course is to teach students about furniture design with regard to its specific objects (chairs, tables, beds, upholstered furniture, cabinets, etc.), as well as furniture development and creation techniques from the product design viewpoint. Lectures will consist of these topics: Classification and characteristics of furniture objects; Process of furniture creation; Contemporary and historical furniture design development; Czech furniture industry and design; Current situation of the global furniture market; Furniture materials and technologies; Ecological viewpoints on furniture production and design; Furniture and human living culture.

A personal project will be focused on the student's own interest within the scope of the course. Student projects will be guided by a teacher and presented together by students at the end of the course.

Instructor: Ing. Milan Šimek, Ph.D., Dept. of Furniture, Design and Habitation

Language: English

Semester: W or S

Duration: 1 semester

Time-table: lectures - 40 hours, project preparation and excursions – 30 hours

ECTS Credits: 5

Prerequisite courses: -

Method of assessment: personal project + oral examination

Course title: Furniture and Interior Visualisations

Objectives and contents: The lessons offer an introduction to CAD visualization software. This will include how to work with 3D studio VIZ and 3D studio MAX via lecturing tutorials. Each lesson guides the students through the basic tasks of 3D modelling and visualization methods via operating with 3D basic primitives, introduction with main viewports and interface, mapping and textures modification, modelling and scene modifiers, setting scene lights and cameras to the proper rendering, and final customization. Lessons are mainly based on active interaction between the lecturer and the student in processing the relevant tasks. In their final work, students should demonstrate their abilities to design and construct simple visuals of interiors – such as a kitchen, living room or other space – and they must present their own 3D VIZ tutorials.

Instructor: Ing. Jiří Tauber, Ph.D., Dept. of Furniture, Design and Habitation

Language: English

Semester: W or S

Duration: 1 semester

ECTS Credits: 5

Method of assessment: test on PC

Time-table: lectures and practices –
40 hours, lab work - 20 hours

Prerequisite courses: -

Course title: Geobiocoenology

Objectives and contents: To gain an understanding of the composition, mutual relationships, processes, and classification of plants as a determining component of terrestrial ecosystems and to gain knowledge on the typological system and geobiocoenological method of differentiating vegetation. To obtain practical skills for describing and analysing the composition of a phytocenosis, including mapping, by means of a seminar paper.

Contents of the course:

1. Introduction. Importance, content, development and current trends in forest phytocoenology and geobiocoenology.
2. Methods of studying vegetation (test areas, mapping, analytic and synthetic features).
3. Interaction between vegetation and the environment (topography, climate, soil, water, fire, fauna, phytoindication).
4. Plant populations and communities.
5. Dynamics of vegetation (growth and distribution of plant populations, relationships between individual plants and plant populations, plant population strategies, succession, dynamics of a natural forest, stability and incidence of stress factors, principles and mechanisms of regeneration).
6. Distribution and development of vegetation (vegetation zoning and altitudinal zones and their variants, ranges, floral regions, floroelements, development of vegetation particularly in the postglacial period, human impact on vegetation).
7. Classification and ordination of vegetation (theory of forest type, systems of forest typology).
8. Geobiocoenological regionalisation (variants of altitudinal vegetation zones, natural forest areas).
9. Outline of the concept of economic sets of forest types, their uses.
10. Vegetation in a landscape from a geobiocoenologic perspective.

Key words:

Forest phytocoenology, phytocenosis, geobiocoenology, geobiocoenosis, forest type, geobiocoene, ecology of plants, forest typology, ecosystem, plant community, typology.

Instructor: doc. Dr. Ing. Jan Štykar, Dept. of Forest Botany, Dendrology and Geobiocoenology

Language: English

Semester: W

Duration: 1 semester

Time-table: lectures, exercises and practices –
30 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: examination

Course title: Geographical Information Systems

Objectives and contents:

Introduction to geoinformation technologies (GIT), principles of geoinformation systems (GIS), main GIS terminology; Geospatial data - location, attributes, spatial relations (topology), time, metadata; Spatial data models; Geospatial database (geodatabase) - terminology of geospatial information, input and output of data, data quality; Spatial operations - queries by location, queries by attribute, Boolean algebra, measurement - distances, areas and perimeters, buffering, Spatial overlays - raster overlays, vector overlays, influence of scale and level of detail; Spatial Decision Support - Multi-Criteria and Multi-Objective Evaluation - decision rules, constraints and factors; Map algebra and Cartographic modeling - transformation of attribute data, local, zonal, focal and global operations; Neighbourhood operations - contiguity analysis (filtering), connectivity analysis (spread functions - frictions) and network analysis; Digital terrain modelling - data models, interpolation methods, topographic calculations; Database systems - Relational and Object oriented database model, domains, structure, manipulation and integrity elements, Structured Query Language; Cartographic projections and coordinate systems - geodetic datum, reference surfaces, main global and local coordinate systems; Desktop GIS applications - commercial and free software; Web GIS applications - web mapping services (servers); Thematic applications of GIS - forestry, agriculture and landscape application; GIS worldwide - main trends and legislation in EU (mobile GIS, augmented reality, cloud computing).

Instructor: doc. Ing. Martin Klimánek, Ph.D., Ing. Petr Vahalík, Ph.D., Dept. of Forest Management and Applied Geoinformatics

Language: English

Semester: W

Duration: 1 semester **Time-table:** Theoretical lectures and practical exercises – 56 hours
ECTS Credits: 6 **Prerequisite courses:** -
Method of assessment: exercise practical exam and examination (test and written examination).

Course title: Global Forestry

Objectives and contents:

Forestry sector, making it challenging to find a global solution. Lessons provided by many foreign lecturers.

Instructor: Dr. Ing. et Ing. Miroslav Kravka, Dept. of Landscape Management

Language: English

Semester: W

Duration: 1 semester **Time-table:** lectures and practices –
40 hours, preparation of the project - 50 hours

ECTS Credits: 3 **Prerequisite courses:** -

Method of assessment: project, oral examination

Naformátováno: Normální1, Doleva

Naformátováno: Písmo: Tučné

Course title: Introduction to Engineering Computing

Objectives and contents: Students will be introduced to computer aided engineering (CAE) using the finite element method (FEM) and with the help of ANSYS software. The course consists of the topics: CAE applications, methods and tools; FEM theoretical background; general concepts of model analyses; ANSYS environment; analysis pre-processing, solution and post-processing; building or import of geometry; building of finite element models; material models, modelling of basic mechanical and thermal problems based on tutorials. Students will choose their own project topics and work will be led by a teacher.

Instructor: Ing. Jan Tippner, Ph.D., Ing. Václav Sebera, Ph.D., Dept. of Wood Science

Language: English

Semester: W or S

Duration: 1 semester **Time-table:** lectures and practices –
40 hours, preparation of the project - 50 hours

ECTS Credits: 5 **Prerequisite courses:** -

Method of assessment: project, oral examination

Course title: Landscape Ecology

Objectives and contents: The objective of teaching landscape ecology is to familiarise students with the theoretical foundations and methodological procedures of modern landscape ecology in an integrated holistic approach as a science studying the structure of the landscape and patterns of ecological processes in the landscape. The contents of the course will be adapted to the needs for applying the results of landscape ecology in the geobiocoenological approach within landscape planning and landscape maintenance. Instruction will focus on the geobiocoenological approach to studying the landscape, on creating supporting materials for designing an ecological network within a landscape, and on landscape maintenance leading to sustainable use. Students should learn and understand the basic patterns in ecological processes and the relationship of natural and socio-economic components in a cultural landscape. They will be taught the principles of bioindication and the methodological procedure of biogeographical differentiation of the landscape in the geobiocoenological approach, including examples of applications under the conditions of various landscapes. The instruction will aim to ensure that students are able to apply the differentiation of landscape as a basis for landscape planning and leading to sustainable use of the cultural landscape.

Contents of the course:

1. Definition of landscape, natural and cultural landscape
2. Landscape ecology, its origin, development, importance and current trends, schools of landscape ecology
3. Geobiocene type theory and geobiocoenological concepts of landscape differentiation
4. Differentiation of the current status of the landscape, mapping of biotopes and the landscape
5. Categorisation of geobiocenoses according to intensity of anthropogenic effects and degree of ecological stability
6. Homogeneity and heterogeneity of the landscape, individual and typological classification of landscapes
7. Landscape structure (matrices, patches, corridors, network characteristics in landscape, island biogeography theory.)

8. Landscape dynamics (ecological stability of landscape, homeostasis, homeorhesis, ecological stress in a landscape, succession of ecosystems and landscape development, transformations of central European landscape due to human influence)

9. Geoecological prognoses

10. Ecological landscape network (ecologically important segments in the landscape, classification according to biogeographical importance, defining the framework of ecological stability, designing territorial systems of ecological stability, current situation in designing, implementing and care for the structural components of the Territorial System of Ecological Stability, European Ecological Network)

11. Examples of the application of geobiocoenology and landscape ecology (protection of landscape character, assessment of environmental impacts, optimisation of landscape use, landscape planning, sustainable use of landscape)

Practices will be conducted in a combined format including field and laboratory work with subsequent processing of results. Each student will prepare a seminar paper on the landscape-ecological characteristics of a selected territory.

Instructor: Ing. Antonín Kusbach, Ph.D., Dept. of Forest Botany, Dendrology and Geobiocoenology

Language: English

Semester: S

Duration: 1 semester

Time-table: lectures, exercises and practices –
30 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: approved exercises, seminars, project work

Course title: Landscape Planning and Regional Development

Objectives and contents: To acquaint students with methods, procedures and legislative framework for planning in the landscape. Students gain basic information about contemporary trends in urban planning in the European and global context. Practical examples are presented to explain the procedures for handling various types of planning documents.

1. Landscape - categories, concept, content, taxonomy, classification, structure, standardization, classification of countries according to natural factors and cultural development of the country

2. Landscape-makers - the genesis, typing, processes, efficiency. Landscape elements - abiotic, biotic, anthropogenic, landscape as a self-regulatory system, landscape impacts, input-output linkages, balance of land

3. Cultural landscape - level of anthropization, anthropogenic influences, cultural landscape, types of conflicts, use

4. Methods of landscape analysis, landscape assessment and landscape planning (level) - topical, choric, regional

5. Types of landscape planning - spatial, landscape, territorial, environmental, regional development plan

6. Landscape planning - goals, objectives, importance, development paradigms, organic synthesis of landscape, landscape synthesis method

7. International relations in landscape planning

8. Sustainable development strategy - concept, design, resources, strategic planning and forecasting

9. Regional planning - legislation, objectives, tasks, planning information, members of the public, municipalities, assessment of the impact on sustainable development in the area

10. Planning tools - planning documents (planning analytical materials, geographical study), spatial development policy, planning documents (the principle of territorial development, land-use plan, control plan), zoning

11. Planning, special planning authorities, links to EIA, regional approval, built-up areas, territorial arrangements, arrangement of relations within a territory, right of first refusal and compensation

12. Landscape Projects and Programs - revitalization programs, restoration, landscape, etc.

Instructor: Ing. Jitka Fialová, MSc., Ph.D., Dept. of Landscape Management

Language: English

Semester: S

Duration: 1 semester

Time-table: lectures and practices –
40 hours, lab work - 20 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: seminar work, written/oral examination

Course title: Landscape Recreology

Objectives and contents: Recreation as the social phenomenon, classification of recreation and activities realized in the countryside; Tourist trade as the form of recreation, social significance. Tourist trade zoning of the Czech Republic. The methods of analyzation of tourist trade. SWOT analysis; Positive and negative impact of landscape elements to the human. Ionization of the air, ozone, phytoncid acids, terpenes, volatile oil. Allergy and *allergic* vegetation; Impact of recreation to the environment – positive and negative; Recreational stress of the landscape, capacities, acceptable impacts, recreational potential, recreational effect; Biological, technical and biotechnical treatments of landscape for recreational and therapeutic utilization. Tourist lanes, nature trails, hipo trails, bicycle lanes, child playgrounds, golf courses, ski slopes, cross-country skiing lanes, accessing of landscape for handicapped people. Protective and correctional measures against the recreational damages; Control of recreational activities, legislature, organizations in the tourist trade and recreation; EU and national funding.

Instructor: Ing. Jitka Fialová, MSc., Ph.D., Dept. of Landscape Management

Language: English

Semester: W

Duration: 1 semester

Time-table: lectures and practices –
40 hours, lab work - 20 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: seminar work, written/oral examination

Course title: Log Yards and Sawmilling

Objectives and contents:

Sources of timber, state of forest supplies, quantity and assortments.

Sawmill log yards. Reception, storage and protection of round timber. Measuring, cross cutting, debarking, butt end reduction, metal detection, sorting of logs. Aims, methods and technological principles of performing particular operations. Machines, equipment and transport vehicles. Solutions and layout of log yards – manual performing of the operations, all round cars, cross cutting and sorting lines. Relations among volume and type of production, machines and technological equipment of sawmills. Organization of production.

Supply and transport of logs to the sawmill. Preparation of logs before sawing. Variability of operations between log yards and pre-sawing. Technological solutions and layout of pre-sawing with regard to volume and range of production and technical equipment of the sawmills.

Sawing of logs. Sawing methods, properties and suitability for use. Yield of sawn timber, sawing diagrams – their construction and levels of yield. Influence of quality of raw materials, technological equipment and discipline on the yield.

Equipment of the sawmills. Frame, band and circular saws, chip canners, aggregates. Machine construction, technical parameters, properties, advantages and disadvantages, suitability for use. Cross cutting and edging of sawn timber – aims and carrying out the operations. Types of saws, properties suitability for use.

Technological layout of sawmills. Selection and sequencing of the operations. Layout of sawmills with various level of mechanization and automation and the range and volume of production. Technological relationships, impacts on the yield, quality and assortment of production.

Waste material – types and volume of the sawmill waste, usability, ways of preparing of the waste for subsequent usage. Types and properties of chip cutters, grinders, sorters. Storage of sawmill waste.

Sawmill products - types, dimensions and quality classes of sawn timber.

Finishing of sawn timber - measuring, quality assessing, trimming, sorting, packaging and banding of sawn timber. Sorters of sawn timber. Finishing lines – types, realized operations and their carrying out. Properties of finishing lines and impact on the production.

Sawn timber yards. Aim and methods of storage of sawn timber. Layouts and organization of the sawn timber yard depending on mechanization equipment employed (side and front lift trucks, cranes). Organization of production, documents.

Instructor: doc. Ing. Karel Janák, CSc., Dept. of Wood Processing

Language: English

Semester: W or S

Duration: 1 semester

Time-table: lectures and practical exercises –
30 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: examination

Course title: Logging and Transport of Timber in European Forests

Objectives and contents:

1. Introduction to the course. Characteristics of the Czech forestry.

2. Wood defects.
3. Wood assortments
4. Timber record
5. Timber felling
6. Skidding with drought animal
7. Tractor skidding
8. Cableways
9. Cableways
10. Others ways of skidding
11. Harvesting systems
12. Elimination of forest environment damage caused by logging of timber.
13. Timber transport

Instructor: Ing. et Ing. Jiří Kadlec, Ph.D., Dept. of Forest and Forest Products Technology

Language: English

Semester: W

Duration: 1 semester **Time-table:** Theoretical lectures and practical exercises.– 56 hours

ECTS Credits: 6

Prerequisite courses: -

Method of assessment: examination

Course title: Mathematics

Objectives and contents: The Mathematics course covers linear algebra (vectors, matrices and determinants, systems of the linear equations), basic numerical methods for algebraic equations, calculus (limits, derivatives with applications) and integral calculus (antiderivative, Riemann integral with applications) and simple differential equations (with separated variables).

Instructor: doc. Mgr. Robert Mařík, Ph.D., Dept. of Mathematics

Language: English

Semester: W or S

Duration: 1 semester

Time-table: lectures and practices – 40 hours

ECTS Credits: 5

Prerequisite courses: -

Method of assessment: written exam

Course title: Multifunctional Forestry

Objectives and contents: The goal of the course is to familiarise students with the principles of multifunctional forestry including: (a) the biological and biotechnical principles of multifunctional forestry (growth dynamics of harvested trees, possibilities to influence them, their use in harvesting practice), (b) the biological, biotechnical and technical measures used in multifunctional forestry, and (c) the effects of multifunctional forestry on the economy and society as a whole. Instruction format: (1) theoretical instruction as practised in the Czech Republic (and, in a broader context, in the EU) and (2) practical demonstrations directly in the field (Training Forest Enterprise of MENDELU in Křtiny)

Instruction schedule (system: block-module-topic)

Block 1: Biological and biotechnical principles of multifunctional forestry

Module 1: Main biotic components Topic 1: Soil, water T2: Radiation, meteo-climate

Module 2: Biometrics T1: Dynamics of specimens T2: Dynamics of the underbrush

Module 3: Structures of landscape components T1: Role of the forest in the landscape T2: Forest functions T3: Landscape planning

Block 2: Biological, biotechnical and technical measures used in multifunctional forestry

M1: Soil care T1: Biological measures T2: Biotechnical measures T3: Technical measures

M2: Care of water sources T1: Biological measures T2: Biotechnical measures T3: Technical measures

M3: Care of wood production T1: Biological measures T2: Biotechnical measures T3: Technical measures

M4: Care of social effects T1: Biological measures T2: Biotechnical measures T3: Technical measures

Block 3: The effects of multifunctional forestry on the economy and society as a whole

M1: Economic effectiveness of MF T1: Evaluation of functions T2: Applications of forest functions evaluation

M2: Financial support of MF T1: Forms of subsidising T2: Comparison of models

Instructor: doc. Ing. Petr Kupec, Ph.D., Dept of Landscape Formation and Protection

Language: English

Semester: S

Duration: 1 semester **Time-table:** lectures, exercises and practices – 56 hours
ECTS Credits: 6 **Prerequisite courses:** -
Method of assessment: examination

Course title: Natural Conservation

Objectives and contents: Definition and description of nature conservation. Ethical principles and motives of nature conservation. Development of nature conservation in Europe and around the world. Biodiversity and its imperilment. Extinction of species and causes of extinction today. Other causes of environmental disturbance. Global market and organization. Exploitation of raw materials, forestry, agriculture, urbanization. Air, water and soil pollution. Global climate changes. Protection of species and populations. Legal protection of species in Europe and related international agreements. Ex-situ conservation. Territorial nature conservation. International categories of protected areas. Territorial protection under IUCN and in other countries. International networks of protected areas. Plans for care of protected areas. General nature conservation. Biological evaluation, EIA, SEA, landscape character. Public access to information. Non-governmental non-profit organizations and associations.

Instructor: Ing. Petr Jelinek, Ph.D., Dept. of Forest Botany, Dendrology and Geobiocoenology

Language: English

Semester: S

Duration: 1 semester **Time-table:** lectures, exercises and practices – 30 hours

ECTS Credits: 4 **Prerequisite courses:** -

Method of assessment: examination

Course title: Non-wood Forest Products

Objectives and contents: The aim of the subject is to obtain basic knowledge of the activities associated with non-wood forest products which are important for economic evaluation of utilization of non-wood forest products. This subject inspires for deeper learning about subsequent use of such products.

1. Non-wood forest products - introduction.
2. Forest fruits.
3. Mushrooms.
4. Medicinal plants.
5. Animal products.
6. Sap tapping.
7. Resin tapping.
8. Vitamin powder. Chlorophyll compound. Essential oils. Tan bark harvesting.
9. Use branches, logging residues and bark.
10. Charcoal production.
11. Willow wicker.

Instructor: Ing. et Ing. Jiří Kadlec, Ph.D., Dept. of Forest and Forest Products Technology

Language: English

Semester: S

Duration: 1 semester **Time-table:** Theoretical lectures and practical exercises.– 30 hours

ECTS Credits: 4 **Prerequisite courses:** -

Method of assessment: personal project

Course title: Pathology of Woody Plants, Diseases of Trees

Objectives and contents: The conception of diseases. Resistance, predisposition, tolerance, immunity. Symptoms, habit diagnostic and aetiology of disorders - the macroscopic appearances, dis-

coloration, branching etc. Biological agents of diseases - viruses, bacteria, fungi, vascular plants, nematodes, insects, other pests etc. Methodology of pest identification on amenity trees and shrubs - symptoms of disease, sign of pathogen, identification using immunofluorescence, isoenzymes, molecular biology, etc. Wood decay, white rot, brown rot, blue-staining fungi, endophytic fungi. Wood decay, pathogen of vascular tissues fungi - symptoms, agents, host and control. Diseases of leaves and needles: rust, blight etc. - symptoms, agents, host and control. Diseases of broadleaved trees - root and butt rots and their influence on stability of trees, rot of stems, branches and twigs, diseases of leaves, vascular diseases. Diseases of coniferous species - the root and butt rots, rots of stems, vascular diseases. Disease of seedlings and young plants, plant protection in nurseries and public gardens. The epidemiology and quarantine pest. Distribution of main diseases of woody plants. Phytosanitary service and plant protection organisations. Biodiversity of wood destroying fungi under context of stability of forests ecosystems, conservation of wood inhabiting organisms. Economic impact of diseases of woody plants.

Instructor: prof. Dr. Ing. Libor Jankovský, Dept. of Forest Protection and Wildlife Management

Language: English

Semester: W

Duration: 1 semester

Time-table: lectures and practices –
40 hours, lab work - 20 hours

ECTS Credits: 5

Prerequisite courses: -

Method of assessment: practical and oral examination

Course title: Physical and Mechanical Properties of Wood

Objectives and contents: The objective of the course is applied and theoretical instruction focused on the following groups of topics:

- water in wood, moisture content of wood and its absorptivity, absorption theory, thermodynamics
- water displacement in wood, types of diffusion of liquids, permeability of cell walls, capillary phenomena
- density of wood and its porosity
- changes in the volume and shape parameters of wooden products in relation to changes in moisture content
- heat and wood: heat transfer in wood, heat conductivity, heat convection in wood
- electromagnetic and acoustic properties of wood
- resistance of wood and wood products
- tensile and compressive stress

The variability of particular parts of the piece of wood will be emphasised within the listed topics, focusing especially on the variability of the physical properties of the wood, wood defects, and demonstrations of laws governing cracking and Hooke's law in woodwork. With respect to the profile of a graduate of the given study programme, attention will also be dedicated to the application of the elasticity theory into ecosystem stress theory, which is also used in the context of European forestry.

The overview in the final part of the semester will be focused on a comprehensive conception of the dynamic properties of wood, on the technological properties of wood, on the methods of determining the basic mechanical properties of wood applicable in practice, as well as on the principles of the theory of tree biomechanics also used in biologically oriented subjects of this study programme.

Instructor: prof. Dr. Ing. Petr Horáček, Ing. Václav Sebera Ph.D. , Ing. Jan Tippner Ph.D. and Ing. Eva Troppová, Dept of Wood Science

Language: English

Semester: W

Duration: 1 semester

Time-table: lectures, exercises and practices –
30 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: examination

Course title: Plant Biology

Objectives and contents: Prokaryotic and eukaryotic cells. Structural characteristics of plant cells: cell walls, plastids, mitochondria, the endomembrane system and cytoskeleton. Compartmental rules, importance of membranes for compartmentation. Primary and secondary meristems, cell division and differentiation. Types of plant cells and tissues. Simple and complex tissues. Tissue systems: meristems, epidermis, water conducting and ground tissues, their structure and functions.

Primary tissues of roots. Primary growth of roots, root tips and root caps. Pericycle and production of lateral roots. Root hairs. Primary tissues of stems, primary growth of stems. Plumule structure. Anatomy of the leaf. Secondary growth: lateral meristems, cambium, phellogen. Secondary stem tissues, secondary xylem and phloem. Transport of water, salts and gases in plants, flux control. Physiological approaches to the study of metabolic processes in plants. Mineral nutrition of plants, intake and use of

individual nutrients. Growth processes in plants, phytohormones, external factors affecting growth. Stress physiology: general and specific responses to stress factors.

Instructor: doc. Ing. Roman Gebauer, Ph.D., Dept. of Forest Botany, Dendrology and Geobiocoenology

Language: English

Semester: W

Duration: 1 semester **Time-table:** lectures, exercises and practices – 30 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: examination

Course title: Public Relations in Forestry

Objectives and contents:

The Public Relations course forms an umbrella for economical disciplines from the field of economics and management. Application of instruments and methods of public relations (PR) is becoming increasingly important. From the economy through public and state administration to the environment of political parties, NGOs, civic movements and initiatives, the practical application of knowledge of the PR becomes a competitive advantage very frequently. The important tasks of PR include understanding, comprehension and targeted effort to establish mutual trust between institutions and organisations on the one hand, and various public groups on the other. The importance of this course is also the possibility of acquisition and ownership of the habits and practices of PR, which can be used in practice and in everyday life.

Course contents:

1. Introduction - What is Public Relations? (Definition; Meaning / Substance; What is PR and is not PR?) and What is a Forestry – some details for successful finishing of this subject
2. Forestry – Historical development of Forestry: A case from middle Europe
3. A Brief history of Public Relations, Presence and Future
4. Theory, ethics and professionalism in the Public Relations (Organisation, Cooperation, Remuneration)
5. The survey, measurement and evaluation activities, which are important for the purpose of PR Public Relations
6. Planning and implementation of the Public Relations Processes
7. Conflict management & Technologies in the Public Relations
8. Forests and Natural Conditions (Biogeography, Tree Species)
9. International cooperation in solution of environmental problems - Forestry organizations (Significant Problems in Forestry)
10. Forests products in Forest Based Sector – non-wood products and wood products
11. Function of Forests Ecosystems and its evaluations.

Instructor: Ing. Kateřina Holušová, Ph.D. et Ph.D., Dept. of Forest and Wood Products Economics and Policy

Language: English

Semester: W

Duration: 1 semester **Time-table:** lectures, exercises and practices – 30 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: PR project work, written and oral examination

Course title: Remote Sensing

Objectives and contents: The course provides information on the most important technologies of acquiring and processing remotely sensed data and on possible applications of results for landscape and forest monitoring.

Introduction to geoinformation technologies (GIT); principles of geoinformation systems (GIS) and remote sensing (RS). RS and its 7 elements. Electromagnetic radiation.

Data types - aerial photography x satellite imagery. RS data characteristics, color systems, color composites. Interaction of radiation with atmosphere and objects. Data recording. Satellites and sensors. Data transmission and storing. Data processing methods - image enhancement, visual interpretation, digital analysis and interpretation. Applications – topographic mapping, land cover and land use mapping, forestry, agriculture, hydrology.

Instructor: Ing. Lucie Zejdová, Ph.D., Ing. Petr Vahalík, Ph.D., Dept. of Forest Management and Applied Geoinformatics

Language: English

Semester: S

Duration: 1 semester

Time-table: lectures and practices –
40 hours, lab work - 20 hours

ECTS Credits: 5

Prerequisite courses: -

Method of assessment: written and oral examination

Course title: Risks and Benefits of Genetic Modified Organisms

Objectives and contents: Genetic modified organisms (GMO) as a hot topic is connected with a lot of emotions. The aim of the course is to provide an information not only about benefits and risks of GMO, but also introduce students techniques used in creation of GMO. In the practical part students will have an opportunity to create their own GMO.

1. Introduction to problematic of genetic modified organisms
 - a. What is GMO and regulation in Czech Republic by laws
 - b. Benefits of genetic engineering
 - c. Risks associated with genetic engineering
 - d. The practical application where GMO is used
2. Techniques used for genetic manipulations
3. Practical genetic manipulation - seminar in laboratory
 - a. Introduction to laboratory work
 - b. Vector production
 - c. Transformation and creation of own GMO
4. Detection of GMO in food and in open nature.

Instructor: Dr. Ing. Jaroslav Mráček, Dept. of Forest Bot., Dendrology and Geobiocoenology

Language: English

Semester: W, S

Duration: 1 semester

Time-table: lectures and practices –
28 hours, lab work – 14 hours

ECTS Credits: 5

Prerequisite courses: -

Method of assessment: written or oral exam

Course title: Silviculture

Objectives and contents: The theory and practice of controlling the establishment, composition, and growth of stands of trees for any of the goods (including timber, pulp, energy, fruits, and fodder) and benefits (water, wildlife habitat, microclimate amelioration, and carbon sequestration) that they may be called upon to produce.

This course will cover the principles for establishing, tending, and regenerating stands in the context of various ecological, economic, and social considerations. Students will develop a broad understanding of the silvicultural concepts and applications needed to manage forest stands for a variety of commodity and non-commodity values. Some of the values to be addressed in this course include timber production, wildlife habitat, water quality, recreation, forest health, and ecosystem restoration.

Instructor: doc. Ing. Radek Pokorný, Ph.D., Department of Silviculture

Language: English

Semester: S

Duration: 1 semester **Time-table:** theoretical lectures and practical exercises – 56 hours

ECTS Credits: 6

Prerequisite courses: -

Method of assessment: written and oral examination, project work

Course title: Soil Biology

Objectives and contents: Soil environment. Properties of soil and vegetation. Soil forming processes in relation to soil organisms.

Organic matter in forest soils, life in forest soil. Properties of soil organic matter and factors influencing its decomposition. Humification. Humus and the fertility of forest soils. Plants as indicators of soil conditions. Soil-protection functions of forest stands.

Soil biota, its composition, functional groups. Europe-wide overview, Mediterranean, boreal, temperate communities.

Life in the soil and nutrient circulation, basic macro- and micro-biogenous elements. Relation of soil biology to uptake of nutrients by forest woody species and their available forms in forest soils. Nitrogen, phosphorus, sulphur. Potassium, calcium, magnesium. Contamination and disturbance of soils and soil biota.

Instructor: prof. Ing. Klement Rejšek, CSc., doc. Ing. Valerie Vranová, Ph.D. Dept. of Geology and Soil Sciences

Language: English

Semester: S

Duration: 1 semester **Time-table:** lectures, exercises and practices – 30 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: examination

Course title: Soil Science

Objectives and contents: Soil-forming substrates of forest soils in the Czech Republic, soil forming substrates of forest soils in Europe.

Forest soil, monitoring of current status/dynamics of the development of soil properties. Paedogenesis. Soil forming factors.

Soil as a four-phase system: firm soil fraction, soil solution, soil gases, soil biota.

Physical properties of forest soils, soil texture and soil type. Soil porosity. Formation of soil structure. Soil aeration. Water in forest soil. Physio-chemical soil properties, soil reaction, soil absorption, redox potential (oxidation-reduction response in soil). Soil buffering and its zoning under conditions of forest stands (Ulrich, 1983). Soil colloids. Exchange of cations and anions. Adsorption of ions.

Function of forest soil in society. Nutrition and fertilisation of forest soils. Soil science aspects of forest nursery management. Composting. Assessing fertilisation needs. Fertilisers and fertilising materials, secondary impacts of the application of pesticides in forestry.

Soil fertility. Pollution and large-area liming. Erosion. Acidification of forest soils.

Soil profile and its development. Differentiation of soil processes: general, partial and basic. Importance of browning, podsolisation, leaching, gleying/pseudo-gleying process and humification in forest soil stock of the Czech Republic and Europe, specific characteristics of Mediterranean, temperate, boreal and mountain forests.

Diagnostic horizons of forest soils and their significance. Taxonomy of forest soils. FAO/ISSS, Soil Taxonomy, important international classifications and typologies. Current approach to forest soil classification in the Czech Republic, in Europe and around the world.

Main soil types and subtypes of forest soils in the Czech Republic and Europe. Status and development of forest soil stock in the Czech Republic and Europe.

Instructor: prof. Ing. Klement Rejšek, CSc., doc. Ing. Valerie Vranová, Ph.D. Dept. of Geology and Soil Sciences

Language: English

Semester: W

Duration: 1 semester **Time-table:** lectures, exercises and practices – 30 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: examination

Course title: Statistical Analysis in Ecology Using R

Objectives and contents: The objective of the course is to introduce students to procedures of data analysis used in ecology. The course focuses on practical examples of ecological case studies. The R statistical environment will be used and the basic theory will be explained.

Content:

- 1) Introduction to R statistical environment
- 2) Sampling design and pseudoreplication issue
- 3) Linear models
- 4) Generalized linear models
- 5) Non-linear regression
- 6) Mixed effect models

Instructor: Ing. Daniel Volařík, Ph.D., Dept. of Forest Botany, Dendrology and Geobiocoenology, M.Sc. Juliette Chamagne, Institute of Evolutionary Biology and Environmental Studies

Language: English

Semester: W

Duration: intensive one week course

ECTS Credits: 3

Method of assessment: approved exercises

Time-table: lectures and exercises – 25 hours

Prerequisite courses: -

Course title: Surveying and Land Records

Objectives and contents: Basic concepts of Surveying. Shape and dimensions of the Earth and their effect on geodetic operations. An overview of cartographic projections. Maps and their scales, sorts of maps, topographic and thematic maps, forest maps and their preparation. Geodetic points, fields, networks. Methods of horizontal and vertical survey. Tools and instruments used for surveying, including electronic devices. Coordinate systems and calculations of point coordinates of in large-scaled surveys. Creating of contours. Compass surveying and its use in forestry. Calculations of areas and volumes. Field operations planning. GPS measurements and processing. Preparation of cartographic and planning background materials for landscape engineering constructions – surveys for land regulation, line constructions, torrent training, water reservoirs; lay-out methods for buildings. Historical development of land records, present real estate cadastre, land registers, map and documentary materials, legislation concerning legal relations to real estate. Computer processing of geodetic data and information.

Instructor: Ing. Tomáš Mikita, Ph.D., Dept. of Forest Management and Applied Geoinformatics

Language: English

Semester: S

Duration: 1 semester **Time-table:** theoretical lectures and practical exercises – 42 hours

ECTS Credits: 5

Prerequisite courses: -

Method of assessment: written and oral examination

Course title: Urban Forestry

Objectives and contents: The course aims on the upcoming Urban Forestry concept in Europe and especially in the Czech Republic. Students will get information on UF practices, management and planning, that differs from recent practices.

1. Urban Forestry concept in Europe and USA, History of urban forestry
2. Tree benefits and negatives
3. UF - Policy and planning in CZ and Europe
4. Research and education in UF
5. Practical Urban Forestry
 - a. Management and planning of UF
 - b. Arboricultural practices
 - c. Tree assessment

Instructor: Ing. Luděk Praus, Ph.D., Dept. of Wood Science

Language: English

Semester: W

Duration: 1 semester

Time-table: three blocks per 8 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: test

Course title: Utility Plants of the Subtropics and Tropics

Objectives and contents: The objective of the course is to present the current state of knowledge in the area of non-timber forest products (NTFP), or non-wood-forest-products (NWFP), which have not only great importance in the history and tradition of trade but also great potential for improving the economic situation of rural areas in tropical countries in the case of improved marketing (as with Fair Trade, for example). The content of the course results from the intention to inform students of similar characteristics of selected plants in terms of the properties of their species, importance in cultivation, and processing of products in main utility groups.

Lectures

Introduction – History of the relationship between humans and useful plants, The concept of usefulness, Usefulness of tropical plant species in an economic and global context

Plants as food – Fruit trees of the tropics and subtropics, Selected species of tropical vegetables,

Plants with a specific culinary use, Cereals, Starchy plants, Sugar-bearing plants, Oil-bearing plants,

Plants used as spices.

Plants with psychoactive effects, Species affecting the psyche, Medicinal plants

Industrial plants – Selected plants providing dyes and tannins, Textile and wax-bearing plants, Plants containing resin, rubber and increased proportion of essential oils

Ornamental plant species

Practices: Practical demonstrations of 3-D botanical collection exhibits, slides, greenhouse practice during practices. Work on a seminar paper on a selected topic or preparation of a case study corresponding to the student's landscape of origin or geographical area of his or her professional interest. Main practical with a topic-specific trip to greenhouses with botanical collections.

Instructor: doc. Dr. Ing. Jindřich Pavliš, prof. Ing. Jaroslav Koblížek, CSc., Ing. Petr Němec, Dept. of Forest Botany, Dendrology and Geobiocoenology

Language: English

Semester: S

Duration: 1 semester

Time-table: lectures, exercises and practices –
30 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: approved exercises, seminars, laboratory work, project work, written/oral examination

Course title: Water Management and Water Quality Policy

Objectives and contents: Objective and contents: Water management in the Czech Republic – total precipitation amount, runoff, floods. Hydrological balance. Quality of surface water and groundwater: evaluation of surface water quality monitoring, sources of pollution – point pollution sources and area pollution.

Instructor: Dr. Miroslav Kravka, Dept. of Landscape Management

Language: English

Semester: W

Duration: 1 semester

Time-table: lectures and seminars –
40 hours

ECTS Credits: 5

Prerequisite courses: -

Method of assessment: written/oral examination

Course title: Wood Anatomy

Objectives and contents: Wood Anatomy familiarises students with the structure of wood on a macroscopic, microscopic and submicroscopic levels. It also deals with the chemical composition of wood and description of the processes of creating wood.

On the macroscopic level, features of the macroscopic structure of wood are defined for basic cuts of wood. The types of wood are divided into groups on the basis of individual features. On the microscopic level, the basic anatomical elements comprising wood of coniferous and deciduous trees are described. Individual types of wood are divided into groups based on features of the microscopic structure of the wood. Within the submicroscopic structure of wood, individual layers of the woody cell wall of the wood's different anatomic elements are described.

Theoretical knowledge includes command of practical identification of wood types on the basis of macroscopic and microscopic features. Practical identification focuses on economically important trees growing in the European area.

Instructor: doc. Ing. Hanuš Vavrčík, Ph.D., doc. Ing. Vladimír Gryc, Ph.D., Dept. of Wood Science

Language: English

Semester: W

Duration: 1 semester

Time-table: lectures, exercises and practices –
30 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: examination

Course title: Wood Modification

Objectives and contents: The objective of the course is to make the students familiar with existing discrepancies in availability and demand of wood quantity as well as in native wood properties and demanded technical requests. The main problem in utilization of lot of wood species and assortments is low quality of wood, which is often not suitable for higher value demands.

Wood modification can help to improve these insufficient wood properties. Traditional wood protection, processed by impregnation of wood with biocides, is mainly limited on increase of durability of wood, reducing or preventing the wood deterioration activity of wood decaying fungi or insects. Effectiveness of inserted biocides with typically toxic components is mainly limited on decay restriction, fur-

ther improvements of additional wood properties are not possible or possible only in a minor degree, because relevant structure of wood is widely unchanged by this process. In contrast to this wood modification, which works on the basic of structure changes of wood components, influences a lot of wood properties, like moisture behavior (humidity uptake, swelling/ shrinkage), physical and elasto-mechanical properties as well as durability.

In addition the mainly toxic-free composition of wood modification agents leads to environmental friendly process conditions and non-complex admission requirements. Furthermore not only toxic-free, but additionally sustainable and renewable production and application processes, using native solutions from plant growing components have been developed by Mendelu wood research group. Students will be educated in theoretical background of native and technical improved wood quality as well as in techniques of wood impregnation with semi-practical autoclave plant in Department Technology Center Utechov. Additional tests, using quality and quantity evaluations, are introduced to prove success of treatments.

Instructor: Dr. Peter Rademacher, Ing. Petr Čermák, Ph.D., Ing. Petr Pařil, Dept. of Wood Science

Language: English

Semester: W

Duration: 1 semester

Time-table: lectures, exercises and practices –
40 hours

ECTS Credits: 4

Prerequisite courses: -

Method of assessment: laboratory work, examination